



Article

Cooperative Learning to Reduce Inequalities: Instructional Approaches and Dimensions

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Abstract: This manuscript deals with how cooperative learning in pre-school and primary education can be dimensionalized in terms of reducing gender differences and inequalities. In this study, formulated through instructional approaches delivered in four medium- to very high-complexity schools (the number of students with an immigrant background ranging from 30% to 100%), 376 pre-service teachers and 43 qualified teachers were asked to analyze the instruction that they gave to 1658 pre-school and primary students over two consecutive years. Instruction was defined in terms of contextualized physical education challenges that included cooperative psychomotor physical challenges, guided discovery activities and psychomotor problem-solving. The analysis was based on reflective narratives on both gender differences and inequalities, which evinced 792 comments regarding gender (618 by the pre-service teachers and 174 by the schoolteachers) and 627 comments for inequalities (363 by the pre-service teachers and 264 by the schoolteachers). The analysis produced categories based on critical reflection—on both individual and classroom scales—from the pre-service teachers and the schoolteachers. Each of the cooperative learning dimensions, i.e., positive interdependence, individual accountability, promotive interaction, social skills, and group processing, were investigated to produce a set of principles and competencies that best promoted education for sustainable development. The research produced 42 principles that operated under the tenet of leave-no-one-behind, with positive interdependence and promotive interaction providing the higher number of principles that are best suited to tackle, through cooperation processes, equity and inclusivity issues in pre-school and primary education classrooms.

Keywords: cooperative learning; inequalities; gender; pre-service teachers; primary education



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1. Introduction

Many educational improvements for long-term sustainable development rely not only on how education builds on human capital, especially in terms of overcoming gender and other inequalities [1–4], but also by considering education as a long-term investment in the future of societies [1]. To achieve the 17 Sustainable Development Goals (SDG) adopted in the UN's 2030 Agenda and the Paris Agreement on Climate Change, the synergies between all education systems have to be promoted, even though education remains an under-financed and under-prioritized sector within development policies [5]. Because education systems are highly interdependent, i.e., they share sustainable education principles and deal with complex trade-offs, they should thus be designed to be consistent with the leave-no-one-behind tenet [3]. For this to occur, educational systems have to cope with

major changes in society and nature and to be aware of the principles of circularity and the decoupling of systems within a stable Earth system. Interaction between educational systems also requires a continuous redefinition of curricula, teachers constantly adapting to new educational methodologies and technologies, evaluating student learning outcomes based on situated, grounded, and contextualized pedagogies. The development of all interactions and synergies directly targets the SDGs concerning education itself (SDG4), gender equalities (SDG5), and reduced inequalities (SDG10).

Pursuing a quality education that promotes gender equality and reduces inequalities mainly relies on how educational institutions can bring sustainable education to future generations of students and professionals [6,7], given that students may carry these competencies and values into the workforce [8]. Most educational systems are focused on delivering sustainability-oriented competencies with little or no research on how that pedagogical approach can deliver significant sustainable-oriented competencies [2,9,10]. In the context of developing interventions to achieve the SDG outcomes, educational approaches should help students to be able to handle uncertainty and the resilience of individuals and societies, to understand the complexity of relationships between individuals, and be able to gauge the consequences of producing new interventions in either pre-school, primary or secondary schools that can generate sustainable changes [7,11]. Applying new frameworks may imply a reformulation or a deeper understanding of educational principles, dimensions, competencies, and outcomes. In terms of recognizing SDGs, students, for example, suggest that the awareness of gender inequality is linked to awareness of the negative impacts of environmental problems and the subsequent impact on their own quality of life [12]. There is a recognized tradition of research on pedagogical approaches and their effects on sustainable competencies in higher education, but how the synergies of tertiary systems can cope with sustainable competencies in primary and secondary education is still a key issue for research [13–15].

This paper analyzes the foundations of the cooperative learning educational practices that are employed by pre-service teachers in pre-schools and primary schools, as well as by schoolteachers when contextualized cooperative psychomotor physical challenges were first implemented. An initial objective is to elucidate a more in-depth definition of the practicality of cooperative learning for K4 to K8 students that can foster gender equalities among individuals and also reduce inequalities, and to elucidate the significant principles that arise for each of the dimensions of cooperative learning: positive interdependence, face-to-face interaction, individual responsibility, interpersonal skills or group processing. A second objective identifies the dimensional components by which each of the five dimensions of cooperative learning are based.

2. Background

2.1. Cooperative Learning, Gender and Inequalities

While developing cooperative educational approaches, the main gender differences for university students have been found in women giving a higher evaluation to relating cooperative learning to future teaching roles [16]. In primary education, cooperative activities in physical education may improve the class climate which, in turn, may result in better student engagement in the class and a climate where boys have been found to exhibit more positive attitudes toward girls [17]. The perception of physical competence may predict a child's gains in both locomotor and general skills [18]. When primary school students develop movement as a language, they can articulate both emotional intelligence and interpersonal skills [19,20]. Intrapersonal emotional skills, such as emotional attention, clarity of feeling, and emotional repair have been scored significantly higher by girls during cooperative physical challenges [21].

The cohesion between the members of a cooperative team in physical education influences the performance of that team and provides students with skills that may be translated into future social domains [22]. This implies dismissing some persisting stereotypes that hinder equality in physical education [23] because the physical education curricula are

considered unattractive for girls, thus indicating whence their lack of motivation is derived [23]. The explicit inclusion of reflections on gender in cooperative inclusive physical education activities provided a space for girls to reflect on their experiences of football and sexism in physical education, and for boys to listen and acknowledge this, with the result of an improved class climate and better student engagement in the classes [17].

In terms of reducing inequalities among students in the classroom, the main focus has been directed toward raising awareness about inclusion and equality among students on the one hand and, on the other, dealing with cultural pluralism at the classroom level [24,25]. Students with immigrant and non-immigrant backgrounds who are embedded in polycultural classes (i.e., those with better intercultural relations (equality and inclusion) and more opportunities to learn about cultural diversity (cultural pluralism) are associated with more positive student outcomes [26]). The reduction of inequalities is then focused on the promotive interactions between groups and fairness (equality and inclusion) and on how cultural diversity, through the equal treatment of peers and an individual's critical consciousness, can induce more perspectives for learning [27].

On the individual scale, a teaching process that fosters promotive interaction and feedback between peers, and positive interdependence between culturally diverse students, can result in an optimal class climate. Cooperative learning is seen, then, as an effective educational approach that optimizes the contact between students from different ethnic, religious, or culturally diverse backgrounds. This approach is reinforced on a classroom scale by promoting equal treatment and, through the absence of institutional discrimination [28], the promotion of equity in members' group roles [29], a culturally diverse curriculum [27], empathy and change of perspective [2] and optimal intergroup dependence [26]. Subsequently, cooperative learning at both individual and classroom levels may create more reflective and critical students [14,15] and more resilience among children at risk from family, community, and/or social dependences. In school, students from an immigrant background tend to perceive differential levels of equal treatment [30,31], forced assimilation of non-immigrant perspectives, false inclusion through differential practices among groups, and low structural class orientation toward class ethnicity and identity. This superficial engagement with cultural differences may even foster increased structural discrimination among students from an immigrant background and an enhancement of perceived cultural stereotypes [32] which, in turn, may increase the levels of ambiguity and tolerance of frustration [33].

2.2. Dimensions of Cooperative Learning

Each individual's personal commitment and positive interdependence is at the heart of cooperative learning, in which the capacity to build an individual's competence is dependent on the success of the group [34]. In formal cooperative learning, students work together to achieve shared learning goals and complete structured or semi-structured tasks, assignments, or challenges [35–38]. The number of members in a group should not be very high since, in large groups, primary school students, for example, do not have their individual psychological needs for positive emotions fulfilled [39].

The pursuit of interdependence between individuals can be understood as a motivational perspective, where each individual is potentially encouraged to decide for themselves, while attaining both self and group responsibility through interaction with other individuals [40]. Thus, cooperative learning is at the core of enhancing interpersonal relations and collaboration in which the individuals participate in group processes on the basis of being empathetic, supportive, non-racist, and fair with others [41]; however, within the structure of cooperative learning, there might exist difficulties in managing relationships [29,42], social laziness [43], and disruptive conflicts [37].

To structure cooperation learning in any educational system, five basic elements are postulated: positive interdependence, individual accountability, promotive interaction, social skills, and group processing [44]. In cooperative learning, motivation, social cohesion, cognitive development, and cognitive elaboration are listed as achievement effects by

individuals [45]. For primary school students, cooperative learning may be significant for them to achieve critical thinking development as expected for sustainable development competencies [15]. That being said, children in their first years of primary school have been found to encounter difficulties in attaining positive interdependence and developing social and interpersonal skills, since their psychological characteristics are closer to preoperative stages. Likewise, these first-year primary students perceive low levels of responsibility, since they clearly manifest some impulsiveness by trying to monopolize, intervene, and interfere in the tasks of the other team members [15]. However, promotive interaction is a principle of the utmost importance for them to understand since they need face-to-face social relationships to learn [15].

2.3. Psychomotor Physical Education

Psychomotor skills are part of an educational methodology that uses motor skills as a means to direct individuals toward their psychosomatic unity, that is, toward fostering all dimensions of individuals. This study takes, as its reference, the definition of the concept of psychomotor skills as developed by the Federation of Associations of Psychomotricity in Spain in 2015, as a result of a review for a unifying proposal that emerged at the European Psychomotor Forum in the year 1996: “Psychomotor skills is a discipline that, based on an integral conception of the human being, deals with the interaction that is established between knowledge, emotion, body and movement and its importance for the development of the person, as well as their ability to express themselves and relate in a social context”. This definition, then, hints at the existence of different positions and strategies for psychomotor intervention. Broadly speaking, most authors today differentiate between two main lines of intervention: (a) instrumental, and (b) relational [18,19,22,23].

Instrumental psychomotor skills form a line of intervention that starts with understanding the body as an instrument of knowledge and control, framed in a more instructive or directive methodology based on the teacher’s performance, and prior programming of the proposals to be developed [46,47]. The second line of intervention, relational psychomotor skills, focuses its intervention on the motor expressiveness that emerges from free and spontaneous motor movements. Relational psychomotor skills are based on both the experience of spaces and the motor act. The motor act is no longer an instrumental execution but has become an experiential one.

Integrative psychomotor skills are considered a discipline of psychomotor intervention that respects the epistemological bases of relational psychomotor abilities [19,20,23,47]. They address the psychosomatic unity of the individual, where the motor experiences by the individual explicitly and systematically focus on the whole of the person.

Integrative psychomotor skills use the individuals’ motor skills as a form of systematized, programmed and intentionally derived motor experiences; they are a preamble to spontaneous motor skills that will have a structured impact on the various dimensions of the person [46,47]. The consideration of a proposed challenge, or of a suggested one, allows a spontaneous didactic action to be established that takes into account the child’s contributions and their reactions, one that is based on the creation of interdisciplinary symbolic contexts.

3. Materials and Methods

3.1. Participants

Three groups were involved in the research, which took place over two years of study—2018/19 and 2019/20. A total of 1658 students (670 in their first year of study and 988 in their second year) from four pre-school and primary school institutions in the area of Girona were involved in the study. The four institutions were operating in close collaboration with the University of Girona for research purposes. Of the participants, 51.3% were girls and 48.7% were boys from pre-school and primary school, i.e., from K4 (4 years old, aged 4.2 ± 0.7) to K8 (8 years old, in their second year in primary school, aged

8.3 ± 0.8). In Spain, pre-school students are 4, 5, and 6 years old, and primary students (initial cycle) are 7 and 8 years old.

The schools included in the study were considered to demonstrate between medium and very high classroom complexities. Students presented immigrant and non-immigrant backgrounds. Of the 1658 students participating in the study, in three of the schools, 33.3% had an immigrant background, 7.8% were from North Africa and 3.9% from sub-Saharan countries, 7.6% were from South and Central America, 10.7% were from Asia, 2.5% were from Eastern Europe, and 0.8% were Roma. With 33.3% of the students having an immigrant background, this doubled the mean (16.0% for primary school institutions) for the region. In the fourth school involved in the project, in the city of Salt, the percentage of students with an immigrant background varied between 60% and 100%, with three classes having a high complexity, with between 50% and 75% of immigrant students, and two classes with very high complexities, with 85% and 100% of the students from a migrant background; these were mainly from North Africa, sub-Saharan countries, and Central and South American countries. The impact of school segregation on equal educational opportunities is especially evident in the chosen schools, which experience a high proportion of socially disadvantaged students. The pre-school and primary school centers are sometimes located in socially disadvantaged environments and suffer the consequences of the internal residential segregation of municipalities; they are the result of years of processes of stigmatization and social ghettoization that have negatively affected the consolidation of their heterogeneity.

A written request was made to the pre-school and primary education students' families, asking for permission to allow their children to participate in the study. The text was provided either in Catalan or Spanish. The request complied with the principles of Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of children, with regard to the processing of personal data and on the free movement of such data. The study research also followed appropriate country-specific ethical guidelines and regulations regarding research with minors, including eliciting assent from minors, informed consent from their parents or legal guardians, and the storage of protected primary data.

In total, 376 pre-service teachers from three bachelor's degree courses (Primary School Teacher Education, Early-childhood Teacher Education, and the double bachelor on Primary and Early-childhood Teacher Education) at the University of Girona developed the instruction over the 2 years of study. Of these 376 undergraduates, 195 were in their first year and 181 were in their second year; 64.9% were women and 35.1% were men (aged 23.2 ± 1.8). The pre-service teachers were informed that they would be participating in a study on cooperative learning in physical education in both university and school domains.

Finally, 43 schoolteachers from four institutions operating with the University of Girona were included during the two years of study. Of these teachers, 76.2% were women, and 34.8% were men (aged 38.9 ± 12.1).

3.2. Pre-Service Teachers' Training on SDGs

The pre-service teachers attended twelve seminars: six on sustainable goals and six on cooperative learning (Table 1). The two-hour seminars were given by the members of the research group and were intended to contextualize the study by focusing on SDG4 (education for sustainable development), SDG5 (gender equalities), and SDG10 (reduced inequalities). To achieve this, specific content information focused on general sustainable concepts (seminars 1, 2 and 3), the principles of sustainable development (seminars 4, 5, and 6), cooperative learning (seminars 7 and 8), and educational approaches (seminars 9, 10, 11, and 12) (see Table 1).

Table 1. Content information on seminars and associated SDG.

Seminars	Content	Related SDG
1	The 2030 Agenda and the 17 Sustainable Development Goals	All
2	Higher education in the sustainable development goals framework	SDG16
3	Early childhood development/education and human capital	SDG4
4	Primary education/education and human capital	SDG4
5	The leave-no-one-behind principle	SDG5, 10
6	The principle of circularity and decoupling	SDG6, 7, 12, 13, 14, 15, 16
7	Principles and competencies of cooperative learning	SDG4
8	Cooperative learning in physical education domains	SDG4
9	The dimensions of cooperative learning (Johnson and Johnson)	SDG4
10	Contextualized cooperative challenges	SDG4
11	Guided discovery challenges	SDG4
12	Psychomotor problem-solving	SDG4

3.3. Application of the Instructional Approaches

When a motor challenge is considered as an instructional educational approach, it targets specific methodological strategies, mainly driven by the contextualization of the objectives of the challenge [37]. In the contextualization of the motor challenges, the instructional approach, in the process of both designing and implementation by the pre-service teachers in the schools, was considered symbolic, interdisciplinary, interrelational, culturally diverse, gender-independent, and significant for the integral development of the children. In the schools, the strategy is presented as a problem to be contextualized in a symbolic way, with the intention of fostering a socio-emotional connection among the members of a cooperative or collaborative group. The strategy usually begins with the identification of symbolic elements that allow the symbolic imagination of the child to be awakened in the form of a challenge. The pedagogical proposal is initiated by questions from the teacher, who also offers students a space for discovery, inquiry, and research to create the challenge, and which will then have to be solved through the motor activity in a group. The co-created symbolic context is established within a preferential empathic climate for the teaching-learning relationship between teacher and learners. This relationship can only be achieved from the responses and contributions of the participants, and from the proactive feedback provided by the teacher [38], which also considers the emotional involvement of children; it unquestionably relies on the involvement and responsibility of all members of the group for the resolution of the cooperative physical challenges.

The pedagogical approach to the contextualized psychomotor challenges was divided into three specific actions: cooperative physical challenges, problem-solving, and guided discovery.

3.3.1. Cooperative Physical Challenges

Cooperative physical challenges are part of a technique that is based on the foundations of cooperative learning [7]. The challenge is presented by the teacher to the students in either a structured, semi-structured, or unstructured way. The students, in a consensual manner, must coordinate themselves, structure the challenge and propose a strategy to finally establish a dynamic of co-responsibility in the learning of their group members, in order to achieve a common goal. Discussion, respect, help, cooperation, thinking in terms of action, learning to reflect or share are, among many other activities, at the core of cooperative physical challenges.

3.3.2. Guided Discovery

Guided discovery is a teaching strategy that involves the student in the discovery. It consists of a particular relationship between teacher and student. The teacher's sequence of questions leads to a series of answers from the student. Each question from the teacher provokes a prospective answer that the student has to discover, solve and complete. The guided sequence of questions facilitates the solution of the challenge. It is a style that requires the student to make more decisions regarding their own learning process. The guided discovery involves cognitive dissonance, inquiry, and therefore discovery. It is executed in several phases: exploration, the presentation of a problem situation, trial and error, identification of the problem at a symbolic, motor, and linguistic level, feedback and evaluation (assessment of the tasks) and the learning retention and transfer phase. This sequential dynamic will allow for the creation of contextual symbols that, by maintaining the format of a cooperative physical challenge, will address a particular motor problem to be solved.

3.3.3. Psychomotor Problem-Solving

Motor problem-solving offers learning situations that require reflection and research to define an action strategy with open solutions. Problem-solving is understood as a creative social construction that requires discovering, developing hypotheses, confronting, reflecting, arguing, and communicating ideas in order to solve the problem. The psychomotor challenge is co-constructed by means of a symbolic context [29,37].

In Table 2 the list of contextualized psychomotor challenges, rooted in cooperative learning, is presented. In the table, both the content element of each challenge, along with the key components of the cooperative instructional strategy, are presented and are cross-referenced to the SDG that each challenge is tackling. The instructional strategy included critical awareness for most of the SDGs that call for a deep transformation and was adapted to the learning processes of pre-school and primary school students. It also deals with inclusive and equitable quality, based on a continuous evaluation of learning outcomes that consider economic, social, and environmental issues, such as awareness on climate change, efficiency when using resources, pollution of the sea, agricultural practices, mobility, sustainable development and reducing inequalities, among others.

Table 2. List of contextualized psychomotor challenges with their content keyword elements, keywords on cooperative activities, and their relationship with SDGs.

Contextualized Psychomotor Challenge	Keyword Elements	Related SDG
1	Landscape ecology, ecosystem recognition, geographical mapping, plant and animal recognition, plant functionality, plants and health, knowledge of body elements, recognition of ethnic groups, interaction between individuals.	SDG2, 3, 5, 15
2	Recognition of structures in societies, rules in ancient societies, knowledge of historical architecture, types of performing arts, building cooperative groups, active participation, analysis of complex systems, recognition of leadership.	SDG10
3	Historical dynamic processes, cross-cultural knowledge, geographical identification of countries, recognition of ethnic groups, attention to languages, eating rules, food rights, recognition of traditional music, participation in traditional games, participation in games from around the world, horizontal group diversity participation, cooperative building construction.	SDG2, 3, 10

Table 2. Cont.

Contextualized Psychomotor Challenge	Keyword Elements	Related SDG
4	Ways of traveling, recognition of characters in story-telling, sustainable means of locomotion, transport networks, planning group activities, decision-making in small groups, group agreements.	SDG9
5	Rules in societies, childhood in the past, availability of family resources, access to resources, distribution of economic resources, stratified societies, country-dependent differences, identification of social welfare, identification of minorities, recognition of gender patterns, individual accountability, and gender.	SDG5, 16, 10
6	Recognition of climates, living in extreme climates, recognition of ethnic groups, biodiversity, and human feedback, integrated land use, recognition of foreign customs, decision-making in extreme climates, support for healthy diets, cooperation for building stable societies, dancing in groups, planning group activities.	SDG10, 11, 13
7	Living in other countries, recognition of country characteristics, cross-cultural differences, efficient agricultural systems, protection of terrestrial biodiversity, integrated land-use, evolution over time of minorities, definitions of structured groups, deciding the best material for challenge development, agreement on decisions.	SDG2, 3, 10, 11, 12, 13, 15
8	Identification of pollution (e.g., plastics in the sea), waste management, modern societies and environment, sustainable development, recycling and reusing materials, building group narratives, class group strategies toward sustainability, solving problems cooperatively.	SDG6, 12, 14

3.4. Development of Cooperative Contextualized Psychomotor Challenges

The contextualized psychomotor challenges were presented by the pre-service teachers once a week for six consecutive weeks and were chosen from the list in Table 2. The pre-service teachers developed the given contextualized psychomotor challenges in groups of three, with a closed group of 12 pre-school or primary school students. Each challenge was either monitored by a schoolteacher or by a member of the research team. The contextualized psychomotor challenges each lasted for a period of ninety minutes, which included the presentation, development, and group reflective processing. The group reflection was monitored by one schoolteacher and one member of the research team and was based on a structured list of questions that facilitated open discussion by the pre-service teachers, who paid special attention to the feedback provided by the teacher.

3.5. Reflective Narratives on Cooperative Activities and SDG5 and SDG10

Once the pre-service teachers had finished the whole set of interventions in the schools, they were asked to produce individual reflective narratives on how the development of the contextualized psychomotor challenges in the schools provided insight into the interlinking among the five basic elements of cooperative learning; that is, how positive interdependence, individual accountability, promotive interaction, social skills and group processing [41] may overcome gender and other inequalities. For each intervention in the

school, the pre-service teachers provided a comment on cooperative learning and gender, and on cooperative learning and inequalities. This resulted in a final total of 2256 comments on gender and a further 2256 comments on inequalities.

Each narrative was analyzed in terms of initially identifying the situation, activity, or experience that triggered reflection, then understanding the role of cooperative learning in fostering equalities, then finally, debating and transferring the pre-service teachers' critical concrete learning on the dimensions of cooperative learning.

The content of these narratives was analyzed on a scale from 1 to 5, where 1 indicates absence or a low weighting, and 5 indicates the highest level of performance. Level 1 corresponded to a basic description narrative and level 5 to a critical reflective narrative. In level 5, the pre-service teacher transformed the out-of-class professionalism developed through the pre-school and primary classroom activities into critical and contextualized social, cultural, and political reflections on inequalities [29,48].

Likewise, the 43 schoolteachers were asked to produce two narratives each at the very end of the instructional approach (i.e., for both years), one in relation to gender and the other to inequalities. Regarding the pre-service teachers, the critical narratives were scrutinized for the uptake of significant comments and categories.

The analysis of both the pre-service teachers' and schoolteachers' narratives was performed in three rounds. In round 1, two researchers from the research team discussed other students' and teachers' comments and reached a consensus on the cooperative learning categories for each individual comment, with an analysis on 10% of the comments. Krippendorff's inter-reliability rating [15,48] was "substantial" for the students' comments (0.91) and teachers' comments (0.95). In round 2, all six researchers analyzed the first-round results to finally locate all comments on each cooperative learning category. The inter-reliability was measured in round 2 and was in "almost perfect agreement" for all cooperative components (0.90). In round 3, all researchers extracted the principles under which each cooperative learning dimension operated. In round 3, the inter-reliability varied between 0.94 and 0.98, depending on the cooperative learning categories. The common agreement on categories was the origin of defining the principles of cooperative learning, based upon the nature of the interpretation and hermeneutics [2]. The categorized principles were derived from the understanding, critical analysis, and validation of the best application of sustainability-based pedagogical instruction and associated competencies in pre-school and primary schools and were framed by the researchers' practicality and values on inclusion and equality.

4. Results

Based on the analysis of all the pre-service teachers' critical narratives (205 for gender and 98 for inequalities), a total of 27.4% (618 comments) for gender and 16.1% for inequalities (363 comments) received the maximum level of critical reflection. In addition, out of the 86 reflective narratives on gender issues provided by the schoolteachers, 81% were found to include critical reflections, on which topic 174 comments were reported, and out of the 86 reflective narratives on inequalities provided by the schoolteachers, 77% were found to include critical analysis, for which 264 comments were reported.

Table 3 presents a list of some of the critical comments provided by both the pre-service teachers and the schoolteachers on each cooperative learning dimension: positive interdependence, individual accountability, promotive interaction, social skills and group processing.

Table 3. Preservice teachers' (PST) and schoolteachers' (ST) reflections on cooperative learning for each dimension.

Dimension 1: Positive Interdependence
"All you need is neutral material, which the child already puts imagination and symbolism into. It's amazing what they can come up with and work together to build something." (PST)
"Non-participatory observation shows how easily the child gets along with others ... they come to agreements more easily than I thought." (PST)
"Achieving the challenge of the session is obviously a collective manifestation of shared joy and satisfaction." (PST)
"The diversity of student groups during the preparation of the session and its execution results in a personal professional growth more in line with the social needs of equality." (PST)
"The exchange of opinions and proposals are accepted and valued from a climate of ideological, cultural, gender or ethnic difference of respect." (ST)
"The empowerment of the roles that are established within the cooperative groups are indiscriminately accepted regardless of gender." (ST)
"Although groups seek inclusive and egalitarian work, the distribution of roles in the execution of the session always tends to respond to the socially accepted typification of gender. We need a reflective introspection of the future teacher towards this condition of surely unconscious gender." (ST)
Dimension 2: Individual Accountability
"The off-center space is easy to drive. A child speaks and the rest listens and waits for the turn to speak. If a child comes forward with a small comment, it's easy to go back." (PST)
"The dynamics of psychomotor intervention based on contextualized psychomotor challenges make individual action an act of collective responsibility to achieve the contextualized psychomotor problem/challenge." (PST)
"Future teachers promote opportunities in dialog spaces. But I don't always pay equal attention to all genres when it comes to managing turn-taking." (ST)
"Carrying out the session in the real context is a clear issue in pre-service teachers' future training, in which, regardless of ideology, belief or social condition . . . all of us are needed in the education of the child, just like all they are necessary for the correct execution of the session." (ST)
Dimension 3: Promotive Interaction
"In a psychomotor session, I would say that communication is more a bodily act than a verbal one." (PST)
"The climate of the session, sustained by this shared challenge, brings to the fore, without any discrimination, constant demands for help. Students experience it as something by everyone, for everyone!" (PST)
"The dynamics of a dialog in the preparation of the session requires a constant adaptation and acceptance of the other." (ST)
"The dynamics of group work in the creation and acceptance of the proposed tasks lead to a progressive intrapersonal and interpersonal development in the acquisition of one's own identity as a future teacher." (ST)
"Co-creation from an open and inclusive dialog allows students to work across different active methodologies in the elaboration and creation of the contextualized psychomotor challenge." (ST)
Dimension 4: Acquisition of Social Skills
"The climate of the session, sustained by this shared challenge, brings to the fore, without any discrimination, constant demands for help. Students experience it as something by everyone, for everyone!" (PST)
"You realize that motor performance facilitates the communication and understanding of the contents you want to transmit, freely, without any ethnic, cultural or gender conditioning." (PST)
"The relationship between peers in this climate of equality and respect offered by the psychomotor intervention means that there is a respect for the partner or playmate. The other is easily included, be it a boy or a girl, from the usual group." (PST)

Table 3. *Cont.*

<p>“The use of body language provides the student with a more sensitive and empathetic communication channel with the child regardless of gender or social condition.” (ST)</p>
<p>“The dynamics of dialog using multilingualism: motor, symbolic, plastic, verbal, etc., allow the student a better understanding of the other (child) and indifferent exchange of their behavioral attitude, origin or sex.” (ST)</p>
<p>Dimension 5: Group Processing</p>
<p>“It is clear that peer groups are formed by affinities and are often groups of boys or girls. But in the game, in their construction, they do not differentiate and when they expose it in the space of decentralization, they do not differentiate it. The ones who are talking are those who have shared the game, whether it’s a boy or a girl, dark-skinned or clear-skinned ... they are super tolerant.” (PST)</p>
<p>“Sometimes one child exposes the game and suddenly another exposes a different version ... and as if nothing comes to a consensus between equals ... they end up reproducing a consensual construction of the game ... it’s impressive.” (PST)</p>
<p>“Promoting these spaces for dialog between equals (students) allows for the different opinions to be made visible—often from the debate that ends up developing agreements and processes of improvement.” (ST)</p>

Regarding the positive interdependence dimensions, the pre-service teachers understood that the pre-school and primary students, when embedded in interactions with the members of the group during the contextualized psychomotor challenges, learned significantly more, provided that the interaction was proactive. In this process, each student depended on the actions carried out by all the members of the group. To solve the psychomotor challenge, the interaction had to be multiple, with each member helping to solve the challenge. Likewise, the pre-service teachers reported on individual accountability, in which girls and boys interacted together face to face, adapting each personal action to the group in light of improving the social relationships within the group. Subsequently, the action of each individual was described as a necessary and visibly mutual process. Nevertheless, the pre-service teachers reported that, in some cases, they had had to interact with the groups to reformulate the individual action of each member. Similarly, in many cases, pre-service teachers formulated that, in order to achieve a psychomotor challenge, the members of a group had to understand that in order to succeed, all members had to interact and that the activity of a group member was based on advancing the other group members, which was dimensionalized as promotive interaction.

Pre-service teachers also reported that to develop the cooperative contextualized psychomotor challenges, girls and boys had to communicate and support each other effectively, either in the distribution of roles or about the most effective way to solve the challenge. This process implied that girls and boys had to get to know each other to achieve their common goal. All in all, the boys and girls had to come up with a fair employment of social skills. Finally, pre-service teachers, through the girls’ and boys’ group processing, reported that reflecting on the activities was essential for them to understand, analyze and debate how they achieved the objectives; this was only attained through the levels of the interactions between them. In addition, the analysis of what went well and what did not strengthen the bonds among both the pre-school students and the primary school students.

The schoolteachers stated that gender equality, respect for others, and social diversity cannot be tackled from a unidirectional discourse. On the contrary, they should be strengthened through school instruction, from either body language, through body expression, executing active roles, enhancing mutual respect and dialog, or empathy. The schoolteachers also reported the importance of conditions for cooperative psychomotor challenges, which should include inclusive spaces and materials for the interpersonal interaction at both individual and group scales. Schoolteachers must promote realistic situations for the children’s development, with a receptive, dialog-based, and reflective interaction, both between peers and between students and teachers, one that can effectively internalize

values. The schoolteachers confirm that children in preschool and primary educational classrooms manifest in a transparent way, and without prejudices. This condition promotes an educational context of development suitable for acquiring values, attitudes, and behaviors that promote inclusive and equitable quality education. They believe that all dimensions of multilingualism—motor, symbolic, plastic, verbal, etc.—may be promoted through active cooperation with an exchange of students' behavioral attitudes, origin, or sex that at a large scale may produce an egalitarian and non-discriminatory society.

Based on the analysis of the pre-service teachers' and schoolteachers' reflective narratives, the principles under which each cooperative learning dimension operates are presented in Table 4. The resulting forty-two principles deliver a framework in which equity and inclusivity in pre-school and primary school classrooms are considered. These principles operate through functional, relational, and personal student dimensions that are linked to knowledge, skills, and values. These address competency-based education for sustainable development, for instance: (i) interdisciplinary thinking, (ii) justice, responsibility, and ethics, (iii) critical thinking and analysis, (iv) interpersonal relations and collaboration, (v) empathy and changes of perspective, (vi) strategic action, (vii) personal involvement, and (viii) tolerance for ambiguity and uncertainty [2].

Table 4. List of the principles that define the 5 dimensions of cooperative learning.

Principles of Positive Interdependence
<ul style="list-style-type: none"> • Analysis of neutral symbolic contexts • Description of historical game contexts from a unique gender perspective • Understanding the perspectives of others • Planning student roles independent of gender • Critical consideration of neutral material • Ability to co-create challenges with internal and external contexts • Ability to create challenges considering motor, cognitive, emotional, and relational diversities • Ability to create challenges considering ethical, cultural, and social differences • Reflection on one's own and others' cultural values • Learning from others' perspectives • Accepting diversity of opinions, experiences, and perspectives • Solidarity with others across differences
Principles of Individual Accountability
<ul style="list-style-type: none"> • Ability to design safe cognitive and motor challenges for children's empowerment • Understanding of ethical responsibility and respect for all genders and different social and geographical origins • Ability to identify one's own and one's peers' perspectives • Generation of empathy with others across differences • Taking responsibility for motivating peers • Taking responsibility when coping with personal conflicts, contradictions, and setbacks • Ability to consider ethics, justice, and ecological integrity • Ability to consider the circularity of processes and materials • Ability to reflect on one's own actions
Principles of Promotive Interaction
<ul style="list-style-type: none"> • Ability to adapt to and accept perspectives from a dialog • Ability to regulate relational feedback between peers • Accepting progressive intra- and interpersonal development • Ability to co-create from open and inclusive communication between peers • Ability to communicate effectively in contextualized contexts • Accepting ideas independent of ethnicity, culture, or social strata • Ability to accept and value other perspectives • Learning as a mutual process across differences • Accepting norms that regulate equity and inclusivity • Accepting and receiving help from peers across individuals' differences • Ability to create community actions in contextualized contexts

Table 4. *Cont.*

Principles of Acquisition of Social Skills
<ul style="list-style-type: none"> • Ability to understand others' perspectives and a willingness to promote feedback • Ability to use multilevel languages: symbolic, corporal, verbal, artistic • Capacity to communicate, deliberate, and negotiate • Willingness to cooperate to solve problems
Principles of Group Processing
<ul style="list-style-type: none"> • Willingness to share experiences to reduce stereotypes and prejudices • Willingness to promote actions in inclusive groups • Ability to listen and respect the contributions of others regardless of gender • Ability to recognize strategies that promote equity and inclusivity in groups • Ability to communicate effectively in open discussions • Ability to produce evaluations and provide feedback in open discussions

5. Discussion

5.1. *Instructional Cooperative Approaches and Competencies in Education for Sustainable Development*

This study proves that in both pre-school and primary education classrooms (i.e., K4 to K8 students), contextualized psychomotor challenges rooted in cooperative learning settings may be congruent with the perceptions of tertiary students regarding the principles that govern education for sustainable development. The participation of schoolteachers and tertiary students in providing critical reflection and the applicability of sustainably oriented competencies add new insights into the principles of education for sustainable development that, on both an individual and classroom scale, may generate strategies to tackle gender differences and inequalities. In addition, from the perspective of childhood education, girls and boys were invested in developing altruistic values, i.e., they were able to care for their classmates, they valued diversity and gender equality, and made decisions based on how to develop diverse contextualized cooperative challenges. Furthermore, we can highlight that teachers, as facilitators for relational educational approaches, have a crucial role in ensuring students' social inclusion [49,50]. The educational activities so far may facilitate students to become immersed in a supportive environment and undergo a positive academic adjustment, especially for students of migrant origin [23,51]. Based on the research on interpersonal relationships, this paper mainly focused on the promotion of equality, in terms of reducing gender inequalities and reducing inequalities derived from students' non-immigrant and immigrant cultural backgrounds. There is still little empirical evidence on how educational approaches based on sustainable development competencies are reflected in different approaches at school. This emphasis on equality concerns in cooperation between individuals and groups calls for educational practices that are based on respect and tolerance [27,29,50].

The set of categories that were derived for each cooperative learning activity were translated into pedagogical principles for cooperative learning. The principles are rooted within the framework of education for sustainable development and manifest the links between principles and competencies [2]; that is, the ability to deal with solutions for a physical education challenge and the process of learning from others as a result of a promotive interaction is the basis of competencies on interpersonal relations and collaboration [14,15]. Similarly, the ability to identify one's own and one's peers' perspectives, understanding and sympathy for the actions of others, empathy, and solidarity with others despite differences, transcultural understanding, and the possibility of embracing a diversity of opinions, experiences, or perspectives are the foundation of competencies on empathy and changes of perspective [2,11]. The ability to communicate during the development of the challenges and during the group reflective process and the self-motivation, willingness, and the ability to take action in cooperative groups can also be categorized as sustainable competencies. Indeed, the contextualized psychomotor challenges in the framework of cooperative learning could be at the core of pre-service teachers' motivation, which not

only provided girls and boys with support but also provided support for relatedness by enhancing girls' and boys' personal involvement in physical activities, a major issue in education for sustainable development [52].

5.2. Cooperative Learning to Tackle Gender and Inequalities

The degree of homogeneity and heterogeneity in schools determines the degree to which students' classroom interactions develop and the socialization of students with diversity [53], with heterogeneity producing higher-order values of equity and inclusiveness. Diversity in the classroom has been found to moderate students' views on students' well-being and race-related issues since a school's ethnic diversity has robust psychosocial benefits for multiple ethnic groups [54]. The medium- and high-diversity classrooms in this study may also mediate in the development of contextualized psychomotor challenges since the balance in number between ethnic groups is less likely to mediate toward possible gender or ethnic differences [54]. That is, heterogeneity in ethnicity and gender can foster inclusion and equality, which is in disagreement with some findings where students in classes with a higher proportion of ethnic minority showed slightly lower achievement levels and feelings of belonging [55]. Our results, then, show that cooperative learning, which relies on students' personal commitment and positive interdependence, could enhance a supportive climate of peer interaction, in which principles are brought up to support the goals of the pedagogical instruction.

Our results indicate that both gender and inequalities may be tackled on the practicability of the same principle of not-leaving-anyone-behind, which pre-service teachers manifested as being mediated mainly through the dimensions of positive interdependence and promotive interaction, both dimensions being at the core of the definition of cooperative learning [14,29]. Indeed, physical education may increase student motivation, their positive interdependence, and both social inclusion and respect among their peers [56,57]. Positive interdependence is attained when all the team members in a cooperative challenge can achieve a goal together and promotive interaction is attained when students work face to face during the development of the process. For both cooperative dimensions, boys and girls are committed to improving relationships and adapting to social competencies [58,59]. In addition, group processing, which has been found to be a space for girls to reflect on their experiences of sexism in physical education, may engage students in reflecting explicitly on gender and inequalities [17].

5.3. Implications, Future Perspectives and Limitations

This study articulates cooperative learning through contextualized psychomotor challenges in physical education, in pre-school and primary instruction. Within this framework, students are immersed in a cognitive dissonance that guides and encourages them to analyze, agree, enter dialog and increase their awareness of the implementation of peer alliances through experiential and contextualized practices. This provides an in-depth approach and analysis in relation to learning activities that open up a new didactic orientation on how to promote gender equality and reduce inequalities through self-identification in the whole teaching and learning process. This study provides research into an education system that focuses on an innovative pedagogical approach and offers principles that guide cooperative learning toward the development of sustainability. The article outlines 42 principles that provide a framework for equity and inclusiveness, in which the treatment of the SDGs ceases to have a descriptive theoretical aspect so as to acquire a competence treatment. In other words, a learning process should be developed that favors the acquisition of competencies and abilities and one which will allow pre-service teachers to promote equal opportunities, with a critical and reflective sense of the cultural, social, economic, and environmental implications.

We believe that it is very important for pre-service teachers to have an initial space to share their experiences in relation to social stereotypes and prejudices. A phase of theoretical documentation through a process of shared dialogs would allow students to

become aware of the responsibility they have as citizens. Furthermore, it is of great interest for future research to adapt the contextualized cooperative challenges to the objectives of several curricular areas in higher education, with attention being paid to the characteristics of the university student in acquiring the contents of a subject and teaching skills. The experience would allow pre-service teachers to analyze the influence of contextualization, in this case from symbolic educational environments, from cooperative learning, and to determine how it affects the development of teaching skills and, obviously, the development of the SDGs.

The SDGs should be employed with a set of competencies to be achieved by pre-service teachers upon the completion of their university studies, giving them myriad skills regarding ethics, sustainability, respect, empathy, and abilities for life in a global world that should offer equal opportunities for everyone. An education based on sustainable development will lead to a responsible education system that allows all to live and experience heterogeneity as wealth. An education system should aim at developing people with critical thinking, anticipation, a sense of justice, responsibility, and ethics, who are tolerant of ambiguity and uncertainty, among other aspects; all these qualities are very well defined in the principles presented in this manuscript.

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