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Cooperative Learning or Group Work in Initial Teacher Education: Impact on Future Teachers' Perceptions

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ABSTRACT

Cooperative Learning (CL) is a pedagogical model that promotes positive interdependence and active learning. However, in higher education, conceptual confusion persists, as group work is often mistakenly equated with CL. This study had two aims: (1) to analyse differences in CL perceptions among third-year students enrolled in Early Childhood Education and Primary Education degrees with a specialisation in Physical Education, and (2) to evaluate the effects of a structured CL model versus a group work

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approach on these perceptions. A total of 121 students participated: GTGEI (n = 54), who followed a course based on group work without a CL structure, and GACEF (n = 67), who followed a structured CL model. At pretest, GTGEI showed higher perceptions in 5 of 7 dimensions. After the intervention, GACEF improved significantly in 6 dimensions, whereas GTGEI showed no improvement and even declined in several areas. The findings indicate that systematic implementation of CL enhances both students' perceptions and teaching competence, whereas unstructured group dynamics may be ineffective or even counterproductive.

Keywords: Active methodology, cooperative learning, inclusive education, initial teacher education, pedagogical model.

Aprendizaje cooperativo o trabajo en grupo en la formación inicial del profesorado: impacto en las percepciones de los futuros docentes

RESUMEN

El aprendizaje cooperativo (AC) es un modelo pedagógico que promueve la interdependencia positiva y el aprendizaje activo. Sin embargo, en educación superior persiste confusión conceptual, ya que el trabajo en grupo suele equipararse erróneamente con el AC. Este estudio tuvo dos objetivos: (1) analizar las diferencias en la percepción del AC en estudiantes de tercer curso de los grados de Educación Infantil y Educación Primaria con mención en Educación Física, y (2) evaluar los efectos de un modelo estructurado de AC frente a una metodología basada en trabajo en grupo sobre dicha percepción. Participaron 121 estudiantes: GTGEI (n = 54), con trabajo en grupo sin estructura de AC, y GACEF (n = 67), con AC estructurado. En el pretest, GTGEI mostró mayores percepciones en 5 de 7 dimensiones. Tras la intervención, GACEF mejoró significativamente en 6 dimensiones, mientras GTGEI no mostró mejoras e incluso descendió en varias. Los resultados evidencian que la implementación sistemática del AC mejora la percepción y la competencia docente, mientras que las dinámicas no estructuradas pueden ser ineficaces o contraproducentes.

Palabras clave: Aprendizaje cooperativo, enseñanza inclusiva, formación inicial del profesorado, metodología activa, modelo pedagógico.

1. Introduction

Cooperative learning (CL) is a pedagogical model in which students learn with, from, and through their peers, within a teaching-learning framework where both the teacher and students take on an active role as co-learners (Fernández-Río, 2017; Johnson et al., 1999). In this sense, CL is conceived as a methodological strategy supported by procedures and techniques in which students collaborate actively to enhance their own learning and that of their peers, with the teacher acting as a facilitator of the educational process (Muñoz-Martínez et al., 2020). This pedagogical model has been established as a teaching strategy with multiple benefits, both in terms of knowledge acquisition (Cecchini et al., 2020), and in the improvement of physical self-concept (Ortuondo et al., 2022), as well as in promoting positive emotions and academic performance in Physical Education (PE), by fostering emotionally meaningful and effective learning experiences (León et al., 2023).

Educational institutions face the challenge of ensuring inclusive teaching that responds to student diversity (Godoy-Briceño et al., 2024), which requires teachers to implement methodologies that promote the inclusion of all students (Jackson-Summers et al., 2024). In this regard, CL appears to be a pedagogical model that fosters inclusion within the teaching-learning process (Lee et al., 2022). For this reason, implementing CL in initial teacher education plays a fundamental role in shaping future pedagogical practices (Cecchini et al., 2024; Scorțescu & Sava, 2024). However, the lack of initial training in this pedagogical model, or inadequate training, has been identified as one of the main obstacles to the effective implementation of CL, limiting its integration into educational practice (Martínez-Benito & Sánchez, 2020). Although in recent decades numerous studies have documented the implementation of CL in higher education settings (Hortigüela-Alcalá et al., 2020; Keramati & Gillies, 2024; Ortuondo et al., 2022), there is still limited scientific evidence regarding the effects of its application depending on the variability in its implementation (Cecchini et al., 2024).

Scientific literature has shown that the benefits of CL are more effective when this model is implemented in a structured and progressive manner (Cecchini et al., 2020; Fernández-Río, 2017; Velázquez, 2015). To ensure the proper implementation of CL, structured proposals such as the CL cycle have been developed, progressively guiding the process and combining simple and complex cooperative techniques to facilitate its effective integration into the classroom (Fernández-Río, 2017). However, in addition to this model, it is also necessary to consider the approach of "motor coopedagogy" proposed by Velázquez (2023, 2015), which establishes a five-stage methodological progression. Throughout these stages, students are initially confronted with conflict situations, gradually internalise the foundations of cooperation, put them into practice, learn through cooperative interaction, and ultimately achieve a level of autonomy in their learning process, evidencing the benefits of cooperating. In this regard, it has been reported that students who have participated in specific and structured CL training programmes gain a better understanding of its structure and function-ing and show greater willingness to apply it in their own classrooms (Muñoz-Martínez et al., 2020).

Specifically in PE, the potential for applying CL-based models has been described as highly positive (Casey & Goodyear, 2015). In this regard, it is essential to analyse the effect of taking a course based on the CL pedagogical model, occasional CL techniques, or even simple group work or collaborative work. Due to a lack of knowledge or a superficial understanding of the model, teachers often use group-based approaches without a clearly defined, structured foundation (Velázquez, 2015). Furthermore, it is relevant to

explore whether pursuing different degree programmes, such as Early Childhood Education or Primary Education, influences the acquisition of specific competencies and learning outcomes related to CL. In this context, this distinction between CL, as a structured pedagogical model, and general group work dynamics is particularly important in initial teacher education, since both approaches are frequently used but they do not provide the same type of training. Consequently, the learning about pedagogical models also differs, which underlines the relevance of analysing how students' perceptions and knowledge evolve depending on the approach implemented. In this regard, the study aims to examine, first, whether pursuing one degree or another provides differentiated training on Cooperative Learning and, second, whether taking a subject delivered through CL or through group work or collaborative work produces different effects on students' perception and knowledge of this model. Accordingly, the objectives of the present study were: (1) to analyse differences in perception and knowledge regarding CL between third-year students enrolled in an Early Childhood Education degree and those in a Primary Education degree with a specialisation in PE prior to taking the corresponding courses, and (2) to examine separately the effects on perception and knowledge regarding CL of two experiences: the subject Game and Sport, delivered through a CL-based pedagogical model in the Group of Primary Education with Physical Education specialisation Cooperative Learning (GPECL), and the subject Body Expression and Its Didactics, delivered through group work dynamics in the Group of Early Childhood Education Group Work (GECEGW).

2. Method

2.1. Participants

The study involved 121 third-year university students enrolled in an Education degree programme (Early Childhood Education or Primary Education with a specialisation in Physical Education) at a Spanish university (20.2 ± 0.4 years), of whom 53 were male (43.8%, 20.2 ± 0.2 years) and 68 female (56.2%, 20.2 ± 0.4 years). Participants were divided into two groups: the Group of Early Childhood Education Group Work (GECEGW), composed of 54 students (13.0% male, 87.0% female), who completed the course through group work dynamics; and the Group of Primary Education with Physical Education specialisation Cooperative Learning (GPECL), composed of 67 students (68.7% male, 31.3% female), who completed the course through a highly structured cooperative learning model. The inclusion criteria were: (1) attendance of at least 80% of the scheduled sessions and continuous participation in the course from the beginning to the end of the study, and (2) full completion of both pre- and post-intervention assessments. The study adhered to the guidelines outlined in the Declaration of Helsinki (2024). It was approved by the Ethics Committee for Research Involving Human Subjects at the University of the Basque Country (UPV/EHU) (CEISH M10/2023/280).

2.2. Procedure

During the first semester of the 2024-2025 academic year, a quasi-experimental study with a pretest-posttest design was conducted (Figure 1), involving third-year students enrolled in an Education degree programme at a university over 16 weeks. The initial phase of the study began in the second week of September 2024, when students from both GECEGW and GPECL completed a questionnaire as a pretest assessment.

Subsequently, GPECL students took the course *Game and Sport*, which implemented a highly structured CL methodology. In contrast, GECEGW students completed the course *Body Expression and Its Didactics* using pedagogical proposals based on group work, but without applying a specific CL implementation model. These courses corresponded to the curricular design of each official degree programme. At the end of the intervention, in mid-December 2024, both groups completed the same questionnaire again during the posttest phase, allowing for the analysis of the effects of each programme.

2.3. Measures

*Cooperation in Higher Education***:** The *Analysis of Cooperation in Higher Education* (ACOES) questionnaire, previously validated by García et al. (2012), was used to assess university students' perceptions of CL. This instrument has been recently used in studies involving university students with similar characteristics (Feria-Madueño et al., 2017). It consists of 49 items distributed across seven factors: *Conception of group work* (n = 5 items), *Usefulness of group work for academic development* (n = 6 items), *planning of group work by the teaching staff* (n = 4 items), *Criteria for group organisation* (n = 8 items), *Group norms* (n = 9 items), *Internal group functioning* (n = 7 items), and *Effectiveness of group work* (n = 10 items). Participants responded to the items using a five-point Likert scale ranging from 1 = Strongly Disagree to 5 = Strongly Agree.

Open-ended questions: The questionnaire included three open-ended questions at the end, designed to explore participants' perceptions of CL in greater depth. These questions aimed to identify the strengths, weaknesses, and suggestions perceived by students regarding the applied learning model. Specifically, participants were asked: (1) to indicate any strengths of group work that had not been included in the previous items, (2) to point out any weaknesses not addressed in the closed-ended section, and (3) to provide suggestions for improving the cooperative learning methodology.

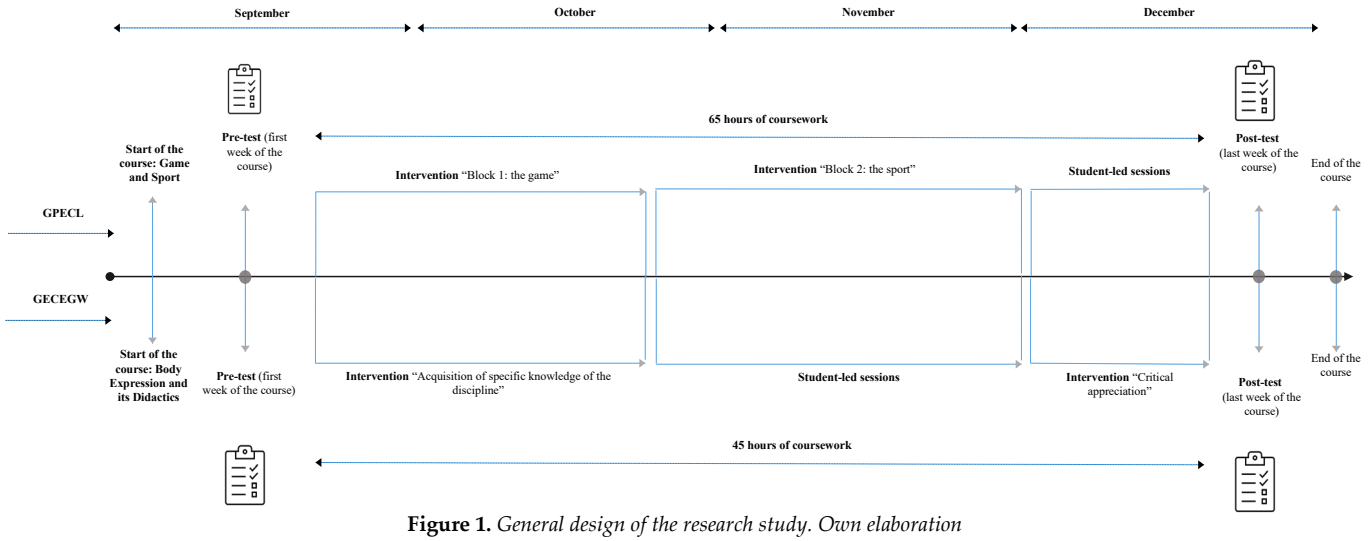

Figure 1. *General design of the research study. Own elaboration*

2.3.1. Intervention programme for the Early Childhood Education group (GECEGW), course Body Expression and Its Didactics.

The course *Body Expression and Its Didactics* was delivered over 30 sessions (20 practical sessions and 10 theoretical sessions), each lasting one and a half hours, for a total of 45 instructional hours. The course content focused on developing students' body language from an artistic-expressive perspective, addressing the fundamental principles of expressive motor skills, symbolisation, and communication.

The practical sessions began with a phase dedicated to acquiring discipline-specific knowledge, where guided discovery learning was used to promote students' creativity and collaborative work. Students entered the project phase as the course progressed, creating small collective artistic and bodily productions. Finally, a phase of critical appreciation was carried out, in which students reflected on and evaluated the learning process through self-assessment and peer assessment methods. In addition, students attended theoretical sessions to develop their competence in planning teaching-learning situations within the field of body expression.

2.3.2. Intervention programme for the Primary Education group with Physical Education specialisation (GPECL), course Game and Sport.

The course *Game and Sport* was conducted over 46 sessions (31 practical and 15 lecture-based), each lasting one and a half hours, totalling 69 instructional hours. The content was organised into two main blocks: game (20 sessions) and sport (15 sessions), followed by nine sessions dedicated to student-led practical presentations. Group cohesion was fostered from the beginning through activities designed to build trust and cooperation. Subsequently, progressive CL strategies were implemented, beginning with collaborative games and motor activities, and gradually integrating CL as a teaching tool. The instructor applied CL as the core pedagogical meth-od, progressively combining two implementation models: the CL Cycle (Fernández-Río, 2017) and "motor coopedagogy" (Velázquez, 2023). In addition, a formative assessment process was implemented to ensure alignment between the methodology and the assess-ment of learning, promoting both self-assessment and peer assessment among students. For a detailed description of each session, objectives, and assessment criteria, readers are referred to section 31.4 *Description of the experience* in the publication by Ortuondo et al. (2024). To verify the proper implementation of CL in the GPECL, at the end of the intervention, participants completed the *Cooper-ative Learning Questionnaire* (CAC) by Fernández-Río et al. (2017). This instrument, validated in educational contexts, evaluates five key components: social skills, group processing, positive interdependence, promotive interaction, and individual accountability. The reported values (M = 4.6 ± 0.4 in each dimension) correspond to students' mean scores on a 5-point Likert scale, where higher scores reflect a more positive evaluation of CL implementation. These results showed excellent ratings across all dimensions assessed, indi-cating an appropriate implementation of CL and high student appreciation of the methodology.

2.4. Statistical analysis

Results are presented as mean ± standard deviation and frequencies and percentages of participants' responses within each dimension. Data normality was assessed using the Kolmogorov-Smirnov test, and homoscedasticity was evaluated with Levene's test. To compare pretest differences between GECEGW and GPECL, an independent samples t-test was used when the assumptions of normality and homogeneity of variance were met. Otherwise, the Mann-Whitney U test was applied. Similarly, to examine with-in-group changes between the pretest and posttest phases, a paired samples t-test was conducted for normally distributed data with

equal variances, and the Wilcoxon signed-rank test was used for non-parametric data. Effect sizes were calculated using Cohen's d for parametric data and the rank-biserial correlation coefficient (r_b) for non-parametric data. The qualitative interpretation of effect size values was as follows: *d* = < 0 - 0.1 (No effect), 0.2 - 0.4 (Small effect), 0.5 - 0.7 (Intermediate effect) y 0.8 - ≥ 1.0 (Large effect) (Cohen, 1988); and r_b = < 0.10 (very small), 0.10 - 0.29 (small), 0.30 - 0.49 (moderate), ≥ 0.50 (large) (López-Martín & Ardura, 2023). To assess the effect of the intervention between GECEGW and GPECL, an analysis of covariance (ANCOVA) was conducted, including pretest scores as a covariate. Statistical analyses were performed using JASP software (JASP for MacOS, version 0.18.3, Amsterdam, The Netherlands). A p-value of < 0.05 was considered statistically significant. In parallel, qualitative data from the open-ended questions were analysed through a deductive content analysis, using a categorisation matrix based on the questionnaire items and following the three-phase structure described by Rueda-Sánchez et al. (2023): data reduction, descriptive analysis, and interpretation.

3. Results

3.1. Quantitative results

Regarding the *Conception of group work* dimension of the ACOES questionnaire (Figure 2A), significant differences were observed between the groups at the pretest stage, with GECEGW showing higher scores than GPECL (p = 0.022, r_b = 0.24, small). In this dimension, GECEGW showed a significant decrease between pretest and posttest (p = 0.025, d = 0.32, small), while GPECL demonstrated a significant improvement after the intervention (p < 0.001, d = –1.35, large). Moreover, significant differences were found between GECEGW and GPECL in the posttest regarding the effects of the intervention (ANCOVA, p < 0.001). Regarding the *usefulness of group work for the academic development* dimension of the questionnaire (Figure 2B), significant differences were found between the groups at the pretest stage, with GECEGW obtaining higher scores than GPECL (p < 0.001, d = 0.71, intermediate). While GECEGW showed a significant decrease in scores between the pretest and posttest (p = 0.002, d = 0.44, small), GPECL exhibited an improvement after the intervention (p < 0.001, d = –1.01, large), with statistically significant differences confirmed by the ANCOVA (p < 0.001).

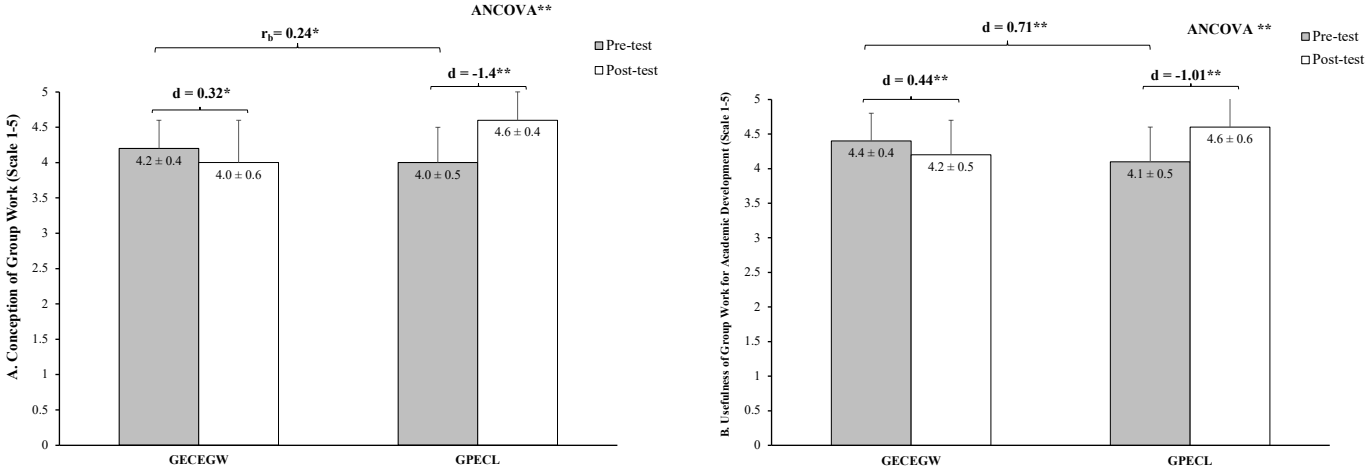

Figure 2. *Results obtained by the Early Childhood Education group (GECEGW) and the Physical Education group (GPECL) before (pretest) and after (posttest) the intervention programme for the dimension "Conception of group work" (2A) and the dimension "Usefulness of group work for academic development" (2B). Own elaboration*

Regarding the *planning of group work by the teaching staff* dimension of the ACOES questionnaire (Figure 3A), no significant differences were found between GECEGW and GPECL in the pretest results (p = 0.532, d = –0.12, no effect). While no significant differences were observed between the pretest and posttest in GECEGW (p = 0.269, d = 0.15, no effect), GPECL showed a significant improvement after the intervention (p < 0.001, d = –0.72, intermediate). In addition, significant differences were found between GECEGW and GPECL in the effects of the intervention (ANCOVA, p < 0.001). Regarding the *Group norms* dimension (Figure 3B), significant differences were found between the groups in the pretest results. GECEGW scored higher than GPECL in their perception of group norms (p = 0.015, d = 0.45, small). While GECEGW showed a significant decrease in this dimension between the pretest and posttest (p = 0.003, d = 0.42, small), GPECL showed a significant improvement after the intervention (p = 0.001, d = –0.42, small). The ANCOVA analysis also found significant differences between GECEGW and GPECL (p < 0.001).

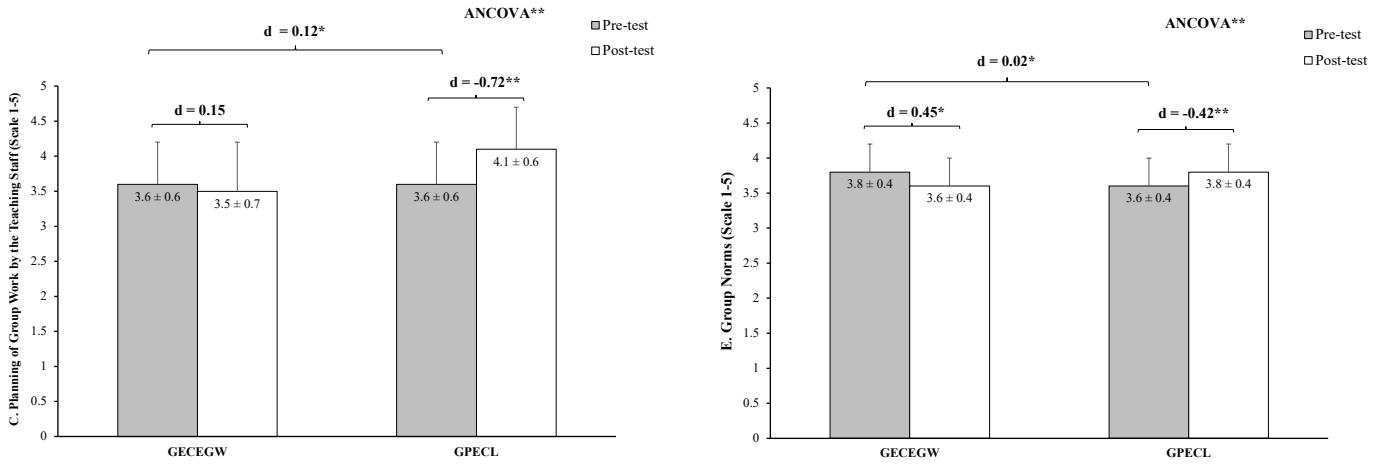

Figure 3. *Results obtained by the Early Childhood Education group (GECEGW) and the Physical Education group (GPECL) before (pretest) and after (posttest) the intervention programme for the dimension "Planning of group work by the teaching staff" (3A) and the dimension "Group norms" (3B). Own elaboration*

Regarding the *Internal group functioning* dimension of the ACOES questionnaire (Figure 4A), significant differences were observed between GECEGW and GPECL in the pretest results ($p = 0.009$, $d = 0.49$, small), with GECEGW scoring higher than GPECL. While GECEGW showed a significant decrease between the pretest and posttest in students' perceptions of internal group functioning ($p = 0.043$, $d = 0.28$, small), GPECL demonstrated a significant improvement after the intervention ($p = 0.002$, $r_b = –0.49$, moderate). Moreover, significantly different effects were observed between GECEGW and GPECL at the end of the intervention (ANCOVA, $p = 0.006$). Regarding the *Effectiveness of group work* dimension (Figure 4B), significant differences were observed between GECEGW and GPECL before the intervention ($p = 0.014$, $d = 0.46$, intermediate), with GECEGW showing higher values than GPECL. While no significant differences were found in GECEGW between the pretest and posttest results ($p = 0.631$, $d = 0.07$, no effect), GPECL showed significant improve-ments following the intervention ($p < 0.001$, $d = –0.88$, large). The ANCOVA analysis also confirmed significant differences between GECEGW and GPECL ($p < 0.001$).

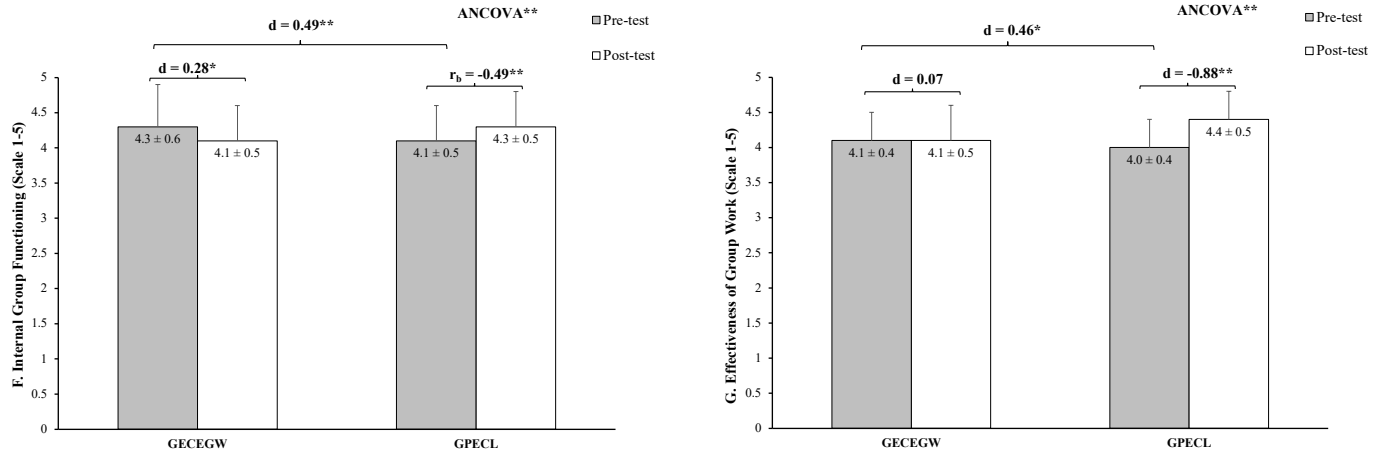

Figure 4. *Results obtained by the Early Childhood Education group (GECEGW) and the Physical Education group (GPECL) before (pretest) and after (posttest) the intervention programme for the dimension "Internal group functioning" (4A) and the dimension "Effectiveness of group work" (4B). Own elaboration*

On the other hand, regarding the *Criteria for group organisation* dimension (Figure 5), no significant differences were found between GECEGW and GPECL in the pretest results ($p = 0.434$, $d = –0.14$, no effect). Likewise, no significant changes were observed between the pretest and posttest in either GECEGW ($p = 0.857$, $r_b = –0.03$, very small) or GPECL ($p = 0.958$, $d = 0.01$, no effect). It is also worth noting that no significant differences were found between GECEGW and GPECL in the effects of the intervention (ANCOVA, $p = 0.794$).

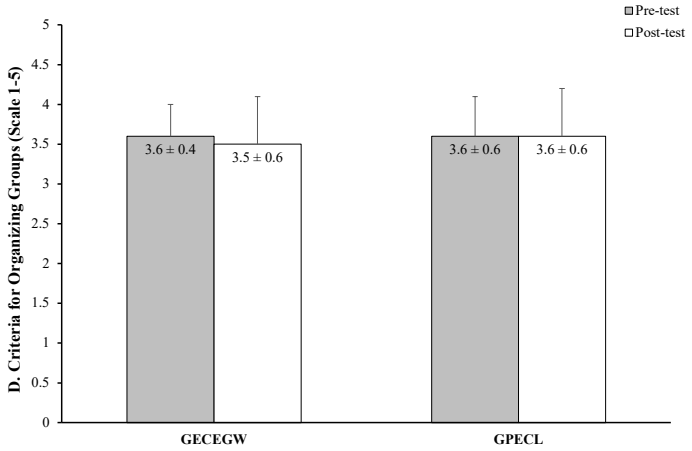

Figure 5. *Results obtained by both the Early Childhood Education group (GECEGW) and the Physical Education group (GPECL) before (pretest) and after (posttest) the intervention programme for the dimension "Criteria for organising groups". Own elaboration*

3.2. Qualitative results

Table 1 presents the main strengths, weaknesses, and suggestions identified by participants from both GECEGW and GPECL in the pretest and posttest phases, based on the three final open-ended questions of the ACOES questionnaire. The strengths identified by participants were mainly related to group work and social and emotional dimensions, emphasising the importance of cooperation, effective communication, and inclusion within the team. Regarding weaknesses, participants pointed out difficulties in conflict management and the equitable distribution of responsibilities, highlighting the need to promote greater involvement of all group members. Finally, among the suggestions provided, participants emphasised the relevance of implementing peer assessment strategies and teacher supervision and the need to improve the organisation of group dynamics to optimise the CL experience.

Table 1

Most representative qualitative responses from participants to the final three open-ended questions of the ACOES questionnaire in both the pretest and posttest: Strengths, Weaknesses, and Suggestions regarding group work. Own elaboration

Strengths		
Groupings	**Pretest**	**Posttest**
Group Work	**GECEGW**: • Greater ease when completing tasks • The opportunity to learn from one another.	**GECEGW:** • Development of communication and decision-making skills. • Working in groups allows you to acquire competencies that benefit your personal development.
	GPECL: • Seeing ideas from another perspective improves learning. • Ease in sharing ideas and reaching different conclusions.	**GPECL:** • Strengthens relationships among group members and allows getting to know them better • Sharing knowledge enhances collective learning.
Social and Emotional Dimension	**GECEGW:** • Group work teaches us to understand and respect others' opinions. • Friendships are strengthened, and an atmosphere of trust is created.	**GECEGW:** • Allows even the most vulnerable students to feel included. • Emotional support among group members.
	GPECL: • The strength of group work is learning to work with different types of people, since we are not all the same. • The inclusion of all students.	**GPECL:** • Your classmates should support you when you are feeling weak. • Students with different skill levels can support each other.

	Weaknesses	
Task Distribution and Assessment	**GECEGW:** • The work is NOT distributed equitably • There are always group members who contribute less but receive the same grade. **GPECL:** • A weakness is the lack of commitment from all members. • Some individuals take advantage of others' work to get a higher grade at the expense of their peers.	**GECEGW:** • Poor or insufficient work by some members also affects the rest of the group. • Work is not distributed fairly. Some members carry a greater workload, and peer assessments often do not matter because we feel pressured to give grades we disagree with. **GPECL:** • Lack of equitable participation • Not all group members put in the same effort or deserve the same grade.
Conflict Management	**GECEGW:** • Conflicts, anger, and arguments. • Sometimes it is not easy to work with people who do not want to listen to your opinion and believe only in their own opinions. **GPECL:** • Differences in opinion and personality can lead to tensions or conflicts that affect group dynamics. • When not all members are equally involved, conflicts can arise.	**GECEGW:** • Working in a group is not always easy because people are different, and disagreements may lead to conflicts. • Poor organisation and lack of proper guidance can lead to disputes. **GPECL:** • Potential conflicts may arise among group members. • Interpersonal conflicts: differences in attitudes or work styles can lead to friction that hinders the group's progress.
	Suggestions	
Peer Assessment and Teacher Supervision	**GECEGW:** • Supervision by the teacher regarding the contributions and involvement of different group members. • The teacher should observe and stay informed about what happens in cooperative groups. **GPECL:** • Greater control or supervision of group work by teachers. • Require self-assessment and peer assessment after presenting the group work	**GECEGW**: • The teacher should observe and stay informed about what is happening in cooperative groups • More support from teachers **GPECL:** • Implement peer assessment and consider who contributes and who does not. • Evaluate the process, not just the final outcome. Allow students to assess themselves during the process and not only at the end, so that both the process and the final product are equally valued, which, in my opinion, is essential for overall learning.
Organisation	**GECEGW:** • Set clear guidelines at the beginning of the group work to avoid misunderstandings among team members. • Whenever group work is carried out, inclusion should be considered, meaning that all students must participate, taking into account the diversity that may exist. **GPECL:** • When working on group tasks, we should set small goals to ensure we move in the right direction. • Establish clear rules and ensure there are consequences for not following them.	**GECEGW:** • If there are problems within the group, teachers should provide solutions. • Improve overall organisation. **GPECL:** • Define group rules and the way the group will work. • Before applying a cooperative methodology, the teacher should implement a programme to foster classroom cohesion to prevent future conflicts and help students resolve issues autonomously.

Note: GPECL = Group of Primary Education; GECEGW = Group of Early Childhood Education

4. Discussion

To guide the discussion, it is important to recall the objectives of this study. First, we examined whether initial differences in the perception and knowledge of CL existed between GECEGW and GPECL, considering the influence of their respective degree programmes. Second, we analysed the effects of the *Game and Sport* course, implemented through a structured CL model in GPECL. Finally, we evaluated the outcomes of the *Body Expression and Its Didactics* course, which was delivered through group work dynamics in GECEGW.

4.1 Differences in ACOES scores between the GECEGW and GPECL groups

Considering that university degree programmes may differ in their pedagogical approaches, academic content, and student profiles, it is relevant to examine whether there are differences in the perception and understanding of CL depending on the degree pursued. The results of the present study showed that, in 5 out of the seven dimensions of the ACOES questionnaire (*conception of group work, usefulness of group work for academic development, Group norms, internal group functioning,* and *Effectiveness of group work*), students in the GECEGW group obtained higher pretest scores than those in the GPECL group. This difference could be attributed to the type of degree programme, the methodology used in previous courses, or teaching practices, all of which may influence students' familiarity with and development of CL-related competencies (Keramati & Gillies, 2024). However, no differences were observed between GECEGW and GPECL in the *planning of group work by the teaching staff* and *the Criteria for group organisation* dimensions, which is particularly relevant given that these are key aspects linked to the teacher's role in CL. To date, no studies have compared students' perceptions across different degree programmes, although prior research has highlighted that the content and methodological orientation of teacher education strongly condition teachers' ability to apply pedagogical models in practice, and evidence also suggests that teachers are more likely to successfully enact these models when they have previously experienced them during their own training (Casey & Bjørke, 2024). This makes it relevant to investigate how the subjects and methodologies experienced during teacher education influence students' understanding of the teacher's role in CL. This line of inquiry becomes even more important in light of previous research showing that the way groups are formed directly impacts the outcomes of CL (Ortuondo et al., 2023). Since multiple factors influence students' perceptions of CL, and not all university programmes provide the same training, further research is needed to examine how these competencies can be effectively developed across different degree programmes to ensure their integration into teacher education.

4.2 Effects in the GPECL group: Impact of Cooperative Learning

Recent studies have highlighted the importance of experiencing and engaging with diverse methodologies during initial teacher education (Keramati & Gillies, 2024), emphasising that experiences gained during university training can enhance future teachers' ability and knowledge to apply these methods in their professional practice. In the present study, it was observed that students in the GPECL group, who received training through CL in the course *Game and Sport*, showed significant improvements in all dimensions, with the sole exception of the *Criteria for group organisation* dimension. These improvements in GPECL students' perception and understanding of CL after completing the *Game and Sport* course may be attributed, first, to the use of implementation models such as the CL Cycle (Fernández-Río, 2017) and "motor coopedagogy" (Velázquez, 2023), which appear to be essential for implementing this pedagogical model in a progressive, functional, and meaningful manner within a stable educational framework (Fernández-Río, 2017). As previously described, applying this model not only offers future teachers valuable hands-on experience, but also helps them acquire the necessary competencies to implement CL in their future professional contexts (Liu & Laygo-Saguil, 2024), potential-ly contributing to more effective inclusion in educational settings (Bermejo et al., 2022; Perlado et al., 2021). In line with these findings, Cecchini et al. (2020) analysed the effects of a structured CL-based intervention and observed significant improvements in pre-service teachers in terms of motivation, content knowledge, responsibility, and in the five core elements that underpin the Effectiveness of CL. As shown in the present study, the positive effects of such courses that employ structured pedagogical models appear to span across all dimensions of development (Casey & Goodyear, 2015; Chan et al., 2024) and may represent an effective strategy for stu-dents in Primary PE teacher education programmes.

4.3 Effects in the GECEGW group: Impact of group work

Although the literature highlights the benefits of CL, in some university courses it is not implemented in a structured way, but rather through more general group work methodologies, or even applied only occasionally (Jurkowski & Abramczyk, 2024). This lack of structure may influence the outcomes, limiting the positive impact that CL has demonstrated in other contexts, since its effectiveness largely depends on correctly applying its core elements (Adl-Amini et al., 2024). In addition to the five essential elements, it has been proposed that two further components, equitable participation and equal opportunities, should be included to ensure effective implementation (Fernández-Río, 2018). In this regard, the results of the present study show that GECEGW, which completed the *Body Expression and Its Didactics* course using a predominantly group work–based methodology, did not demonstrate improvements in any of the ACOES dimensions after the intervention. Despite having carried out group activities, a significant decline was observed between pretest and posttest in several key dimensions of CL, such as *Conception of group work*, *usefulness of group work for academic development*, *Group*

norms, and *Internal group functioning*. In this context, previous research has pointed out that one of the main challenges in assessing group work lies in the difficulty of discerning individual student performance within the group, which affects both the validity and fairness of the assessment process (Forsell et al., 2021). These findings suggest that implementing group dynamics without a clear methodological structure may lead to a negative perception of CL, affecting both group cohesion and the Effectiveness of teamwork (Cecchini et al., 2020; Supanc et al., 2017).

In this regard, the use of structured CL approaches is recommended, including the CL Cycle (Fernández-Río, 2017) or "motor coopedagogy" (Velázquez, 2015), as they provide clear guidance for organising group work and promote meaningful learning (Fernández-Río et al., 2016). A balanced and coherent use of pedagogical frameworks such as those proposed by Fernández-Río et al. (2016), or the one applied in the present study by the GPECL group, could enhance students' engagement, motivation, interpersonal relationships, learning, autonomy, and self-discipline. At the same time, such approaches could foster optimal professional develop-ment among future teachers, ultimately improving the educational process. Considering the results of the present study, it would be of interest for future research to analyse whether delivering the same course attended by GECEGW students through a structured pedagogical model such as CL could positively affect their perception and acquisition of competencies related to this instructional approach.

4.4 Strengths, weaknesses, and suggestions

Although previous studies have affirmed the benefits and strengths of CL (Pujolàs, 2012), particularly when implemented in a structured manner (Cecchini et al., 2020), highlighting its positive impact on students' social interaction, motivation, and academic performance (Casey & Goodyear, 2015; Chan et al., 2024), there are also various challenges associated with its implementation, posing difficulties for both teachers and students. Several studies have reported numerous obstacles that may arise when implementing CL, including students' lack of experience and skills, previous negative experiences with group work, insufficient teacher training, organisational issues at the institutional level, family resistance, lack of classroom control, and unrealistic expectations on the part of teaching staff (Martínez-Benito & Sánchez, 2020; Rodríguez-Eguren et al., 2025). The findings from the open-ended questions of the present study also reflect this duality. While the GPECL group showed improvements in the quantitative CL results, the qualitative data reveal that, despite the strengths observed, such as the promotion of cooperation, development of communication skills, and the creation of a more inclusive learning environment, several persistent challenges and suggestions for improvement were noted by both groups. In particular, GPECL and GECEGW highlighted weaknesses related to conflict management, the equitable distribution of tasks, and the need for greater engagement from all group members.

The suggestions provided by participants also highlight the importance of implementing a formative and shared assessment process based on more effective peer assessment strategies (Pérez-Pueyo et al., 2020) and teacher supervision (Carney et al., 2022), as well as improving the organisational structure of group dynamics to ensure a more equitable and efficient CL experience. These results reveal the difficulties that future teachers may face when managing this methodology, as Martínez-Benito and Sánchez (2020) noted. Moreover, as stated by the participants in the present study, it is essential to implement formative and shared assessment within the CL framework, since the evaluation process must be aligned with the learning objectives and activities of the teaching-learning process (Norton, 2004). The literature has shown that formative assessment is a key tool for methodological change, as it allows for timely correction of emerging challenges and promotes active student participation (Pérez-Pueyo et al., 2020). Likewise, as noted by the participants, the importance of formative assessment does not mean that teachers should disengage from the learning process. On the contrary, it is crucial that teachers actively supervise and guide the development of CL, ensuring that assessment is transparent, clear, and participatory. This, in turn, facilitates the development of students' self-regulation, autonomy, and metacognitive skills (Hortigüela-Alcalá et al., 2015). In this regard, it would be advisable for students to more frequently engage in CL experiences and related assessment processes to strengthen their competencies, enhance their strengths, and reduce their weaknesses and difficulties in applying the methodology. This would lead to better adaptation to cooperative dynamics and a more positive perception of their Effectiveness in the teaching-learning process.

Even though the present study was conducted with the highest possible scientific, methodological, and ethical rigour, certain limitations must be acknowledged. First, although the sample included students from two different degree programme it was relatively homogeneous, as all participants were enrolled at the same university. Therefore, the sample is not representative of the broader university student population. Future research should expand the sample to include students from other universities and training contexts to understand better the impact of completing different university courses. Additionally, due to the research design employed, it was impossible to precisely isolate the causes of the observed effects, which may depend on variables such as student characteristics, the degree program, prior training, the methodology used, course duration, or content delivered. Furthermore, the analysis of two different degrees and courses prevented the inclusion of a specific control group for each condition. Finally, the study did not assess long-term effects. Although changes in the perception of CL were measured immediately after the intervention, it would be relevant to conduct longitudinal follow-up to determine whether these improvements are sustained once students begin their professional teaching careers. Future studies could examine the impact of CL on teaching performance one or two years after training, providing key insights into its long-term applicability and sustainability.

5. Conclusions

The results of this study show that students in GECEGW demonstrated better initial perceptions and knowledge of CL in 5 out of the 7 dimensions of the ACOES questionnaire compared to students in GPECL. However, GPECL students, who completed a course based on a highly structured CL pedagogical model, showed significant improvements in 6 out of the seven dimensions. In contrast, GECEGW students did not experience improvements after completing the *Body Expression and Its Didactics* course. On the contrary, their perception of CL significantly declined in several key areas, including *the perception of group work*, *the usefulness of group work for academic development*, *the planning of group work by the teaching staff*, *group norms*, and *internal group functioning*. These findings suggest that in contexts where initial knowledge of CL is limited (as in the case of GPECL), implementing a structured model through the CL Cycle and "motor coopedagogy" may effectively enhance knowledge and skills related to CL. Conversely, in the case of GECEGW, the inclusion of general group work dynamics without a structured approach based on the principles of CL does not appear sufficient to generate improvements. Therefore, it is necessary to explore whether implementing a structured CL model could produce effects similar to those observed in GPECL.

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