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Cooperative and competitive learning as transformative factors of educational processes for extracurricular skill enhancement

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Introduction: The learning process goes beyond the acquisition of curricular cognitive elements to include extracurricular skills. This extended concept has attracted renewed attention through the European Council Recommendation (2018) on skills development for lifelong learning in schools. The Organization for Economic Cooperation and Development has also highlighted the relevance of socio-emotional skills for learning and life chances. The official uptake of extracurricular skills in curricula poses schools and educators the challenge of finding ways to conceptualize, teach, and assess them. To this end, co-operative learning and peer-to-peer education hold a prominent place among educational strategies alternative to conventional teaching practices. Both actively engage students and have a positive impact on achievement in curricular disciplines and on the development of lifelong learning skills and social and emotional competences. The present study presents a case study in which collaborative learning was supported via a digital platform.

Methods: We analyzed the qualitative data collected in Italian schools taking part in the Kids4alll, a Horizon 2020 project. The project's aim is to improve lifelong learning skills directly and other skills indirectly through collaborative learning based on the "buddy method" (pairs or groups of peers working together).

Results and discussion: Our findings reveal the potential benefit of peer-to-peer approaches. This potential extends to the development of co-operative skills used in school context and transferable to other areas, along with the acquisition of character-building skills. However, a criticality in the application of peer learning interventions is that many teachers are often ill prepared to implement cooperative learning in classroom practice or lack sufficient training in matching peer-to-peer work and pedagogical needs.

KEYWORDS

cooperative learning (CL), lifelong learning (LL), skills and competencies, innovation in education, group dynamics, buddy method

Introduction

The learning process goes beyond the acquisition of curricular cognitive elements to include extracurricular skills (Pellerey, 2010; Farrington et al., 2012). This concept has recently attracted renewed attention following the European Council's recommendation (European Commission, 2018) on the development of lifelong learning skills at school. The Organization for Economic Cooperation and Development (OECD) has also highlighted the relevance of

socio-emotional skills for learning and life chances (Chernyshenko et al., 2018).

The interest in developing lifelong learning and transferable skills in school curricula stems from the need to combine a performative approach – based on an instrumental projective notion of education as a set of tools for the labor market – with a lifelong learning perspective that views education as a process of acquiring essential knowledge and skills for self-development, participation, and full citizenship. Such a transition does not come easily, however, Castoldi (2018) noted that it poses a challenge to the current educational paradigm, as it requires that "disciplinary knowledge return to its role as a tool for the formation of the subject and not as an end in itself." Furthermore, "the disciplines themselves must return to the role for which they emerged and developed in human history," namely, "the provision of cultural tools for understanding and coping with natural and social reality" (Castoldi, 2018, p. 39).

The measures of lifelong learning in education developed out of a long debate that began in the 1970s with the introduction of the term by UNESCO, which advanced the hypothesis of the learning society (Faure et al., 1972) and continued by the OECD. Then, in the 1990s, the European Union defined lifelong learning as an instrument of competition within the globalized economy (Murphy, 1997; Field, 2001) and as a factor of social development, since learning can be framed as a "social act" (Lindeman, 1926).

The pedagogical didactic model underlying this approach states that effective teaching is possible only when a student is motivated and actively involved in the construction of knowledge within the social dimension of the classroom. The last 20 years of the new sociology of childhood (e.g., Alanen, 1988; Qvortrup, 2002; Corsaro, 2005) show that this approach necessitates a radical change in perspective of the agency and the participation of children and adolescents as central to the learning process. Moreover, a new conceptualization of the educational process is needed to meet the multiple dimensions involved, as outlined in the Save the Children's definition of educational disadvantage, which underlines the interdependence between the cognitive and the affective/relational side of education.

Save the Children (2016) define educational disadvantage as insufficient development of essential cognitive skills for growing up and living in a modern innovation and knowledge society, with implications for the development of non-cognitive skills, such as emotional skills, relationships with others, and discovering oneself and the world. Within this frame, the campaign against educational disadvantage targets four main dimensions: *learning to understand*, *learning to be*, *learning to live together*, and *learning to know the world*. The first refers to the development of basic cognitive skills for life in society, while *learning to be* refers to the development of emotional and psychological skills needed for coping with everyday life. The third dimension emphasizes the development of interpersonal relationships and friendships and captures the importance of family ties. The final dimension of *learning to know the world* refers to education and knowledge for an independent and active life and to strengthen life chances.

There is urgent need for change in the Italian context where various surveys have repeatedly rated as unsatisfactory the general population's skills level. For example, EC—European Commission (2019) report on education and training found extremely low literacy and numerical skills in nearly a third of adults in several European countries, including Italy. In 2018, the OECD's Program for International Student Assessment (PISA) study reported that one in five Italian students is not sufficiently equipped with lifelong learning skills (Scleicher, 2018). Data from the 2022 National Institute for the Evaluation of the Educational and Training

System (INVALSI, 2022) survey reveal an even bleaker picture. The COVID-19 pandemic impacted on the acquisition of basic skills in some regions of the country. The Italian educational system grasped the importance of introducing teaching and relational methods and innovative pedagogical practices for integrating the development of knowledge and skills with the vertical skills curriculum starting in 2000. The curriculum, which went into effect with the educational reform known as the Gelmini Reform (2008–2010)[1], consists of objectives to be achieved as students' progress along an educational-training pathway so they can consolidate what they have learned and prepare the basis for acquiring new skills.

The official uptake of extracurricular skills into the curricula poses schools and educators with the challenge to find ways to conceptualize, teach, and assess the skills. The plethora of definitions (e.g., lifelong learning, social and emotional skills, transferable skills, character skills, soft and hard skills) raises confusion about which skills are to be developed and strengthened in and through school and about the methods by which students are to be taught how to strengthen these skills.

The aim of the present study was to present a case study in which a skill-based curriculum was implemented and supported via a digital platform. The qualitative data were collected in Italian schools participating in the Kids4alll project. The Horizon 2020 project applies a technology-based approach based on the buddy method (pairs or groups of peers working together) to develop lifelong learning and socio-emotional skills in primary, lower secondary, and upper secondary students.

Review of the literature

Educational research has long hailed the potential of peer learning practices and the positive impact they can have on performance in curricular disciplines and on the development of lifelong learning and socio-emotional skills (Beals et al., 2021). But before peer learning can be activated in the classroom, new educational strategies and teaching methods are needed to promote the acquisition and development of skills and knowledge. In this regard, peer-to-peer education and cooperative learning (CL) hold a prominent place among alternative educational strategies and practices.

In Italy, CL in the classroom was recognized in 1996 as an effective tool for fostering individual performance, classroom climate, and certain socio-emotional skills (Johnson et al., 1996). In short, the basis of CL theory is that the learning process is enhanced when sociability is effectively utilized and that successful cooperative learning occurs when individuals work interdependently to promote the success of both shared and individual goals.

The CL refers to classroom situations where group members feel equally responsible and involved, albeit each in their own way, according to their own abilities and inclinations. CL can be viewed as a strategy that promotes individual qualities and modulates them through mutual adaptation toward a common goal. Peer-to-peer learning, for example, helps students become conscious protagonists of their own education and makes them responsible for the education of others through the exchange

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1 The term "Gelimi Reform" commonly refers to a series of legal acts of the Italian Republic enacted between 2008 and 2010 during the term of office of the Minister of Education, University and Research, Mariastella Gelmini, concerning the education sector in Italy.

of knowledge. This makes peer education one of the most integrative pedagogical measures that teachers can use to improve more than just the curricular aspects of the classroom. In this context, the concept of positive interdependence is of particular theoretical and practical importance, since it is central to CL and the theory of social interdependence (Deutsch, 1968; Johnson et al., 1996). Roger and Johnson (1994) found that positive interdependence occurs when the group members feel that they are so interconnected that no one can succeed unless everyone does. In this way, positive interdependence creates a commitment to the success of others and to one's own success, thus helping students generate positive social interactions in learning situations (Johnson and Johnson, 2013).

From this perspective, teachers can promote skill acquisition by combining CL and peer-to-peer experience in classroom practice. This is consistent with the goal of overcoming of simple "learning" skills and implementing a "way of teaching that enables students to become competent" (Ajello, 2021). Nevertheless, CL does not come about by simply putting students together and expecting them to rely on themselves (Gillies, 2016); on the contrary, learning outcomes are improved when certain behaviors are encouraged. This is why it is particularly important to prepare students for collaboration by promoting cooperative values and norms, with a focus on setting student learning goals and fostering a positive climate for learning with peers (Baloche, 1998; Blatchford et al., 2003). Johnson et al. (1996) stated that intragroup relationships should be based on mutual knowledge and trust, effective and clear communication, mutual acceptance and support, and positive conflict resolution to ensure good intragroup collaboration.

Despite the well-documented benefits and the diversity of techniques within CL to create positive interdependence (e.g., goal interdependence, reward interdependence, and resource interdependence), many teachers find it difficult to implement it in classroom practice (Cohen, 1994). In some cases, the difficulties arise when teachers are uninformed of the research and theoretical perspectives underpinning this approach or how to transfer this information into classroom practice (Buchs et al., 2017). Teachers face numerous hurdles that impede them from integrating the key elements of CL into their classroom routine (e.g., Abrami et al., 2004; Gillies and Boyle, 2010; Buchs et al., 2017), ultimately limiting the effectiveness of CL (Roseth et al., 2008).

Implementing a skill-based curriculum is difficult for teachers and educational staff (Ornstein and Hunkins, 1998; Glatthorn et al., 2005) because it requires a radical rethinking of teaching content and methods. This means that effective implementation of competence curricula in schools cannot be improvised. Furthermore, teachers need training to help them build a new teaching-learning relationship with their students. In their recent study, Van Ryzin et al. (2022) described the positive impact of using technology-based solutions to overcome the limitations of conventional CL. Research in this area is still scarce; nonetheless, current evidence suggests that technology to deliver CL lessons may foster its rapid implementation, accessibility, and fidelity to best practices, as well as scalability and sustainability.

Materials and methods

The materials for this study were collected in Turin and Padua during the monitoring of two pilot phases of the Kids4alll project. Activities were carried out from November 2022 to September 2023 and involved more than 300 students. The students were categorized from ISCED 2 to ISCED 3, according to the International Standard Classification of Education ISCED 2011 (UNESCO Institute for Statistics, 2012). A total of 14 classes (ISCED 2: $n = 8$; ISCED 3: $n = 6$) were familiarized with the use of the platform, i.e., a digital tool to promote key competences in lifelong learning. The learning units posted on the platform were divided into lifelong learning key competencies. Students studied the learning units on "citizenship" and "cultural awareness" skills.

The focus of the present study was to enhance the dynamics between peers and the pedagogical relationship between adults and non-adults within a learning experience of knowledge, skills, and abilities. During their training, the students were supported by educators[2] and teachers. The majority of teachers taught Italian and history (readers should refer to the introduction to the special issue for further details about participants and methods).

Qualitative materials were created and collected by the authors and consisted of: ethnographic observation reports ($N = 42$) of student interaction with the digital platform in class, interviews ($N = 6$) with teachers and school principals; focus groups ($N = 6$) with teachers and educators; focus groups ($N = 3$) with local and national stakeholders; transcripts from national meetings ($N = 3$) with the project's stakeholders.

As described in the Introduction to the special issue, the Kids4alll activities were based on buddy cooperation. In the original buddy method, student pairs are trained to promote skills learning through cooperation and creativity. In the present study context, however, the teachers did not always have the students form buddy pairs to work together on the platform. Instead, they often organized the work in small groups of 3 to 4 students. The reason was that the teachers wanted to encourage the inclusion and the support of socio-culturally disadvantaged students or students with special educational needs or disabilities, which were common in the study settings.

The current study focuses on the difficulties that the educators faced in implementing CL activities and on the peer relationships that formed in class. The influence of technology on CL was also analyzed. In detail, the research questions of the study were:

- What difficulties do teachers encounter when putting CL into practice and to what extent does technological support aid in the learning process?
- Do peer-to-peer activities within groups and in the classroom trigger other types of peer relationships besides collaborative relationships?

Data analysis

The qualitative materials were analyzed using a grounded approach, with attention directed to the themes that emerged from the observation diaries, focus groups with teachers, educators and stakeholders. N-Vivo software (Version 13, 2020 R1; Lumivero, 2020) was use to archive and access materials.

As it is known, grounded theory (Glaser and Strauss, 1967) is a qualitative research method that aims to interpret the underlying

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2 Educators are professional figures specialized in non-formal educational activities; they are often involved in school and third sector associations.

processes of a particular phenomenon. The grounded theory approach is characterized by the fact that it is as free as possible from theoretical pre-structuring in order to "let the data speak." Indeed, this analytical technique is characterized by its focus on the data – which are local and contextual – rather than on theories that emerge (are grounded) directly from the analysis of the data. Although critics of grounded theory point to the risk that analysis can be complicated by the multiple stimuli that emerge from the data and the lack of reference points that theory provides, other scholars instead emphasize that the grounded theory approach allows for greater flexibility in analysis and the ability to adapt to different epistemological positions (Tarozzi, 2008).

In the present study, we adopted a grounded theory approach in line with Glaser and Strauss (1967). Our analysis found its starting point in the general assumption that peer education produces learning effects in both knowledge and skills. From here, the research took the typical circular course: there was never any discontinuity or hierarchy between the data collection and the analysis, as we proceeded through an iterative approach of continuous reflection on the research process, valorizing what the data had to offer.

The section below presents the study findings and the answers to the research questions.

Results

The data available to us highlighted three main areas of findings: the potential and risks of the peer-to-peer relationship, which was the buddy configuration in small groups in the Know.what, Know.how, and Work.it phases; the emerging competition between peers in the delivery of activities with the learning units and in the production of creative products in the Work.it phase in particular; finally, the definition of the leader-follower dynamic within some groups. The following sections present the results of our analysis.

Strength and limitations in the innovation of peer education

The teachers' notes and the researchers' ethnographic observations provide a complex picture depicting the students confronted with a new task and working method. Peer-to-peer is less used in Italy either because CL is used sporadically or because it is adopted by some but not all teachers. Nevertheless, CL is familiar to the students, as they have had opportunities to practice it in the course of their education.

Indeed, like other educational experiences, the effectiveness of working peer-to-peer is a process relies on it application in other disciplines. This means that the potential of CL for acquiring knowledge and skills can be realized under through the progressive socialization fostered by this method, which students must acquire and assimilate. This was clearly pointed out during a national stakeholder meeting by a representative of an educational foundation:

> … the issues of cooperative learning techniques and other forms of learning are not always easy, they (the students) need to be accustomed to it gradually. (Turin, National stakeholder meeting)

While peer learning methods was not unknown, it was not systematically applied:

> The method of working in small groups is not new to the children, but the teacher reports that it is little used, not with continuity, it is often a tool to lighten the load, it is not intended as a real teaching practice. (ethnographic notes of researchers, ISCED 3, Pilot 1, Turin)

In this intermediate area where the investment is unclear and CL is not perceived by the teachers as an opportunity for teaching and learning or is variously applied by different teachers working with the same class, the effectiveness of the intervention is weakened. An expert in educational processes from the Ministry of Education stated:

> … there is the issue of continuity; a spot action is not of much use; we would like to have this methodology among the teachers, it only exists in the first year, but the cooperation is very limited… the duration and continuity in the school make the difference; the spot intervention can be useful for very few who already had the resources and skills. (Padua, National stakeholder meeting)

Most teachers in Italian schools use traditional pedagogy and with frontal teaching. They should be encouraged to change their teaching methods and adopt the principles of independent, constructivist learning, where children consolidate their knowledge independently through research, dialog, and feedback. During a national stakeholder meeting, a representative of a regional educational bureau noted:

> Both as director of the regional education bureau and as a teacher, I am a great advocate of the peer-to-peer method. This method is also mentioned in the Ministry's guidelines, also for the whole human aspect, for citizenship, for inclusion. (…) That is, getting children to work together, starting from their differences, (…) is very necessary. But it requires an effort and preparation on the part of the teachers, and the effort is not so small. But this part is still missing, or it is small, or it is episodic and unstructured and consequently the results are modest or fall short of expectations. (Padua, National stakeholders meeting)

Against the background of teachers' and students' limited familiarity with the CL method, the use of technological tools seems to have added to the complexity. According to many teachers and educators, the integration of digital teaching platforms into the curriculum is complex, as stated by a representative of a regional school office:

> Most teachers are neither prepared, nor are they interested or curious. You know, in this case it becomes difficult to integrate new methods and ideas into everyday life. The platform does not do the work for you, it supports you, it gives you an idea, but you have to work with it, get to know it, understand its potential in relation to your teaching with your students; it's not like if you have the platform you have the method to use it cooperatively. (Turin, National stakeholder meeting)

Moreover, there are often large classes and a high student-teacher ratio, as well as strict national regulations on the curriculum. Most schools still need to upgrade their technological infrastructure and be equipped with sufficient technical tools and skills. Several ISCED 3 teachers in Turin involved in a focus group pointed out the problem of not having enough (or any) tablets/laptops/etc. for all students, as well as Internet and infrastructure problems:

> *Let us put it this way: all platforms today have standard functions and features, what is missing are tools for collaboration between students. I managed to get them to collaborate remotely during the lockdown, but certainly much less than in person and using traditional methods. There is still a lot of work to be done here, especially for teachers' skills.* (Turin, Focus group with teachers and educators, Pilot 1)

The digital divide already experienced by many teachers and educators during the COVID-19 pandemic impacts not only on how learning is delivered but also on the ability of teachers to understand and harness the potential of technology to impart knowledge and develop skills in their students. The potential of CL is underestimated due to insufficient use of available technological support and digital resources. This may involve reluctant or extremely limited use of technologies, as well as teachers' outdated or insufficient digital skills. This problem was discussed by ISCED 3 teachers during a focus group in Padua:

> *Schools are more or less well equipped to renew learning processes. But teachers must at least know how to use an IMW to make a difference in learning. In any case, there is a lack of digital culture among teachers, even among the youngest teachers who have attended a non-digital school themselves.* (Padua, Focus group with teachers and educators, Pilot 1)

Similarly, during a national stakeholder meeting, a representative of a regional education bureau stated:

> *In this respect, educators and teachers are taken aback. The platform, the learning units, seem to be very well done and undoubtedly useful. However, I think that educators and teachers are the first ones who do not have a very clear idea of these issues, so it also becomes difficult to imagine how to make the most of a resource like the platform if you do not have the skills yourself.* (Padua, National stakeholders meeting)

Nonetheless, a number of teachers and educators agreed that the platform and the materials provide a toolbox for educational professionals and practitioners to generate ideas, input, and inspiration for innovative lesson design. If teachers are properly motivated and supported, digital resources can drive innovation in education and give new impetus to CL practices, as outlined by ISCED 2 teachers during a focus group:

> *There is no a priori recipe but each educational intervention should be tailored on each class with its characteristics, its dynamics and its problems. This is why joint planning is important and not just the invitation to form working pairs or small groups. Therefore, specific preparation of teachers and educators is required, coordination (is needed). it (Technology-mediated CL) is not an intervention that can be improvised.* (Padua, Focus group with teachers and educators, Pilot 2)

These complex elements prompted the teachers to reflect on the effectiveness of CL and the buddy method in particular, as stated by a ISCED 3 teacher:

> *The (buddy) method was useful for teaching other ideas. For large and challenging classes it was useful for teaching social and emotional skills and the method of work (cooperation). So it (the*

> *effectiveness of the buddy method) depends on what you use the buddy method for: whether you use it to teach content or whether you use it to acquire a work method or both.* (Padua, Focus group with teachers and educators, Pilot 2)

The formation of small groups or buddy pairs dictated by the project meant that the teachers had to adapt the project criteria for grouping pupils to the individual classes. CL means grouping students to work together on a task and thinking about the characteristics each student brings to the group so that it can achieve the goals of trust, cooperation, sharing, and responsibility. As an educator working with ISCED 2 students noted, this task requires experience and competence by the teacher or educator so as to gradually grow knowledge and skills in the students, which is the fundamental aim of CL:

> *We worked in small groups. I prefer pairs and groups of three, because at least that way everyone works together and is equally involved. Working in pairs works very well because it gives responsibility to the students, both when they are homogeneous and when they are heterogeneous; when they are both in difficulty it is a motivation, when they are heterogeneous the good one supports the less good one; in this way confusion is also reduced and concentration and maintenance of attention are encouraged.* (Turin, Focus group with teachers and educators, Pilot 2)

In addition, small group work simulates situations that students might encounter in professional life or in other later educational environments. The advantage of the experience at school is that it is a "controlled" experience, where teacher and educator guidance makes the difference, as noted by an educator working with ISCED 2 children:

> *Pairs and triads were put together on the basis of different variables. It is not always possible to work with everyone you want; the children would prefer to work only with their friends. Therefore, the teachers' intervention is not only aimed at making pairs and small groups "productive", but also at making them understand what limitations or opportunities there are to work with others, even if you do not like them, even if it requires an adaptation effort or if the division of labor is exhausting or you need to understand what the other person is good at and how to motivate them. Working in pairs is more comprehensive because we really talk to each other, exchange notes and are therefore very useful. Of course, it is easier within the usual educational pathways that they are already used to.* (Padua, Focus group with teachers and educators, Pilot 1)

In this framework, control should not be understood as interference in group dynamics but rather as preparatory work so that the group dynamics produces the expected effects: this presupposes that teachers have a clear knowledge of the skills with which their students are individually equipped.

Cooperative learning and group dynamics

Here we describe two further aspects that emerged from the collected material: a focus on the internal dynamics of small groups and the possible emergence of leader positions within the groups;

comments on competitive dynamics between groups and on relationships with adults.

Intragroup dynamics and the emergence of leadership

The main purpose of a peer-to-peer learning experience is to test one's ability to cooperate and work with others toward a common goal, to which each must contribute using their own resources and learn from each other. The researchers' observations and the teachers' reports show that CL actually had a positive effect on group cohesion and created positive dynamics of cooperation:

> *Each small group works fairly harmoniously, sometimes micro-conflicts are observed aimed at asserting one's position within the group, but these are quickly resolved and mediated without difficulty.* (Turin, ethnographic notes of researchers, ISCED 2, Pilot 1)

Analysis of the relationships between peers within the same group/pair reveals the emergence of a relatively unexpected leader/follower dynamic. The collaborative approach enabled the emergence of spontaneous leadership in the working groups formed by the teachers. This leadership took shape during the group interactions in the execution of the task and surprised the teachers in many cases, who had not recognized the hidden potential of some of their students. The leadership qualities that emerged in the working groups triggered what Goleman (2011) defines as resonance processes: relationship-oriented forms of leadership (Fiedler, 1967) with positive connotations and effects of motivation, participation, trust and enthusiasm that can boost performance:

> *The presentations were polyphonic, with the children dividing up the speeches; some had a leader/speaker who was either appointed or simply appeared spontaneously, but in any case everyone got involved, even at the insistence of the group coordinator.* (Padua, ethnographic notes of researchers, ISCED 2, Pilot 2)

Resonant leadership manifested in combination with the ability to reflect and coordinate when group performance falls under uncertainty and unpredictability, as occurred in the Pilot 2 phase when the groups presented their own creative products to younger colleagues, as noted by an educator working with ISCED 2 during a focus group:

> *They realized that although their project was beautiful, everything was ruined because the children (i.e., the junior peers) reacted differently to the lessons, differently than they had imagined, i.e., everything they had imagined from the outside did not materialize; and that's when they took action and improvised. The result was better cooperation and perseverance, because there they understood that you have to bring the result home, i.e., reactivity, improvisation, the ability to adapt to the circumstances and achieve the goal; even those who were not involved in traditional teaching felt involved here; personalities emerged who can respond to the needs of the children. In these cases, leaders emerge who are able to understand the problem, propose solutions and at the same time act together with their group by motivating them.* (Padua, Focus group with teachers and educators, Pilot 2)

The gender differences in the leadership positions that emerged from the data show that this role was unequally divided between boys and girls within the working groups, with the latter predominating. In fact, in all the contexts and regardless of age, girls were more likely to take on a leadership role. The emergence of female leaders derived mainly from their previous reputational mechanisms and emotional abilities:

> *Girls are more active and able to coordinate work and also involve their classmates in the work without taking an obvious leadership role or imposing themselves on their peers. Boys tend to be disorganized and chaotic, so in the groups, which are almost always mixed, the girls provide order and method… according to the teachers, this is a reflection of what happens during the school year.* (Padua, ethnographic notes of researchers, ISCED 2, Pilot 1)

> *Female students are more pragmatic, they enjoy a good reputation within the class, so it is easier for girls to take the lead in groups, being willingly followed by their classmates.* (Turin, ethnographic notes of researchers, ISCED 3, Pilot 1)

The overall picture is one of a harmonious interaction ritual within groups, an effect that certainly includes several social, emotional, and character skills. The available data do not allow us to determine with certainty the effects of this group climate, the assumption of roles, and the division of work between peers on academic performance. What we can hypothesize, however, is a positive relationship between a cooperative climate, experimenting with a new way of working, and the development of knowledge and skills through motivation.

In search of adult recognition: social comparison and intergroup competition

While the project-based activities were not competitive *per se*, a sense of competition between groups in the same class was tangible. Nonetheless, antagonism never seems to have taken the form of a zero-sum game. Instead, the data suggest that between-group competition was driven by mechanisms of social comparison, which, as Festinger (1954) noted, provide both a reference point for evaluation and motivation to improve performance. This provided for episodes of solidarity and cooperation between groups perceived as belonging to the same group, as emerges in the ethnographic observation:

> *No dynamics of abuse are observed. Everyone makes their own contribution, but the groups compete with each other, even in the design phase of the work. They produce, with a constant eye on the work of others, affirming their own superiority in both conception and implementation. But then they return to their group more motivated and with renewed commitment to do better.* (Padua, ethnographic notes of researchers, ISCED 3, Pilot 2)

This form of antagonism between groups is consistent with the objectives of self-development and fosters recognition of the limits and strengths of an individual and the group, while motivating students to give their best as individuals and as team members. The ethnographic note reads:

> *There is healthy competition between the groups, but also lots of constructive comments and mutual encouragement. The children*

compare themselves, but also want their work to be recognized as the best, a mechanism that activates the desire to improve. (Padua, ethnographic notes of researchers, ISCED 2, Pilot 1)

The interest in having the quality of one's own work recognized by adults is particularly pronounced among high school students, although they are older than lower secondary school children and perform their *métier d'élève* (Perrenoud, 1994) more autonomously and independently than younger students. Nevertheless, high school students keenly search validation of the quality of their performance by adults, especially by those they consider competent, such as teachers and educators:

Pairs often exchange opinions about their work; they also show their products to the researcher and ask how I like them; they need feedback and approval from the adult; the request for an opinion is always guided by the idea that the adult is more capable and competent, that he knows more. The adult's evaluation of the best and highest quality product is highly considered by the children. (Turin, ethnographic notes of researchers, ISCED 3, Pilot 1)

This logic of competition between peers for recognition by adults reflects several of the typical aspects of the performative approach to education. This attitude can be traced back to the still widespread notion of school as a directive and evaluative context. This implicit representation of conventional teaching and assessment can lead children to understand didactic situations, albeit presented as "free," in a performative perspective in which the degree of success is evaluated by external experts (i.e., teachers and educators).

Discussion and limitations

Overall, the study findings disclose the rich potential of peer-to-peer approaches. This potential is not limited to the development of cooperative skills in the school context and transferable to other areas but extends to the acquisition of character-building skills. The data underscore the added value of peer-to-peer interventions. This added value can manifest at the individual, the intra-group, and the inter-group level, with assumption of one's own role within the group, including the leadership role. The key findings are shared by previous work (e.g., Adams, 2013; Slavin, 2015), that reported that peer work promotes learning, activates individual responsibility and a sense of group belonging, promotes inclusion and enhances individual skills and abilities toward a common goal. Nonetheless, our findings also support previous authors when they state that the learning outcomes of CL occur after students have been prepared for collaboration (e.g.: Baloche, 1998; Gillies, 2016) and emphasize the difficulties teachers face in implementing cooperative learning in the classroom (Cohen, 1994) and integrating technological devices and platforms into their everyday teaching (e.g., Gillies and Boyle, 2010; Buchs et al., 2017).

Although data for the ISCED levels involved in the Kids4alll activities can be considered essentially homogeneous, there were several differences between the educational cycles worth noting. First, CL had more positive effects on learning for ISCED 3 students than for ISCED 2 students. This is probably because ISCED 3 students have greater autonomy and self-direction than ISCED 2 students who depend on adult guidance for carrying out the activities assigned them. Also, from the perspective of normative socialization,

only the ISCED 3 students showed they were able to exercise self-control, to cope with stressful situations, and to activate genuine cooperation. This was especially true for the technical and vocational education students, probably because both courses of study in Italy involve collective learning, laboratory experience, and multiple opportunities for comparison (e.g., peer-to-peer comparisons, comparisons between learning environments and professional contexts, comparisons between students and worker roles during internship).

The present study has several limitations related to the research tools used in the project and the fact that the teachers and educators involved did not always apply the buddy method because they preferred that students worked in small groups rather than pairs.

The qualitative instruments in the project (i.e., ethnographic observations, focus groups, and interviews with education professionals, reports of stakeholder meetings) comprised adults' observations of and comments about the students' learning experience. This means that the perspective of this study is exclusively that of adults. Other studies could give students a voice by collecting their experiences and feelings to gain insight into the recipient's perspective.

The decision of teachers and educators to have the students work in small groups instead of buddy pairs, contrary to the researchers' directions, raised the question of real inclusion and participation by all students. The change in group structure, from buddy pairs to small groups, had an impact on class dynamics within and between groups and showed several unexpected effects: the small group structure fostered antagonism between groups and promoted positive interdependence within the group. An area of future research is the relationships between how CL groups form and the potentially different outcomes in relationships and learning performance.

Conclusion

The overall findings of this study show that student participation in the Kids4All experience directly improved their lifelong learning skills and indirectly improved social and emotional skills by working with peers. The Kids4All experience has been envisaged as an incubator for new pedagogical practices and methodologies, the results of which may inform research into the development of educational methods and learning skills. Nonetheless, findings indicate that teachers cannot rely solely on a student's natural development to exploit the potential of CL. Our findings for the pedagogical relationship suggest that the critical point in the application of peer learning interventions may not lie with the recipients, i.e., the students. Instead, the data show that teachers are often ill-prepared to implement CL practices or lack sufficient training in peer-to-peer methods in relation to pedagogical needs. The implication for practical policy is that Italian educational institutions need to undertake more effort to promote CL by investing in the training of permanent teachers and in the formal introduction of collaborative methods in both their work with students and in the academic careers of future teachers.

Data availability statement

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

Ethics statement

The studies involving humans were approved by Bioethical Committee; University of Turin. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

Author contributions

GC: Writing – original draft, Methodology, Formal analysis, Conceptualization. AM: Writing – review & editing, Methodology, Conceptualization.

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Conflict of interest

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

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