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Teachers' Professional Development for Cooperative Learning: A Constructive Controversy Between Long-Term Versus Short-Term Professional Development

Previous scientific research has recognised the pedagogical model of cooperative learning (CL) as a best-practice pedagogy, which facilitates students' academic and social learning. Teachers are crucial for implementing CL in the classroom. While they value the method, they often find it complex and challenging to use. Thus, it is crucial to support effective CL professional development (PD) for teachers. Various approaches, forms and lengths of PD in CL are available for teachers, and long- and short-term approaches have been debated in the literature. Based on the perspective of constructive controversy, the goal of this study is to examine teachers' PD in CL, with a particular focus on long- and short-term PD. Drawing on our different perspectives and experiences with long- and short-term PD in CL, we aim to contribute knowledge that can support teachers' learning and implementation of CL. To provide insights and reflections along with theoretical findings, we utilise a narrative approach, with one narrative on long-term PD and one on short-term PD. One issue that becomes clear is the lack of a consensus on what counts as PD for teachers, as PD is a holistic multidimensional construct. We propose four common characteristics that should be considered in developing successful PD regardless of the CL approach or the length of the PD: 1) It enables participating teachers to acquire a shared understanding and knowledge of the theoretical framework of CL; 2) It supports teachers in taking ownership of CL; 3) It involves collaboration (in different forms); and 4) It includes support structures. While both long- and short-term PD can support teacher learning, how the time is used is the most important factor for a successful outcome. Hence, short-term PD is better than no PD at all.

Keywords: teachers' learning, professional development, cooperative learning, implementation, constructive controversy.

Introduction

The pedagogical model of cooperative learning (CL) has a long history and an extensive research base. Numerous studies clearly show that CL is beneficial for students' academic learning, but it also has several affective non-academic effects on social skills, communication, peer relationships, attitude toward learning, motivation and well-being (JOHNSON & JOHNSON, 1999, JOHNSON et al., 2014; KYNDT et al., 2013; LIEBECH-LIEN, 2020a; ROSETH et al., 2008; SLAVIN, HURLEY & CHAMBERLAIN, 2003). Due to the large research base on the benefits of CL, it is recognised as a best-practice pedagogy (BALOCHE & BRODY, 2017). CL facilitates students' academic and social learning, making it a powerful educational tool for providing students with the skills needed in their future professional and personal lives in the 21st century (JOHNSON & JOHNSON, 2014).

The teacher is crucial in incorporating and structuring CL in the classroom (GILLIES, 2016; FERGUSON-PATRIK & JOLLIFFE, 2018). Although teachers value CL, they often find it complex and challenging to use (GHAITH, 2018; GILLIES & BOYLE, 2010; SURIAN & DAMINI, 2015). Even after completing formal training in CL, the method is often abandoned, or its use is noticeably reduced in their practice (SHARAN, 2010). Challenges with implementing CL generally relate to limited knowledge of the method and a lack of understanding of how to implement it effectively (ABRAMCYK & JURKOWSKI, 2020; BUCHS et al., 2017; GILLIES & BOYLE, 2011; HENNESEY & DIONGI, 2013; VOLLINGER et al., 2018), challenges adjusting it to the curriculum (DYSON et al., 2016; GHAITH, 2018), planning and class management (GILLIES & BOYLE, 2010; SURIAN & DAMINI, 2014) and student assessment (BUCHS et al., 2017; SURIAN & DAMINI, 2014; HAMMAR CHIRIAC & FORSLUND FRYKEDAL, 2022, 2023).

Thus, supporting effective professional development (PD) in CL for teachers is crucial to support teachers' learning and implementation. Various forms and lengths of PD in CL are available for teachers, and there is a debate in the literature regarding whether long-term or short-term approaches can best support teachers' learning. In this article, we examine PD in CL, with a particular focus on long-term and short-term PD and the ways in which they can support teachers' learning and implementation of CL.

CL is a generic term. There are various approaches to CL and PD that researchers and educators have developed since the field of CL began in the late 1960s and early 1970s. The research by Deutsch (1949) on the effects of cooperation versus competition provides a theoretical and empirical base for the field of CL (see STEVAHN, 2021). The original developers created an extensive body of theory and research and varied approaches to classroom practice and PD. This is documented in the book *Pioneering Perspectives in Cooperative Learning* (DAVIDSON, 2021). The historical development of CL has been based on the originators' thoughts, reflections and personal stories about their own work, starting from their beginnings and moving forward to 2020. All the approaches to CL have certain common elements. While they are taken into account in PD programmes, they are not necessarily presented as basic principles.

1. A common task or learning activity suitable for group work.
2. Small-group interaction focussed on the learning activity.
3. Norms for cooperative, mutually helpful behaviour among students as they strive together to accomplish the learning task.
4. Individual accountability and responsibility for what students have learned and/or contributed to the learning goal.
5. Positive interdependence in working together – also known as interdependence or mutual interdependence. (Interdependence is the mutual reliance between two or more individuals or groups.)

In addition to these common elements, each approach to CL has unique characteristics. These characteristics are then emphasised in PD targeting the specific approach.

Table 1 presents a selection of the major approaches to CL and PD and their characteristics. This list is not exhaustive, as there are many different approaches and recommendations for CL and PD (e.g. FERGUSSON-PATRICK & JOLIFFE, 2018; FOHLIN et al., 2017; JOLIFFE, 2007).

CL Models and Developers	Year	Characteristics
Learning together and alone by Johnson & Johnson	1970s	Social interdependence theory, face-to-face promotive interaction, teamwork skills, assigned roles and group processing (see JOHNSON & JOHNSON, 2021)
Small-group processes and organisation development by Schmuck	1970s	Concepts from group dynamics and group development, such as communication, friendships, cohesiveness, shared norms, leadership and conflict; also applied in conjunction with organisation development (see ARENDS, DAVIDSON, & SCHMUCK 2021)
Small-group CL in mathematics and beyond by Davidson	1970s	Discovery learning, challenging tasks, groups working together at the blackboard or whiteboard, guidelines for cooperation and higher-order thinking skills (see DAVIDSON, 2021)
Group investigation by Sharan & Sharan	1970s	Research groups plan and conduct their investigations and then present their findings to the entire class (see SHARAN & SHARAN, 2021)
Jigsaw classroom by Aronson	1970s	Sociological emphasis on equity, task division into several parts, expert groups for learning the parts and home groups for presenting the parts (see ARONSON, 1978, 2021)
Complex Instruction by Cohen and Lotan	1980s	Sociological emphasis on equity, assigned roles, multiple-ability tasks and status interventions (see LOTAN & HOLTHUIS, 2021)
Student team learning and success for all by Slavin & Madden	1970s	Group goals and rewards through bonus points or team recognition and individual accountability, such as the methods of STAD, TGT and CIRC, included in the programme Success for All, a whole-school reform model for disadvantaged schools (see SLAVIN & MADDEN, 2021)
The structural approach by Kagan	1980s	Cooperative structures, class building and team building, based on PIES principles, including equal participation and simultaneous interaction (see KAGAN, 2021)

Table 1. Major approaches to CL connected to originators and initial time period of publication

PD for teachers' learning and implementation of CL

In order to realise the potential of CL to support students' learning, an important prerequisite is supporting teachers' learning so they develop an understanding of the theory behind CL and how to utilise it in their teaching. Adequate knowledge of CL through training, where they gain experience with CL, is vital for teachers' use of the method. Darling-Hammond et al. (2018) argued that effective PD is needed if teachers are going to learn and refine the pedagogies that address students' learning needs in the 21st century. In their study, they found that effective PD programmes have certain characteristics in common, such as being focussed on content, the use of pedagogical models, active learning, collaboration, reflection, support and being sustained over time.

There are different approaches to PD that is provided for teachers in CL. Some PD follows the originators' specific approach to CL (e.g. KAGAN & STENLEV, 2006), while other providers modify and create their own versions inspired by different CL approaches (e.g. FOHLIN et al., 2017; HAMMAR CHIRIAC & FORSLUND FRYKEDAL, 2022; JOLLIFFE, 2007; LIEBECH-LIEN, 2022). Brody and Davidson's (1998) book *Professional Development for Cooperative Learning. Issues and Approaches* includes multiple viewpoints on PD for CL, showing that approaches to PD vary considerably. An important takeaway from their book is that an introductory workshop is necessary but not usually sufficient for teachers to become skilled implementers of CL. The teachers will also need first-hand experience with the method as participants in CL workshops or classes and the opportunity to reflect on their experiences. Although CL is subject-independent, teachers need to see example applications in their own subject areas and think about further applications for their classes. The workshop needs to include some information on the rationale, theory and research about CL and provide a CL experience and opportunity for reflection. Practical implementation questions also need to be addressed, such as group formation, the role of the teacher, student motivation and behaviour, assessment and evaluation.

Long-term and short-term PD

In the field of teacher PD, there is a shift from delivering training models that are short-term, which are often delivered as workshops or courses taught away from school, to approaches that are more long-term, grounded in classroom practice and focussed on developing professional learning communities for teachers. The long-term approach is often advocated by experts in the field (BORKO et al., 2010).

The originators of CL employed both long-term and short-term PD approaches for CL. As a large amount of research has shown the effects CL can have on students' academic and social learning, it has become recognised as a best-practice pedagogy (BALOCHE & BRODY, 2017). This has likely contributed to the fact that PD in CL is currently available for teachers from different providers and in different forms and lengths. This includes private providers as well as researchers and school developers, who are providing PD in CL as part of their research and development projects (HAMMAR CHIRIAC & FORSLUND FRYKEDAL, 2022; LIEBECH-LIEN, 2020b). For example in Norway and Sweden, private providers deliver PD in CL in different formats, including one- or two-day workshops in CL for individual teachers, workshops for schools and workshops with continuous follow-ups tailored for individual schools.

Although Borko et al. (2010) advocated for a long-term approach to PD, it is not always possible, and teachers are often provided with short-term PD in CL (e.g. BUCHS et al., 2017). A key question is what can be accomplished in a short-term PD programme compared to a long-term programme. In this article, we examine both long-term and short-term PD to explore how they can support teachers' learning and implementation of CL.

We regard short-term PD as having a duration from one workshop to a couple of weeks, while longer-term approaches have a duration from several weeks up to years. Long-term PD often also includes follow-ups, which are usually lacking in shorter interventions.

Long-term PD

The current literature on teachers' learning and implementation of CL indicates that long-term PD supports teachers' use of the method. A recent study examined a long-term PD professional development programme in CL within a large school across several curricu-

lum areas and age groups. The results showed that professional learning sessions involving several workshops, in which teachers planned cooperative CL learning tasks together, implemented and reflected on their implementation with support from the researcher enabled the teachers to implement cooperative CL learning and motivated them to further develop their CL practice (ALANSARI & RUBIE-DAVIES, 2021).

Goodyear (2016) also described the benefits of long-term PD in the context of a year-long PD programme in physical education. She found that long-term PD supported teachers' CL practice, highlighting the importance of support and collaboration from facilitators and colleagues. The one-year duration allowed adaptation of the PD to meet the needs of the teachers. As a result, the teachers developed a routine CL practice and were able to adapt key elements to address their students' learning needs. This is in line with the results of Dyson et al.'s (2016) study on a year-long PD programme where teachers worked in professional learning groups, which showed that participation in these groups with ongoing support helped the teachers implement CL in their teaching. A larger study of a peer learning CL network model across 20 schools in Spain also demonstrates that long-term PD with teacher collaboration helped teachers adapt the method to their practice (MIQUEL & DURAN, 2017).

Ferguson-Patrick and Jolliffe's (2018) book *Cooperative Learning for Intercultural Classrooms* provides a description of case studies of CL worldwide. Many of the case studies give examples of how long-term PD with workshops and continuous support enables teachers to implement this pedagogy. The case studies describe a variety of approaches to PD and CL implementation. However, important features of many of the long-term PD approaches are teachers getting first-hand experience with CL as learners themselves, experimenting with CL in their own classroom, teacher collaboration and receiving support, such as from the PD professional development provider, researchers and school leadership.

The long-term approach combined with teacher collaboration seems to be particularly beneficial for teacher learning and implementation of CL. Indeed, the literature on teachers' learning and PD highlights the importance of participating and interacting in a community of professionals (DARLING-HAMMOND et al., 2017; TIMPERLEY et al., 2007). A growing number of studies show that long-term PD in CL combined with teacher collaboration has a positive impact on the implementation. Jolliffe's (2015) study on long-term PD in CL in a network of schools in England illustrated that the effective implementation of CL requires a sustained and collaborative process. The study emphasised that implementing CL is not a quick fix, nor is the development of a professional learning community (JOLIFFE, 2015, p. 79). Davidson (2021, p. 219) found that PD in which a team of teachers from a school participate in an ongoing programme over time and then form a support system for one another supports strong CL implementation.

Short-term PD

Much of the previous and current literature and research on teachers' PD related to CL seems to advocate a long-term whole-school approach to bring about effective and sustainable change (CORDINGLEY et al., 2015; FERGUSSON-PATRICK & JOLIFFE, 2018). Nevertheless, even short-term PD of moderate duration can have an impact on teachers' practice when focussed on a specific area of teaching and learning (CORDINGLEY et al., 2015). Further, PD over a longer period does not guarantee a better result. As Timperley et al. (2007) concluded, it is what the time is used for that determines the outcome. This notion is further supported by Ha et al. (2015), who argued that a well-designed short-term PD programme 'can achieve significant, meaningful and sustainable impact' (p. 20). Our interpretation is

that this conclusion applies to teachers' PD in CL. Next, we will give some examples of short-term PD that are described in current research. One example of short-term PD can be found in the classic Australian study by Gilles and Ashman (ASHMAN & GILLIES, 1997; GILLIES & ASHMAN, 1996), who showed that a small educational intervention had a great impact on students' experience and use of CL.

For example, some studies have focussed on teachers' perceived difficulties in introducing CL after shorter periods of PD (BUCHS et al., 2017; MALUSÀ, 2020). Buchs et al. (2017) studied 200 Swiss elementary teachers' pedagogical convictions after implementing CL in their classes following a two-day training intervention. Malusà (2020), inspired by Busch et al. (2017), focused on elementary and middle school teachers' perceived self-efficacy after implementing CL following 10–25 hours of experimental in-service training. An overall conclusion from both studies was that a short teacher PD is partially beneficial but not sufficient for a sustainable transition from traditional teaching methods to CL. Decisive for the level of impact of short-term PD seems to be whether teachers have previously used CL or if they have shown a high level of prior interest in CL. Jolliffe and Snaith (2017) confirmed that such previous experience with CL is important to the outcome of short-term PD.

Two other examples of short-term PD were reported by Ferguson-Patrick and Joliffe (2018). First, they described a case study from India of an eight-week PD programme. With help from a CL expert, teachers implemented cooperative activities in their classrooms to enhance inclusive education. In the second case study, one teacher from Singapore decided to implement CL in his classroom after attending a single workshop (unclear duration). According to the case study report, he has now been using CL for two years. Both case studies illustrate the important impact that individuals, both teachers and experts, have on whether short-term PD produces sustainable long-term effects.

Methodology

This article is a result of a collaboration between three researchers from three different countries, all with a particular interest in CL and supporting teachers' learning with PD in CL. Our collaboration came about after getting to know each other's work through a book project where two of the authors contributed to different chapters, and the third author was the editor of the book. It was evident that we shared the same passion for the potential of CL in education and student learning. However, we had different experiences and results in terms of how to support teachers' learning with CL through long-term and short-term PD.

Our different viewpoints and experiences led us to think that it would be fruitful to explore research on long-term versus short-term PD in CL through a review of the literature and drawing on our experiences from research and practice.

In our investigation for our investigation and development of our article, we were inspired to use constructive controversy as a framework to support our research collaboration. Constructive controversy can be seen as inquiry-based advocacy that starts with presenting opposing perspectives and thereafter inquiring into the issue from the different perspectives to gain an increased understanding and reach reasoned judgment to establish the best action or course of action (JOHNSON, 2015). Johnson (2015) stated that constructive controversy leads to the exchange of expertise, facilitates perspective-taking and promotes creative insights that can lead to new understandings.

For us, the goal was to use the lens of constructive controversy to examine teachers' PD in CL and use our different perspectives and experiences with both long-term and short-term PD in CL to contribute knowledge that can support teachers' learning and implementation of CL.

Narrative method

In this article, we have utilised a narrative approach to provide the reader with insights on our experiences with long-term and short-term PD in CL from research in the practice field. A narrative approach can be a powerful tool to gain insights on professional practice. In particular, when studying educational experience, the narrative approach can give a holistic picture of an issue while also revealing its complexity (MERTOVA & WEBSTER, 2020). A narrative offers a window into others' experiences that can lead to understanding without having to experience it oneself. In this article, we combine a research review on teachers' learning and implementation of CL with a focus on long-term and short-term PD based on our own research experiences.

A narrative inquiry is the study of experiences as a story (CONELLY & CLANDININ, 2006). In this article, a narrative based on one of the author's long-term experiences with PD for teachers in CL and a narrative regarding one of the author's short-term PD experiences was developed to inquire into our experiences.

Developing these narratives allowed us to travel back to our experiences in researching PD in CL for teachers and consider how these PD programmes influenced teachers' learning and implementation. In order to develop these narratives, we had to revisit our field texts, data and findings from our teacher PD. Developing narratives is an iterative process that involves moving back and forth between data, the interim narrative and the final narrative (CLANDININ & CONNELLY, 2000). In the process of developing the narratives presented in this paper, the authors shared their interim narratives with each other to get insights and discuss each other's experiences, but also to get feedback on how the narratives captured the meanings of our inquiry to portray meaningful experiences of long-term and short-term teachers' PD in CL. The authors' collaboration in developing the narratives can also be seen as a part of the constructive controversy, as it allowed us to present our experiences to each other, advocating and elaborating positions and rationales. This is in line with how Johnson and Johnson (2014) described the interaction patterns of constructive controversy.

Ethical considerations

The narratives developed are based on research projects that was ethical approved by the Norwegian Centre for Research Data (NSD) and by the regional Research and Ethics Committee at Linköping University, Sweden.

Narratives*Narrative from a long-term PD*

This narrative is based on the first author's experience of a long-term PD programme and research in Norway. It explores how teacher collaboration through teacher teams can support teachers' learning and implementation of CL.

In Norway, lower secondary teachers commonly work as part of interdisciplinary teacher teams, each teaching their specialised subject to a shared student group from year 8 to year 10. Three interdisciplinary teacher teams from the same grade level (year 8) participated in the PD programme in this study. I had the role of a developer and facilitator of the PD programme and was situated as a researcher in my own organisation. The PD pro-

gramme was developed in close collaboration with the participating teachers and the school leadership. Altogether, the PD programme had a duration of nine months. The teachers had little knowledge of CL before the PD programme but were interested and motivated to learn about the method. I had only two predetermined criteria for the school: (1) that the teachers would explore a conceptual approach of CL based on the five elements (JOHNSON & JOHNSON, 2002) and (2) that learning and exploring CL would mainly take place working together in teacher teams. In this narrative, I will present my experiences and findings from this research project and my reflections on the long-term PD programme and how it influenced the teachers' learning and implementation of CL.

The PD programme can retrospectively be viewed in three stages. The first stage involved a three-day workshop in CL that I facilitated. In the making of the workshop, I used the five elements of CL as a framework to structure the learning activities, and I was specifically inspired by Johnson and Johnson's 'Learning together model'. In addition, I made use of different CL structures (KAGAN & STENLEV, 2006) and jigsaw puzzles (ARONSON, 1978). The workshop was held at a conference centre for three days, which enabled the teachers to concentrate solely on CL. In the workshop, the teachers learned about the theory behind CL as well as the three main ways of structuring CL: informal CL, formal CL and base groups (JOHNSON & JOHNSON, 2002). During these three days, the teachers worked together in groups focussed on the theory of CL, team-building activities and CL structures to give them first-hand experience with CL and with being part of a CL group. In addition, time was allotted for the teachers to plan how they would individually use CL in their subject teaching and how they could incorporate CL as a team in their upcoming lessons. As a facilitator during the workshop, I was amazed by how eager and motivated the teachers were to start using CL in their practice after experiencing with the method. An example of this was a participant on one of the teams planning an upcoming lesson, who spoke about CL and the structures as follows: 'We can use this. We can use that structure, and this one we can use every lesson'. After the workshop was finished, I wrote in my research journal that it was almost too good to be true. I was happy that the workshop had worked so well and motivated the teachers to start incorporating CL in their teaching, but my reflections revealed I was also concerned that it would not last.

To keep the knowledge and experiences after the workshop fresh and to support the teachers in implementing CL in their teaching, we continued the PD programme with two follow-up sessions a couple of weeks later. In these sessions, they were introduced to some new informal CL structures with an assignment to try out at least a couple of them in their lessons and then reflect on their experiences with the team in the second follow-up two weeks later. When I started the first session, I immediately felt that the atmosphere had changed from the teachers being highly motivated. It seemed that coming back to school and a cramped teaching schedule influenced the teachers' motivation to use CL. In the first session, they got their assignment to try out some informal CL structures of choice and write reflection notes on their use of the method to discuss with the teacher team in the second follow-up session. When the second follow-up session came, the atmosphere was awkward, as many of the teachers had not done the assignment we agreed on while others had been motivated to use other and more advanced CL techniques. The motivation and the shared focus on CL of the teacher teams were no longer present. In my research journal, this was clearly a challenging period, representing a setback in the teachers' learning and implementation of CL. Based on my reflections in my journal, I believe that if the PD programme had ended here most of the teachers would have returned to their former teaching practice and not implemented CL in their practice.

This implementation dip in the PD programme resulted in a lot of frustration, causing me to return to the research literature and have ongoing meetings with the school to dis-

cuss how to pursue the PD programme further. In collaboration with the teachers, we decided that continuation would involve an action research project in their teaching team on how to implement CL in their teaching inspired by Schmuck's (2006) proactive action research model. In proactive action research, the participants act first and then study the effects of the action taken.

This resulted in the third stage in the PD programme, a seventh-month proactive action research programme in teacher teams. In many ways, this was the turning point in the teachers' learning and implementation of CL. Their own investigation revitalised the learning from the workshop and led them to customise CL to their own practice and their common student group. Developing a shared action research project allowed the teachers to collaborate on the implementation of CL. During these seven months, the school allocated time for the teachers to examine how to implement CL together, make an action plan for implementation, try out their action plan and research how the implementation had worked for students learning in their class. To support the teachers, I facilitated regular check-ups and meetings to support their process. Being positioned as a researcher in my own organisation also enabled me to provide ongoing support, both in the learning sessions and when the teachers tried out CL in their lessons for the teacher team during the period the PD programme lasted. At the end of the seven months, each of the teacher teams was in charge of one meeting, where they presented their implementation of CL research to the other teacher teams and the school leadership. This created a communicative space for sharing experiences and learning from each other. As a facilitator of the PD programme, I reflected on the last stage as vital for the teachers' learning and implementation of CL. It caused them to take collaborative action and customise CL to their own practice. Their presentation of their action research projects to the other teams also showed me that they had understood the theory behind them and utilised different CL structures. Two of the teams even developed their own formal CL structures based on the five elements of CL to ensure effective student collaboration to support academic and social gains. In my research journal after the teacher teams' presentations, I reflected on how the teachers presented their implementation with ownership, and I felt that their motivation for CL was restored.

As a researcher in my own organisation facilitating and researching the teachers' learning in the PD project, the narrative provides insights into my experiences and shows what supported but also what challenged teacher learning. If the PD had been short-term and ended after the follow-up sessions, based on my experience from the PD programme I doubt that the teachers would have implemented CL in their teaching. The PD programme being longitudinal and including teachers' collaborative inquiry into their implementation of CL became a catalyst for teacher learning and implementation after the workshop.

The findings from this research project exploring teacher collaboration for the implementation of CL show that the workshop alone did not support the teacher's learning and practice with CL, although it did motivate further use of CL and strengthened the social bonds between the teachers. When the PD programme became longitudinal with continuous follow-up with action research, it helped to translate the theory of CL, revitalised the learning experiences from the workshop and supported the teachers' learning and implementation of CL in their teaching. A key finding was that collaborating in teams and inquiring into CL supported by action research led the teachers to collaboratively implement and adapt CL to their classroom context. Data from the students before, during and after the PD programme show that the teachers changed their teaching from lecturing and regular group work to CL practice after the PD programme. It should be noted that there was a decline in the teachers' use of CL a year after the PD programme ended, when they started to prepare for the exam period of lower secondary school. This emphasises the importance of prolonged support for teachers learning and CL implementation.

Narrative from short-term PD

To improve teachers' attitudes toward using CL, they need to master the significant but difficult task of assessing students' knowledge and abilities developed in a joint activity. In 2014, in order to support teachers' use of CL, the second author together with a colleague planned and implemented a short-term PD programme on group-work assessment. The overall goal was to increase the teachers' knowledge and promote their assessment practices related to group-work assessment when using CL, and by extension, to increase their willingness to use CL. An intervention in the form of short educational sessions and the implementation of a CL activity in the classroom was included in the short-term programme. The participants included seven math teachers, five females and two males, between 34 and 48 years of age, with 9–23 years of experience. The teachers came from five different schools in Sweden and taught students in Year 5 and 8, in six classes (children in Sweden begin Year 1 at school in the year they turn seven years old). Five of the teachers were randomly selected to participate in the intervention, and two teachers were included in the control group.

The intervention consisted of training and education on how to work in groups inspired by interdependence theory (JOHNSON & JOHNSON, 2002, 2009) and how to perform suitable group-work assessments (BROKKHART, 2004, 2011; JOHNSON & JOHNSON, 2004). The intervention was implemented at the university on two separate days with two weeks in between. The choice of carrying out the intervention outside the school gave the teachers an opportunity to meet each other under the same conditions and focus on the PD programme without interference from regular school activities. The first day was theoretical and consisted of theory on group work/CL as a teaching strategy. We prepared three seminars in which we presented a few carefully selected aspects of how to create cooperation and group-worthy tasks (LOTAN, 2003, 2014) as well as different types of group-work assessments suitable for group work/CL.

Another important task during this first day was getting to know each other and establishing collaboration between the researchers and the participating teachers as well as between the teachers. During the day, several discussions in which everyone participated arose, which led to the establishment of cooperation in the entire group. The discussion was carried out in an open- climate, and everyone who wanted to speak was allowed to do so. This collaboration was a prerequisite for the second 'applied workshop day' of the intervention, when the teachers jointly produced materials for the forthcoming CL activity in each teacher's classroom. In addition to getting the teachers involved in the study, the objective here was to contribute joint competence to a feasible group-work/CL assignment, including the assessment. From our perspective, the second day was characterised by hard work by the teachers, who showed great commitment and jointly constructed a CL assignment, an educational planning session and a test. The work that the teachers performed was decisive for the study's implementation. Notably, the teachers belonging to the control group received the same training after the short-term PD programme was completed.

Thereafter, all teachers – whether they received an intervention or not – worked with their respective classes for 3–6 weeks on the same mathematics-related CL assignment. The assignment was inspired by the CL jigsaw strategy (ARONSON, 1978) and included both individual and collaborative elements. In the assignment '*Our environment – A study that explains and justifies how you can improve life for us*', the students were required to investigate the following areas: (1) travel to and from school; (2) recycling at home; (3) leftover food thrown in the school canteen; and (4) meat consumption. Each area was investigated individually by one of the group members. Then, the group collectively deduced how to justify maintenance of a more sustainable environment. The assignment entailed students developing their knowledge and abilities with respect to core concepts in mathematics

(e.g. probability, statistics and problem-solving), thereby learning about mathematical problem-solving in everyday situations.

The teachers' part in the CL assignment was to give instructions and coach the groups. In addition, the teachers provided formative and summative feedback and conducted group-work assessments on both the individual and group levels. The assessment was conducted by (a) observing students' individual and joint performances and (b) reviewing each student's individually written summary, (c) the group's common product, (e) each individual's and the groups' mutual oral presentations and (f) individual written exams. During the implementation of the CL assignment, both the teacher and one of the researchers were present in the classroom. The researcher's (our) primary task was to collect data via video recording as well as to assist the teacher if necessary. A reflection in hindsight on our task in the classroom is that our role varied between different classrooms, depending on the need for support that the teacher was looking for. In some classrooms, we were only observers who operated the video camera, while in other classrooms we had to take a more active role both in terms of the CL activity itself and as a coach for the teacher. Our interpretation is that whether the teacher made the task his own and adapted it to his own teaching was of great importance. Teachers who 'owned' the CL task needed less support in the classroom.

A core result was that the short-term PD programme had a positive *impact* with respect to teachers' knowledge and their assessment practices on group-work assessment when using CL. The most significant result concerned *teachers' linguistic repertoire*. Overall, the teachers developed their mode of language use. First, they expanded their linguistic repertoire in terms of terminology and concepts concerning group-work assessment. Our interpretation is that the teachers developed a professional language concerning group-work assessment, an important springboard for future collegial cooperation. Further, participating in short-term PD also influenced the teachers' use of language when targeting students, improving their ability to adapt their linguistic repertoire to the pupils' level when giving spoken feedback and written feedback. For instance, some students in year 5 felt that the teachers used too many adult words' and requested a more understandable language. In sum, the teachers' use of language, both spoken and written, posed both opportunities and challenges—depending on whether they 'spoke the same language' as the recipient. Thus, this narrative is one example that supports that short-time PD focusing on a specific area of CL can have an impact on teachers' practice, in this case the teachers' knowledge and assessment practices aligned to group-work assessment when using CL.

Discussion

The goal of this article was to use the lens of constructive controversy to inquire into teachers' long-term and short-term PD in CL. Drawing on the authors' different perspectives and experiences with teachers' PD in CL, we sought to contribute knowledge that could support teachers' learning and implementation of CL. In accordance with constructive controversy, different perspectives and experiences related to long-term and short-term PD in CL have been elaborated. Constructive controversy involves a deliberative discussion between different perspectives aimed at creative problem-solving (Johnson & Jonson, 2014). In this section, we integrate the results of our discussions when working on this article and our different perspectives and experiences related to PD for teachers' learning and implementation of CL. Four common characteristics emerged that should be considered in PD for teachers in CL.

One ambiguity that becomes visible in the text is that there is no consensus on what counts as PD for teachers; rather, it is a holistic, multidimensional construct. For example,

PD in CL can a) be based on different CL approaches (see Table 1); b) involve a whole school or a single teacher (FERGUSON-PATRICK & JOLIFFE, 2018; JOLIFFE, 2015); c) focus on CL or on a specific area of CL (CORDINGLEY et al., 2015); d) range from a few hours to several months or even years (FERGUSON-PATRICK & JOLIFFE, 2018; GOODYEAR, 2016); e) include predetermined elements (DAVIDSON, 2021; KAGAN & STENLEV, 2006); f) allude exclusively to one intervention or to both an intervention and a practical implementation (HA et al., 2015; HAMMAR CHIRIAC & FORSLUND FRYKEDAL, 2022); and g) include or not include follow-ups (HAMMAR CHIRIAC & FORSLUND FRYKEDAL, 2022; LIEBECH-LIEN, 2021). In line with previous research (CORDINGLEY et al., 2015; HA et al., 2015), we conclude that the purpose, who is targeted and how the time is used are more important to the outcome than following some predetermined rules for what counts as PD.

In sum, short-term PD is better than no PD at all. This is promising result in today's society, which is characterised by reduced resources within the education system worldwide. This lack of resources (i.e., budget limitations, availability of substitutes to cover classes during PD or different priorities) is a strong incentive for some schools, universities or districts to offer short-term PD.

Based on the literature on PD in CL and the narratives presented in the methodology section we find a number of common characteristics between long-term and short-term approaches to PD that support teacher learning and implementation of the method. These characteristics should be taken into consideration in developing and facilitating effective PD for teachers in CL. This is particularly relevant since, after finishing PD in CL, teachers often abandon or noticeably reduce their use of CL in practice (SHARAN, 2010).

The first characteristic is the importance of providing a PD programme that provides a shared understanding and knowledge of the theoretical framework. Focussing solely on CL techniques the teachers can use in their teaching can lead to discontinued use and makes it more difficult for them to adapt to changing conditions in practice (see JOHNSON et al., 2000). Regardless of the CL approach and the length of the PD programme, it is essential that the participating teachers acquire a shared understanding and knowledge of the theoretical framework for CL (DARLING-HAMMOND et al., 2018). Even if the teachers only participate in a few hours of PD, the acquisition of a linguistic repertoire, including CL terminology and concepts, can light a spark and lay a foundation for future collaboration with colleagues who are also interested in CL (HAMMAR CHIRIAC & FORSLUND FRYKEDAL, 2019). Similarly, an increased understanding of the theoretical framework of CL and a developed mode of languages can be useful in the teacher's implementation of CL in practice. When we understand why we do something, it also becomes easier to explain it in our own words to the students included in the change of practice.

Second, PD needs to facilitate teachers taking ownership of CL. Both narratives provide examples and show the importance of teachers' ownership of the method. Teachers' incorporation of the CL assignment when implementing it in their classroom teaching is an essential part of their PD. In the short-term PD narrative, the importance of the teacher owning the CL assignment and including it in their own teaching was particularly notable in two classrooms where this was lacking. The CL task to be implemented in the classroom 'did not belong to the teachers but to the researchers', who were participating as observers. This approach resulted in a mechanical implementation, and when questions arose in the classroom, the teacher turned to the researcher, who then had to step in as a coach and solve the problem. In classrooms where the teacher owned the task, no such need for coaching arose during the actual implementation or problem-solving in the classroom. It is likely that the teachers who did not take ownership of the method will have challenges in continuing to use CL in their practice when they no longer have support from the researcher.

The long-term narrative also highlights the importance of teacher ownership of CL and how it can be achieved. The narrative shows that gaining first-hand experience with the theory and method in the workshop and follow-up session was not enough to support teachers' learning and implementation of the method. Cooperative learning needed to be adapted and attempted in classroom practice as part of the PD. This involved the teachers trying out CL and inquiring into their own practice with support from a self-developed proactive action research project. Planning, trying out the method in their own practice and reflecting on the implementation are vital components of PD to support teachers' ownership, learning and implementation of CL, as shown in other studies (e.g. ALANSARI & RUBIE-DAVIES, 2021; GOODYEAR, 2016).

The third common characteristic of effective support for teachers' learning and implementation of CL is that the PD includes collaboration. An important prerequisite to support students' CL is that the teachers have experienced the benefits of collaboration as learners themselves (LIEBECH-LIEN, 2022). Collaboration in PD in CL can take many forms, such as teachers getting first-hand experiences with CL as learners themselves in CL groups, as described in the long-term narrative. Participation as learners enables reflection on their experiences with peers and can provide them with knowledge and ideas about how they can further implement CL in their practice. Collaboration in PD in CL can also take the form of planning with others how to implement CL in the PD sessions. This can involve teachers across schools, as in the short-term narrative, and within teams in schools, as described in the long-term narrative. Interacting and collaborating while learning and planning how to use CL in the PD programme can enable the participating teachers to form a professional learning community. In fact, participation and interaction in a community of professionals has been shown to support teachers' learning (DARLING-HAMMOND et al., 2017; TIMPERLEY et al., 2007). Further, there is a growing body of research that points to whole-school approaches to PD in CL, showing that it is particularly beneficial when the school takes collaborative action to implement CL (CORDINGLEY et al., 2015; FERGUSSON-PATRICK & JOLIFFE, 2018, JOLIFFE, 2015).

The importance of collaboration in PD leads us to the fourth common characteristic we want to accentuate: the importance of support. Through collaboration and participation in a community of professionals, the participating teachers become an important support structure for each other's learning and implementation of CL (ALANSARI & RUBIE-DAVIES, 2021; GOODYEAR, 2016). Teachers participating in PD from different schools can become a greater professional learning community. However, it is also important that they develop support structures within their own schools to rely on in the future. Krečič and Grmek (2008) argued that it is important for teachers to have the opportunity to collaborate and receive support in implementing CL in their practice.

Moreover, support from the provider of the PD in CL is vital for teachers' learning. This is in line with the factors facilitating effective PD to support teachers' learning (DARLING-HAMMOND et al., 2017). As seen in both narratives, the researcher functioned as a collaboration partner and support structure throughout the PD programme. In the short-term narrative, the researchers took the time to get to know each other and establish collaboration between the researchers and the teachers as well as between the teachers themselves. The researchers facilitated the PD but were also present when the teachers implemented the CL assignment and provided support if necessary. In the long-term narrative, the author had the role of a researcher in her own organisation, facilitated the PD and also provided ongoing support when the teachers conducted their own action research implementing CL. Collaboration and support from the researchers facilitated collaboration between researchers and teachers, who benefitted from the complementary knowledge and experience, which supported the teachers' learning and implementation of CL.

Concluding remarks

Our study explored long-term and short-term PD in CL for teacher learning and implementation. The results show that PD in CL is a holistic multidimensional construct and that both long-term and short-term PD can support teacher learning. However, how the time is used is the most important factor for a successful outcome. In the development of the article, we adopted constructive controversy as our framework to explore long-term and short-term PD. One conclusion is that regardless of the approach, there are four common characteristics of effective PD in CL: 1) It enables participating teachers to acquire a shared understanding and knowledge of the theoretical framework of CL; 2) It facilitates the teachers taking ownership of CL; 3) It involves collaboration (in different forms); and 4) It includes support structures. These four characteristics are in line with current research on effective PD, which emphasises that PD requires active learning, a content focus, collaboration, reflection and support (DARLING-HAMMOND et al., 2017). Moreover, CL is an established pedagogical model that has been shown to be highly effective in classroom practice, which is one of the characteristics highlighted for effective PD.

However, one important difference between long-term and short-term PD that influences teacher learning and implementation is the time frame, which greatly impacts possible content and follow-ups. The literature on effective PD for teachers emphasises that successful PD is sustained over time. Moreover, in short-term PD teachers are not given enough time to plan, try and reflect on their CL practices to support the implementation and development of their CL practice. This is especially true in terms of the conceptual approaches to CL, which include the underlying theory and guidance on how to structure CL to the specific context (see JOHNSON et al., 2000), which are likely to benefit more from a long-term approach to PD. Another drawback of short-term PD is that providers will not have the opportunity for follow-ups or sustained coaching in the practice. Even so, PD that is focussed on specialised content can also benefit teachers' development, as shown in the short-term narrative. Thus, we highlight the importance of schools and teachers participating in short-term PD to develop support structures for themselves to continue to implement, develop and sustain their CL practice.

While research strongly supports long-term PD to improve teachers' learning and practice, our results show that short-term PD can support teachers' learning as well by identifying common features of effective long-term and short-term PD. The four common characteristics of PD in CL regardless of approach have important implications for developing strong PD and supporting teachers' learning and implementation of CL. Another implication of this research is that constructive controversy can be used as a framework for collaboration between researchers with different perspectives and experiences. Specifically, it can support perspective taking, collaboration and joint reasoning, thereby contributing to new branches of research on how to facilitate teachers' learning and implementation of CL.

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