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Teaching twenty-first-century skills: examining collaborative learning in initial teacher education in Finnish universities

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ABSTRACT
This study investigated whether and how research-based knowledge on collaborative learning is applied as theoretical content and a pedagogical approach in the Initial Teacher Education (ITE) curricula in Finnish universities. It adopted a qualitative approach, triangulating curriculum documentation and in-depth interviews with curriculum development experts responsible for designing ITE. Results suggest CL's central ideas are present in the curriculum documentation and transversally addressed as a teaching practice of group work, highly dependent on the teachers' approach. However, the up-to-date empirical discoveries of the learning mechanisms involved in CL processes are not visible in the formal curriculum, creating tensions between content/theory and method/pedagogy. The study uses the Finnish case to critically discuss the challenges of evidencing clear guidelines on CL in ITE curriculum. It emphasises the importance of addressing CL theories and practical methods in ITE to bridge gaps between theory and practices, preparing teachers for contemporary teaching and learning. contexts.

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Introduction

Collaborative learning (CL) is well-known to require individuals to activate their cognitive, metacognitive, interaction and technological skills in group settings (Dillenbourg, 1999; Roschelle & Teasley, 1995) and plays an integral role in developing twenty-first-century competencies. Numerous national and international frameworks of twenty-first-century skills (e.g., Assessment and Teaching of twenty-first Century Skills (ACT21S), the Program for International Student Assessment (PISA) or Finnish National Core Curriculum) highlight the importance of these CL for success in education and at the workplace (Dede, 2010). Research on CL in classroom environments has continuously shown that it benefits students' cognitive and metacognitive learning in any discipline (Ferguson-Patrick, 2016; Gokhale, 2012), regardless of the nature and scope of different forms of CL (Järvenoja et al., 2020b; Meijer et al., 2020), and it is the base for developing skills on collaborative problem-solving and collaborative study plans. However, how these practices are organised to bring positive outcomes for learners strongly depends on the teacher. Thus, teachers' competencies in implementing CL in practice should be fostered already during pre-service education and training (Kaendler et al., 2014). Ruys et al. (2010) suggest that teacher education should focus on implementing CL as an activity for student teachers and as content, as students

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must understand what CL is and how they can apply it in their teaching practice. Recent research has been strongly focused on the collaboration skills of in-service teachers (Le et al., 2018; Hämäläinen & Vähäsantanen, 2011). However, it remains unclear how well the existing Initial Teacher Education (ITE) programmes prepare future educators for designing, implementing, and managing CL in their classrooms. To address this gap, the present study investigates whether and how knowledge about CL is approached in ITE curricula, using Finnish higher education as a case study for the examination. Specifically, we consider whether CL is mentioned in the curricula as a pedagogical method, a practical activity, or/and theoretical content (Ruys et al., 2010). We understand that collaborative learning is the key process for developing collaboration in a broader perspective, which builds on the different skills (e.g., collaborative problem-solving and collaborative strategical planning) mentioned in the twenty-first-century frameworks. Finnish higher education is a rich site of research for this approach. It enjoys great autonomy in curriculum planning (Mäkinen & Annala, 2012) and maintains a strong connection with the practices in basic education due to intense teaching practices taking place in teacher training schools that are part of the teacher training universities (Malinen et al., 2012). Understanding how CL is approached in the Finnish ITE will allow us to identify areas of ITE that need improvement and provide general insights into how CL is addressed and how knowledge of CL is transferred in the context of teacher preparation.

Collaborative learning and its importance for education at all levels

Definitions of CL can vary considerably depending on the focus of the process (for a review, see Ferreira, 2021). From a cognitive perspective, CL is a situation where a particular student interaction triggers mechanisms (e.g., explanation, disagreement, and regulation of learning) for knowledge elicitation, internalisation, and reduced cognitive load (Dillenbourg, 1999). Focusing on interactive dynamics, CL is the presence of positive interdependence and individual accountability while promoting social skills and group processes (Johnson & Johnson, 2008). The balance of these elements facilitates individual learning. Alternatively, from a social perspective, CL is a joint activity in which partners, aware of a common goal, negotiate intentions and coordinate synchronous actions toward its achievement (Roschelle & Teasley, 1995). The guiding idea is that learners share their previous knowledge, experiences, or relevant information, search together for meanings and solutions, and maintain a shared understanding of the problem throughout the learning process, aiming to co-construct a joint solution or new knowledge (Iiskala et al., 2011; Zabolotna et al., 2023). Although presented differently, the common idea among these perspectives is that CL does not occur independently; it must be intentionally planned, guided, and supported. CL is identified in groups that can create a coordinated dynamic, entailing diverse and self-regulating individuals who are able to contribute to the shared processes and outcomes. Within this social system, individuals simultaneously guide and support their and others' shared strategic activities rather than divide a task into smaller packages of actions each group member conducts individually (Grau & Whitebread, 2012; Koivuniemi et al., 2018).

Research on CL has consistently shown individual and group benefits (Järvenoja, 2010), including the development of self-regulation among the members of a group, which is positively correlated with better learning strategies (Volet & Vauras, 2013). CL improves individual psychological health, social competence, and self-esteem (Laal & Ghodsi, 2012) and enlarges students' capabilities to deal with divergent perspectives, which affects their cognitive learning paths (Chi & Wylie, 2014). CL also enhances social relations in classroom dynamics, boosting motivation and supporting better academic achievement (Peterson & Roseth, 2016; Tolmie et al., 2010); supports the development of critical thinking (Gokhale, 2012), promotes empathy-based skills that contribute to conflict resolution (Ferguson et al., 2017), and enlarges the understanding of diversity, which allows successful functioning of an individual in diverse and multicultural environments (Loes et al., 2017).

Incorporating CL theories, methods, and practices into ITE serves as a platform for pre-service teachers' professional development. CL theoretical framework provides them with a broad understanding of different elements involved in learning processes, e.g., (meta-)cognitive, socio-emotional, and motivational. It supports the development of pedagogical practices aligned with the demands of the rapidly evolving conditions of today's world (Ananiadou & Claro, 2009). It also fosters their abilities to elaborate knowledge on the meta-level of collaboration and the performance level (van Leeuwen & Janssen, 2019), support them in guiding CL processes to engage their own (De Hei et al., 2016), and in choosing adequate strategies to assess student's performance in CL contexts (De Hei et al., 2015; Meijer et al., 2020). Accordingly, the benefits of CL in primary education are contingent on class teachers being competent in designing and implementing CL into effective practices (De Hei et al., 2015). Therefore, it is natural to assume that CL is a relevant topic in contemporary ITE.

At the same time, studies have consistently discussed the challenges of implementing collaborative learning, including the theoretical and methodological challenge of identifying and understanding the mechanisms of shared cognitive processes, i.e., the socially bound learning mechanism. The observable and measurable aspects of collaboration lie in students' actions. The consequences are, first, that CL activities are often designed as "hands-on" activities instead of activities that deal with the construction or understanding of conceptual knowledge, and second, that such activities end up supporting shallow learning (Chi et al., 2018). Further criticism comes from teachers' limitations in identifying what students need in the process of knowledge construction (Li et al., 2022) and, thus, failing to offer the necessary support. The presence of the teacher and its role in guiding collaborative work is not sufficiently clear for many teachers, including experienced ones, which leaves students pedagogically unattended. Another aspect that adds to the challenges of implementing CL, particularly in higher education, is its relational and interpersonal structure. CL fundamentally depends on students' willingness, openness, and ability to interact with others. Some studies focusing on CL's emotional and motivational aspects emphasise the vulnerability of such interactions, especially for students who face psychological issues (Fitzsimons, 2023). In such cases, the construction of the collaborative setting is understood as another dimension of pedagogical planning, and teachers should consider individuals' emotional demands. Emotional and motivational regulations are as important as cognitive and metacognitive ones. However, students need support to learn to use emotional and motivational regulations in collaborative interactions, which is a challenge when teachers decide on the level of autonomy they wish their students to have (Järvenöjä et al., 2020a).

Moreover, despite being present across national and international frameworks, CL as a twenty-first-century skill (Geisinger, 2016) is not clearly defined in today's ITE curricula and remains unclear how the existing research on CL is integrated into ITE. For example, the latest Teaching and Learning International Survey (TALIS) 2018, organised by OECD, emphasises collaboration as a tool for teachers' professional development and growth of collegiality and refers to it in the context of teachers' professional (role of collaboration in teacher feedback) and pedagogical (innovation, professional experimentation) characteristics. Nevertheless, how CL skills are meant to be developed is defined vaguely. Studies exploring different possibilities of implementation of CL, both within the context of ITE and teacher's work (Järvenoja et al., 2020a; Le et al., 2018) and in the context of teachers' professional development (Keay, 2006), point out several barriers to implementation of CL, one of them being the lack of sufficient knowledge for creating an independent practice. Acknowledging all these barriers raises the question of whether pre-service teacher training prepares future teachers sufficiently and effectively to plan, identify, support, and guide collaborative learning in their practices. It highlights awareness of the need to further investigate how the ITE curriculum of pre-service teacher education in higher education addresses CL in ways that would enable and support the development of future teachers' necessary skills necessary for working with its implementation in basic education and other educational contexts.

Curriculum development and knowledge transfer in higher education

In this study, we commune with the idea that the curriculum is a place for negotiating several vital issues concerning the tensions between internal and external objectives, scientific-educational, pedagogical, administrative practices, and individual and collective interests (Annala, 2023). It is where to negotiate relations between learning and teaching and discuss how knowledge is created and its role. This approach is based on a framework that recognises the importance of presenting coherent and well-put-together normative guidance for curriculum designers but does not limit the idea of curriculum as a syllabus, which focuses on a body of knowledge to be transmitted or a subject to be taught. Instead, it is aligned with the idea that looking at the curricula entails three levels of engagement: knowing, acting, and being (Barnett & Coate, 2005; Mäkinen & Annala, 2010), dealing with the tensions between content vs learning outcomes, theory vs methods, and knowledge transfer vs transversal skills commonly found in many curriculum approaches (Annala et al., 2016). It also sees the curriculum as answering the universities' and teachers' expectations to fit and preserve areas of interest. Within this perspective, the extended academic community decides what knowledge is included in the curriculum, carefully balancing external and internal expectations and pressures. Therefore, curriculum development is a complex process, and challenges are expected.

ITE curriculum encompasses multiple layers, including knowledge that needs to be delivered to the students, how it is delivered in terms of the curriculum design and teaching and learning opportunities and practices, and assessment of students' knowledge and skills to apply what they have learned in their own practice. However, one of the biggest challenges is that the relations between these layers are often not well articulated and addressed, which contributes to the gap between what students learn at the university and what the real-world classroom is like (Ashwin, 2014). Often curriculum is viewed as settled and predefined, and the complexity of its design is overlooked. Implementing constructivism then becomes problematic since it is primarily considered by curriculum and instructional designers as a way to engage students in social interaction and activity rather than a complex system of pedagogical choices and conditions needed for its implementation (O'Connor, 2020). This, in turn, influences what kind of experiences pre-service teachers have with CL and their attitudes to it as a pedagogical approach. For example, Ruy's et al. (2014) found that traditional assessment methods in teaching practicum do not stimulate pre-service teachers to use CL but rather make safe choices in their teaching to get better performance evaluation. Another study on CL implementation in ITE in Flanders (Ruys et al., 2010) showed that CL is rarely implemented in teacher education. Thus, pre-service teachers tend to avoid practising CL in their practical training due to insufficient training on the pedagogical use and application of CL theories in the classroom. Again, this highlights the lack of relations between different curriculum layers – it may offer enough theoretical content for pre-service teachers to learn. However, the limited possibilities to practice it themselves in their studies and teaching practicum may hinder their interest and motivation to implement it in practice. Bengmark et al. (2024) found that pre-service teachers prefer more practice and learning on how to use different teaching methods rather than theoretical concepts. However, the authors suggest that grounding theory in practice and raising the importance of theoretical knowledge may contribute to pre-service teachers' attitudes.

Another important challenge in curriculum development is the influence of the constant political, economic, cultural, local and global societal changes (Unger et al., 2020) and their impact on the balance between internal and external interests. Like in other Nordic countries, education in Finland has only recently been directly affected by the job market, shifting towards outcome-based curricula strongly connected to the OECD's project *Definition and Selection of Competencies* (DeSeCo) (OECD, 2005) and the European Quality Framework (Annala, 2022, 2023; Young, 2008). This change has gradually pushed education institutions at all levels to prioritise developing competencies that prepare individuals to respond to the twenty-first-century world and the challenges in specific work fields, e.g., developing materials, methods, or ideas that serve the industry purposefully in different areas. Consequently, it has limited the discussion about the role of research-based knowledge and how it should be incorporated into curriculum development in higher education (Petkute, 2019), which can weaken how we address all the dimensions of engagement: *knowing, acting, and being*.

In Finland, an example of this complex interaction between external and internal interests is in the alignment of the twenty-first-century skills drawn in the DeSeCo outcomes (international instrument), the Finnish National Core Curriculum for basic education in 2014 and 2015 (Lavonen, 2020), and its influence on the curriculum development in teacher education in higher education. In the Finnish context, teacher's work is guided by the Finnish National Core Curriculum (FNCC). The alignment *per se* does not represent a challenge, but the lack of clear guidelines for implementing and supporting these twenty-first-century skills in practice. Thus, tensions and contradictions emerge during curriculum development and implementation, making research focused on curriculum and the transfer of research-based knowledge to identify critical areas and improve pedagogical implementation needed. In this study, we focus on the research-based knowledge of one of the twenty-first-century skills – collaborative learning, which appears in the FNCC within cultural competency, interaction, and self-expression (Ferreira & Zabolotna, 2022). According to Lavonen (2020), collaboration both in the form of students' learning (e.g., active engagement in collaborative processes and learning within diversity and heterogeneous classrooms) and teachers' work (e.g., collaborative work with other teachers and different professionals) are a current challenge in Finnish education (for full report produced by the Finnish Education Evaluation Center, see Blömeke et al., 2018).

The present study

This study aimed to investigate the presence and conceptualisation of CL in Finnish ITE as a theoretical concept and a pedagogical approach. We approach the curriculum analysis relying on Goodlad's (1979) distinction between the *ideal, formal, perceived, operational,* and *experienced* curriculum. These domains characterise different ways to conceive a curriculum and different perspectives from which it can be conceptualised and experienced. This study focused on the *formal* (i.e., the official, authorised, and often a consensus document describing the curriculum guides, state or local syllabi, and textbooks set forth by a curriculum committee) and the *perceived* curriculum (i.e., the ideas and interpretation of the curriculum, portraying how it is perceived in the minds of those involved in its implementation).

We addressed this phenomenon by looking at Finnish ITE as case study that could allow for better understanding of how the advancements on CL are (or not) visible in the curriculum. We observed whether integrating CL theories, strategies, and skills can be evidenced in curriculum documentation and focused on unravelling the possibilities that the curriculum offers for developing CL skills in pre-service teacher education from the perspectives of professionals responsible for curriculum work and development in Finnish higher education. Thus, the study aimed to understand how CL is conceptualised and addressed in Finnish ITE programmes supporting future educators in developing their CL skills and implementing CL in practice. The strong research-based approach in Finnish higher education and the substantial research in CL conducted in Finland supports the assumption that empirical-based knowledge on CL is addressed in ITE explicitly. Also, as a transversal skill, it is expected that CL appears across the teacher training degree programmes, following the FNCC. Thus, the present study asks:

(1) How is CL conceptualised as an educational phenomenon in the ITE curriculum in the context of Finnish universities?
(2) How do Finnish ITE programmes reflect recent conceptual advances in CL, and what possibilities and suggestions do Finnish ITE programmes offer for implementing CL?

Method

Participants

The participants were staff members ($n_{female} = 11$, $n_{male} = 4$, aged between 29 and 53) from five of eight Finnish academic universities (universities 5, 6, and 8 in Figure 1 declined the invitation to participate). Participants were selected through a purposive sampling technique following three criteria: holding at least a master's degree in the field of work (e.g., education, art, educational psychology, philosophy of education), occupying a work position that requires professional involvement in curriculum development, and having at least two years of experience with tasks directly related to curriculum development. The research protocol involved advertising an open call for participants through the faculty's internal email with the authorisation of the deans of each faculty. Participants interested in joining the study would answer an online screening questionnaire designed for the study. The second author examined the participants' demographic information and eligibility according to the study's inclusion criteria. They were experts in curriculum implementation, responsible for overseeing its development and occupied official positions of study coordinator (n = 2), head of the faculty (n = 2), project leader (n = 3), and university lecturer assigned to oversee curriculum development (n = 8). All participants were Finnish-speaking professionals, educated in Finland, holding a doctoral degree in philosophy (n = 8), a doctoral degree in education (n = 4), or a master's degree in education or arts (n = 3), and presented varying years of experience (min = 2; max = 30).

Data collection and analysis: a three-step sequential process

Data were derived from two sources: (1) curricula documentation of ITE programmes in five universities, and (2) interviews with the experts responsible for guiding the curriculum development in the same universities.

Step 1

Once the institutional representative agreed to participate in the study, the curriculum documentation was requested by email from the curriculum experts. The final dataset comprises of five sets

ID	Institution	Program (Total 180 ECTS each)	Mandatory courses (ECTS)	Elective courses (ECTS)	Duration (years)
1	Tampere University	Bachelor's Program in Educational Studies, Class Teacher Education	*30 courses (145ECTS)*	*Minimum 4 courses (10ECTS) out of 42 (119ECTS) + Free choice course (min 25ECTS)*	3
2	University of Eastern Finland	Bachelor's Program in Class Teacher Education	41 courses (107 ECTS)	Minimum 2 courses (8 ECTS) out of 23 (118 ECTS) + Free choice course (min 65 ECTS)	3
3	University of Helsinki	Bachelor's Program in Education: Class Teacher, Education	21 courses (110 ECTS)	Minimum 8 courses (26 ECTS) out of 42 (101 ECTS) + Free choice course (min 28 ECTS)	3
4	University of Jyväskylä	Bachelor's Degree Program in Primary Teacher Education	38 courses (134 ECTS)	Minimum 1 course (5 ECTS) out of 6 (22 ECTS) + Free choice course (min 41 ECTS)	3
5	University of Oulu	Primary Teacher Education (BA, Education)	32 courses (152 ECTS)	Minimum 1 course (3 ECTS) out of 2 (10 ECTS) + Minor studies (min 25 ECTS)	3

Figure 1. Participating universities and primary teacher education programmes they offer.

of curriculum documents describing: (1) the content of the courses, expected learning outcomes, and recommended literature, (2) the courses timetable showing the flow of the educational process, (3) the core values and beliefs guiding the organisation's work to support the degree programmes and (4) statements of pedagogical views adopted by the faculties or departments to elaborate on the teacher education and training (see Figure 1). The analysis focused on the curriculum for bachelor studies as it is at this level that a solid foundation for understanding the core knowledge and skills required of primary teachers is provided. Master's programmes emphasise research and advanced academic studies.

The compiled documents contained 277 course descriptions ($n_{pages} = 124$; Times New Roman 12, space 1,15). All materials not originally available in English were translated by a qualified Finnish native speaker with a background in education.

The document analysis method used for this study combined content and thematic elements (see Bowen, 2009) and was supported by qualitative analysis software ATLAS.ti (version 22). In the first-pass document review, we identified key concepts related to CL. This was followed by developing a theory-driven code book containing different concepts related to CL, e.g., collaborative assessment or interactional competence. Further, the content analysis, guided by the codebook, generated a conceptual map describing learning content, processes and outcomes in the curricula documentation. In the next step, we carried out a thematic analysis, which included careful re-reading and data-driven review. It identified patterns within the data and revealed emergent themes – categories used for further analysis. The curriculum of each university was individually analysed to identify references to CL in syllabi, content, and course objectives. A total of 282 codes were assigned by researchers into four major categories: (1) mandatory courses with CL mentioned as content; (2) mandatory courses with CL mentioned in learning outcomes; (3) elective courses with CL as content; and (4) elective courses with CL as learning outcomes. Although not indicative of relevance, the frequency of these codes supported the analysis.

Step 2

This step consisted of developing a script for the semi-structured interview, divided into two sections. The first section addresses (1) how CL is conceptualised or recognised in the curriculum in general; (2) its implementation in teacher education; (3) theoretical frameworks of CL used in the curriculum; and (4) how teacher students are trained to implement CL in their practice. This script was piloted for refinement, diminishing theoretical bias and vagueness (Becker, 1998). The pilot interview was not included in the dataset.

The second section contained institution-specific questions based on the curriculum document analysis (Goldstein & Reiboldt, 2004), addressing individual teacher education programme specifics. Combining these two sections ensured a balanced interview, not limited only to personal perspectives but also to create an evidence-based discussion (Charmaz, 2006). Therefore, this process enhanced the complementarity of the methods and materials and the possibility of cross-checking information. The final script contained 18 standardised (Section 1) and three specific (Section 2) questions shared with participants in advance for reflection and preparation.

Step 3

The final stage involved conducting the interviews as open conversations since the participants were pre-informed about the questions (Rubin & Rubin, 2005). All participants answered all the questions. Interviews were audio-recorded, anonymised, and transcribed. Each participant gave their consent to data collection and processing. Data analysis was initiated immediately after recording, integrating data collection and analysis (McDonald et al., 2017). The qualitative content analysis was guided by Grounded Theory coding procedures (Corbin & Strauss, 2008). This technique ensured a comprehensive understanding of participants' views on CL and curriculum development

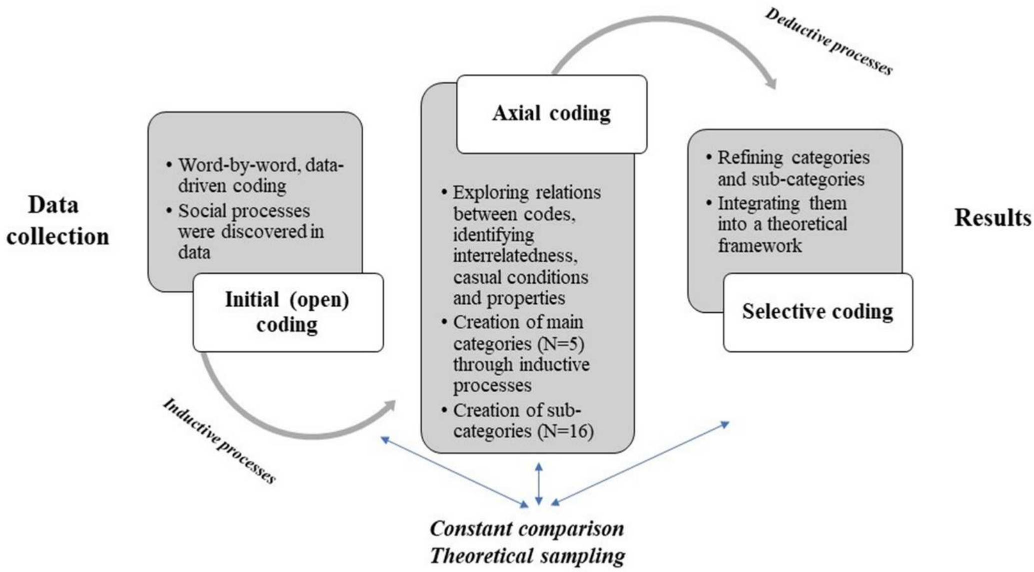

Figure 2. Illustration of the model for the coding process in the analysis of interviews.

combining inductive and deductive processes, which allowed to identify key categories in the data relevant to the research questions. The analysis process, relying on open, axial, and selective coding (Figure 2), created insights into CL incorporation in the curriculum. The interviews were initially treated separately to provide an overall view of each case (participant and university); types of information were compared, and, when necessary, complementary data were collected to achieve saturation.

During the initial open coding, codes were labelled using an *in-vivo* approach (data-driven procedure). The axial coding stage formed subcategories and main categories by assessing code relationships and merging codes of similar meanings. The selective coding stage combined datasets to map out the phenomena. Researchers repeatedly discussed code interpretations at every data analysis stage, ensuring comprehensive understanding and reliability. Figure 3 offers an insight into this coding process.

Ethical considerations, validity, and reliability

Ethical considerations were rigorously observed, including consent agreements, data anonymisation, and secure data storage. Participants were offered to speak Finnish or English in their interviews, with all choosing English. The second and third authors conducted the coding processes individually, with the first author overlooking and double-checking the whole process. All coding disagreements were resolved through discussions, with contentious codes discarded. To ensure validity, continuous reflexive practice and peer debriefing were employed throughout the study (Creswell, 2013).

Results

The analysis of curriculum documentation

In Finnish primary teacher education, cooperative learning (CL) is a recurring theme. It is mentioned in various forms, such as group activities and team teaching, across both compulsory and optional courses. However, it was noticed that there aren't any courses dedicated solely to CL. Also, when CL is mentioned, it's not usually tied back to solid theories or research, and there isn't much in the way of specialised reading material to support it. The focus tends to be more on nurturing positive group interactions and mediating conflicts or task-related disagreements, rather than diving deep into the CL process itself.

N	*Topic*	*Dominant codes*
1	Relevance of collaboration	important, essential, promotes learning, demanding, facilitates learning
2	Definitions of CL	group work, doing together, working in pairs, team, strategy, teaching tool
3	Implementations of CL	in group work, in small groups, different courses, different moments
4	Use of CL	for students' learning, interactional skills, understand diversity, deeper study, combine strengths, promote inclusion
5	Teacher's role	teachers use, teachers apply, teachers decide how, teachers know, teachers implement, quality keepers
6	Curriculum development in CL	students need more CL, concepts are needed, improve quality
7	Challenges of CL	is hard, it is cognitively demanding, students' have a lot to do, individual work is also important, free travelers
8	Theories of collaborative learning	Vygotsky, Constructivism, dialogical learning, own models
9	Students' knowledge on CL	don't know enough, don't try to collaborate, CL is too time consuming
10	Curriculum in higher education	CL is not mandatory, CL is undefined, not strict, CL is more visible, no guidelines for implementation

Figure 3. Example of the chain of evidence of codes in axial codding.

When we look at the course offerings across Finnish universities, it's interesting to see how they approach CL distinctly. For instance, the University of Jyväskylä often includes CL in its required courses. Tampere University, on the other hand, tends to explore CL more in its optional modules. Then you have Tampere University, the University of Helsinki, and the University of Eastern Finland, where CL principles are highlighted in the learning goals set for students. Meanwhile, the University of Oulu and the University of Jyväskylä weave CL into the fabric of their course content (see Figure 4, informing where and how CL appears across the different university courses). This variety can be interpreted as evidence of the autonomy for curriculum development that Finnish universities enjoy (Mäkinen & Annala, 2012).

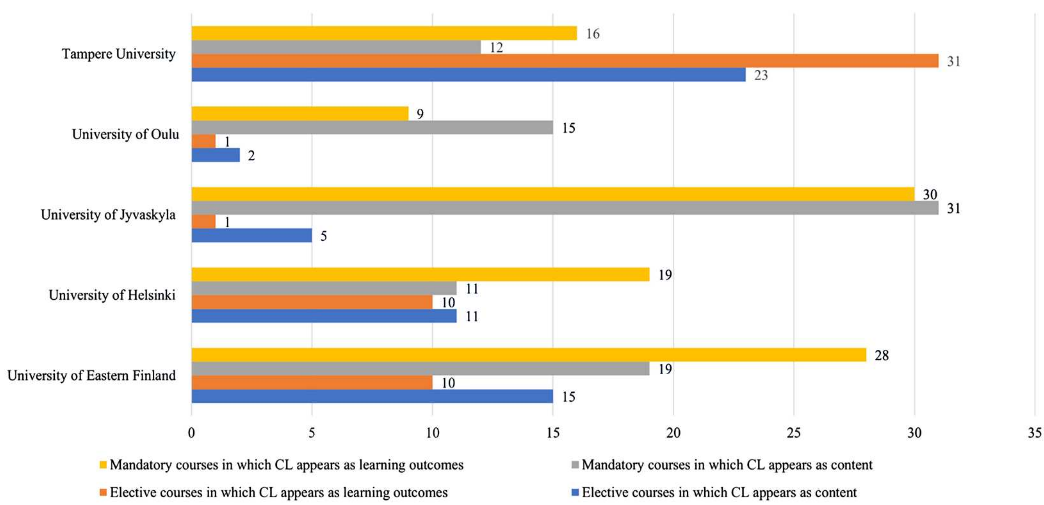

Figure 4. Frequencies of conceptual references of collaborative learning in the curriculum of primary teacher education in Finland.

The document analysis identified sixteen sub-categories of CL concepts and ideas (see Appendix A), documented in both mandatory and elective courses as content or learning outcomes. Notably, "interpersonal skills or social skills" and "interactional competence" were frequently mentioned in the courses' content descriptions. In terms of learning outcomes, references to CL were expressed as specific actions or achievements, often using verbs like *structure*, *act*, or *develop* in relation to CL ideas, e.g., "we expect students *to develop* interpersonal skills, *to act* collaboratively, or *to structure* cooperation in work environments". Courses' learning outcomes encompassed aspects of collaboration, such as co-developing ideas and collaborating with others. The focus primarily remained on communication and interaction skills for teamwork rather than theories or strategies of collaborative learning.

When examining categories where CL concepts and ideas appeared as content, there were ambiguities in addressing empirical-based knowledge of CL. For example, in the course *Teacher Practice I, Class Teacher Education*, the content of the course is described as "studying how teaching is planned, implemented, and valued in cooperation with other teachers". From this description, it is unclear whether students can learn how to establish collaborative interactions or about the specific role of collaboration at different teaching stages. These may be ambiguities originally related to the conceptualisation of CL or related to how the role of CL is understood as part of the teachers' professional attributions. Both cases show, to a certain extent, barriers to addressing CL clearly in the curriculum, which is aligned with previous research reports in other countries (Ruys et al., 2010). Ambiguities were sometimes clarified when CL concepts and ideas were mentioned as learning outcomes. In the same course, students were expected to "work in constructive collegiate cooperation, provide and use feedback, and evaluate their and others' work in teaching and learning". This clarified that CL was addressed as a method of work. The emphasis in the learning outcomes, particularly in mandatory courses, was more on developing collaborative skills rather than understanding CL theories and applications. This pattern was observed across all five sets of curriculum documents and corroborates with conclusions from previous studies suggesting that CL is effectively incorporated in teacher education at the practical level – as part of the pedagogical strategy in teacher education (Zhang et al., 2021) instead of part of the contents related to pedagogical theories and models.

Additionally, the document analysis highlighted the absence of relevant literature references in course descriptions. Only 31% of the course descriptions provided a bibliographical list, and among those, only 9% referenced CL concepts or ideas without including academic literature. The lack of information regarding the supporting theories hindered the understanding of how CL content is implemented in teacher education. These findings suggest that the formal curriculum of teacher education programmes may not comprehensively address the development of collaborative competence but instead rely on CL as a teaching method. While CL concepts are present across universities, the lack of specific courses addressing empirical-based knowledge and a lack of clarity regarding theoretical and methodological applications raise concerns about primary teachers' opportunities to acquire sufficient knowledge and competence in CL. This may impact their ability to effectively teach and support their future students in collaborative learning contexts.

Experts' views on the implementation of collaborative learning in Finnish teacher education

The interviews with curriculum experts revealed three central categories (see Figure 5). The first category, *A method more than a theory,* informs how participants rationalised CL, providing an overall understanding of how CL theories, methods, and practices are intertwined. It is particularly important to unravel the shared views on CL, which guide answering how CL is addressed in the curriculum of teacher education programmes.

The second category, *Transversal skills vs knowledge transfer,* concerns participants' reflections on the teacher education curricula in their universities. Thus, participants reflect on CL considering

Categories	Sub-categories	Example of conceptual unit	Example of data excerpt
A method more than a theory	-CL as group-related activity -CL as a learning strategy -CL as a value for learning -CL as cognitively demanding	One way to learn - strategy Learning together	"collaboration is a *type of learning* when students teach and learn *together,* and from each other"
Transversal skill vs. knowledge transfer	-CL in the teacher education -Different CL implementations -Connections to the National Core curriculum -Students don't know enough	Teachers use CL with students CL is used in different times	"In general, *teachers can use* collaborative learning in *different moments* of *their work with the students*"
It is up to the teacher	-Teacher play the biggest role -Mastering CL theories -Improving CL practices -Cl is challenging	CL can be difficult Teachers think differently Difficult to find common ideas	I think that`s how it is, that it *can be very difficult* also in the curriculum work to *find any common idea.* And teacher *educators think so differently.*

Figure 5. Main categories explaining the incorporation of CL into teacher education.

the curricula they have been developing. The third category, *It is up to the teacher,* describes participants' views on the important role of university teachers in implementing CL and the specific actions necessary for developing CL as a pedagogical method.

A method rather than a theory

The first category comprises the most shared and recurring ideas across the datasets. Participants defined CL primarily as *group-related activity*, emphasising *the ability to work together* and referencing *teamwork*. Collaboration was often illustrated through examples of *group assignments or projects*, with the understanding that *tasks must be accomplished collectively*. Peer assessment was also highlighted as a means of collaboration. Once more, we identify that CL is addressed by enabling students to practice it during their learning process, with practices structured around the dynamic of group work.

Another recurrent idea was that CL is viewed as *a learning strategy* and a specific approach emphasising dialogue between the students and the need for careful implementation in a particular subject area. Participant 2 noted that "CL can be a good way to learn if done correctly, that it can teach interaction skills". Participants recognised that CL benefits both students and teachers by fostering a positive classroom environment, for example:

> In general, teachers can use collaborative learning in different moments of their work with the students. It is one more type of learning, and it is a type of learning when students teach and learn together and from each other; it is very good for the students and for the teacher because it creates a different dynamic in the classroom. (Participant 7)

Participants often highlighted specific purposes and benefits of CL as a pedagogical approach and a learning strategy that can be "a good way to understand diversity" (Participant 1), "a way to try to understand things deeper" (Participant 4), and "a way to combine different strengths of students" (Participant 10).

> It is a teaching methodology that can help students develop their social skills, a way to teach students to listen to each other. It is not always easy because students also need to work individually, but it can teach communication skills (Participant 5).

These ideas of CL are aligned with the research that shows that CL contributes to developing a social support system for learners, is a positive atmosphere for modelling and practising cooperation, and reduces learners' anxiety (Laal & Ghodsi, 2012). It also shows that Finnish teacher education, like many other countries, has enriched its pedagogical approaches to include student-centred practices such as collaborative learning. Furthermore, all participants agreed that CL is a significant element of teacher education and has important *value for students* enabling their cognitive and metacognitive processes:

> I think they can learn more about the subject, and they can learn how to think about different kinds of things and how to take part in collaboration. They can also learn something about how to study, how to read texts, how to bring them together, and so on. (Participant 3)

This recognition of the cognitive and metacognitive benefits of collaborative learning can be an indication that curriculum development processes are considering the advancements in CL studies. The future of CL learning depends on how the empirical evidence of its benefits and mechanisms are integrated into teacher training (for more detailed debate, see Ferreira & Zabolotna, 2022).

The participants also related CL to student's holistic development, as it allows them "*to identify their strengths and weaknesses*" (Participant 3), "*to find their goals*" (Participant 14) and "*to plan their next steps accordingly because when they are collaborating, students can achieve something they would not achieve on their own*" (Participant 9). CL was also seen as instrumental in developing social skills relevant to societal changes. For example, participants recognised that by encouraging students to engage in dialogue and learn from each other, CL has the potential to impact diversity and inclusivity. Participant 1 noted that CL can contribute to a society "where everyone feels respected and is equal". The definition and recognised benefits of CL reflect participants' perspectives on CL as a pedagogical method applied in teacher education, highlighting its significance in fostering a supportive and inclusive learning environment that prepares students for the evolving demands of society.

While participants described the benefits of CL, they pointed out that *CL is cognitively demanding* for teachers and students and expressed concerns regarding its effectiveness in all situations. CL was noted as an intensive activity that "demands planning from the teacher, and how it is incorporated in the class" (Participant 10) and "demands a lot of thinking" (Participant 15). For example:

> It is a very important thing – students' collaboration. We have to think of it at different levels in our curriculum, whether it is even possible for students to collaborate. Also, when we have our classes, we have to make plans so that they can use collaboration but also learn about how to collaborate together. (Participant 3)

Participants also stated that the learning process should "not be too difficult but challenging enough" (Participant 2) and that CL only works when students "understand why they collaborate, so that one person does not conduct the group and instead everyone shares their knowledge" (Participant 8). When describing the labour involved in planning CL, participants addressed some important elements that guide the implementation of CL as a teaching method. For example, participants strongly emphasised that "for CL to work, a task should include students designing and planning the task itself together" (Participant 9), "modifying the task goals together" (Participant 13), "collecting and analysing the data collaboratively" (Participant 10), and "presenting the results together" (Participant 5). These statements address some more obvious joint goals and actions that have long defined CL (Roschelle & Teasley, 1995). Therefore, it was a common understanding that collaborative tasks would only be effective when every stage of the process is carefully planned and students are engaged.

The findings indicate that the group element is fundamental to collaborative learning (CL), aligning with current educational trends that emphasise collaboration in assessment processes, such as feedback exchange among students (van Gennip et al., 2010). Participants' conceptions of CL are influenced by the research-based understanding of CL as a group process (Keay, 2006). However, it remains unclear whether participants consider all group work as equivalent to CL and how they differentiate CL from general group work. Collaboration in CL does not occur spontaneously or simply by students studying together (Koivuniemi et al., 2018). It involves specific interactional requirements, including (1) coordinated efforts to solve problems or complete tasks together, (2) constructing solutions that would not emerge individually, and (3) co-constructing knowledge through negotiation of meanings (for a review, see Ferreira, 2021). Surprisingly, these requirements were not explicitly mentioned in participant interviews, despite the emphasis on the value of working together in teacher education.

Transversal skills vs. knowledge transfer

The second category displays participants' reflections on CL in relation to the developed curricula, revealing the potential dichotomy between theory and method in teacher education and ambivalences regarding the implementation of CL in connection to the FNCC.

All participants acknowledged the presence of *CL concepts and ideas in their teacher education program curricula* and expressed confidence that CL is implemented through "CL activities that are present in most of the courses" (Participant 2) or "addressing CL throughout bachelor and master level studies" (Participant 7). However, they held different understandings as to how CL should be addressed in their programmes. One key divergence concerns the different ways of implementing CL, with most participants noting that it is included in curricula descriptions of teaching and learning strategies, thus explaining pedagogical methods used in the courses. Participants stated, for example:

> CL is not the content of any course, but it is present in the way we teach our students in practically all the courses. Our teachers used a lot of group work during their lectures, and it is possible to see how the students learn with this method. (Participant 5)

Nevertheless, the participants did not refer to specific teaching methods. Still, they described CL concepts and ideas at a more general level, stating that "CL is in the curriculum" (Participant 6) or "present in most of the courses". This conclusion supports our findings from the document analysis and suggests that CL is present across the curricula to some extent as a transversal skill.

Those participants who believed that their curricula had examples of CL knowledge transfer and combinations of CL theory and methods discussed it within Vygotskian ideas and social constructivism, dialogical learning, or referred to the work of the Finnish scholars, e.g., Kai Hakkarainen, Kirsti Lonka, and Lasse Lipponen. Examples of such statements are:

> Hmm, actually, here … I think that many teachers think through social constructivism and some Vygotskian thoughts also, but we don`t need to have only one main theory; we can teach many … For example, I am just in this nowadays, very interested in design-based research, which is also very collaborative. (Participant 3)

The same participants also provided general insights into how knowledge of CL is transferred into teacher education. One participant observed that CL is embedded within the courses focusing on social aspects of learning, where interaction and the prerequisites for its success are explored. Two other participants stated that "teacher trainer combine different theoretical frameworks" (Participant 14) or "occasionally develop their own" (Participant 1). Furthermore, it was mentioned that the teacher education curriculum relies on FNCC (EDUFI, 2014), which does not mandate the use of any specific theory or teaching approaches related to CL. As a result, while the FNCC and teacher training curricula generally acknowledge the importance of CL as a twenty-first-century skill, they lack specific indications of how CL should be taught or implemented in primary and higher education.

Additionally, participants noted that even after graduation, *students don't always know enough about CL*, meaning that they "don't always understand their roles in CL and why CL is important" (Participant 9) and "do not try to collaborate meaningfully during their teacher practice"

(Participant 8). Participants acknowledged the deficit of theoretical knowledge on CL in teacher education. Failure to address this gap may lead to a limited understanding and application of CL principles in their professional practice. For example, participants mentioned that:

> Sometimes they (students) say there is too much group work, it is too time-consuming, but I think it is also because they do not necessarily understand why it is important and maybe yea … (Participant 2)

> In the field practice, when they (students) are reporting to me, (…) many of them reflect on that (use CL in their practices). Or they are describing why they didn`t do that. So, they are aware of their shortcomings. They don't always know what to do, even in their last year. (Participant 7)

There are different ways to address CL in the teacher education curricula. Curriculum experts demonstrated a general knowledge of the course contents and affirmed that empirical knowledge of CL is transferred to the curricula, however, it remained unclear how. They also suggested that students lack support in learning how to apply CL in their practice.

It is up to the teachers

According to the participants, *teachers play the biggest role* in implementing CL in teacher education, as they "decide whether or not to use CL" (Participant 3) and are "responsible for how CL is implemented" (Participant 1). Most participants strongly emphasised *teachers' autonomy* as the main decision-making power. Teachers can decide which theories, methods, and practices will be used. For example, participants noted that:

> Of course, our curriculum says for some courses what to do there, for example, as I mentioned, that Learning Communities course. But it is more or less so that each teacher can decide. But I think that quite many are using CL. (Participant 8)

> I don`t think that there is any official rule or guideline. At least, I am not aware of that. Teachers decide on that. But as I said, I think in most courses, CL is used. (Participant 3)

Another subcategory relates to the actions that could promote and further develop CL, enhancing the opportunities for students to develop their skills. In this case, *mastering theoretical perspectives on CL* and elaborating *practices to improve the quality* of collaboration between students are the main actions necessary for the development of CL. One of the participants stated that:

> Especially in research-based academic teacher education, we should always keep in mind also these theoretical aspects that it's not enough that students reflect or discuss together without any theoretical basis, without any theoretical aspects. They also need it. (Participant 5)

Developing CL as a pedagogical approach requires teachers to reflect actively on collaboration in their work and "encourage students to participate in CL meaningfully" (Participant 11) and "encourage them (students) to consider the quality of their work" (Participant 10). Participants highlighted the importance of practical examples and experiences that teachers can provide by "modelling CL for their use in the future work" (Participant 11) so that students can understand CL's significance. Some participants emphasised the value of engaging in collaborative practices already during teaching practice or school activities. However, it was also acknowledged that in real school environments, where some teachers may prefer traditional methods, student teachers may face challenges in implementing CL. This can impact their ability to transfer their skills in CL into their practice as teachers. To address this, participants suggested that collaboration should extend beyond peer interactions during teacher training and involve collaboration with in-service teachers for reflections and feedback.

However, the most recurring idea in this category was that *CL is a challenge in teacher education*. Participants highlighted students' lack of base knowledge and diversity of teachers' backgrounds as two main factors hindering CL's implementation, e.g., "it is difficult when students' ability levels vary depending on the courses they have previously taken" (Participant 4), and "the supervisors that students have at the practice school, and the reality that students cannot implement CL at traditional schools is a really big issue" (Participant 9).

Overall, this category demonstrates the democratic and collaborative nature of curriculum development in Finland. However, the lack of a systematic approach in its implementation and a strong independence of a teacher in the classroom can hinder the development of a coherent curriculum. Consequently, students may have varied experiences, opinions, and skills in CL due to discrepancies in learning opportunities. These discrepancies arise from differences in access to CL content among students in different teacher training programmes.

Discussion

This study explored the presence and conceptualisation of CL as a theoretical phenomenon and a pedagogical approach in Finnish ITE. The Finnish context, due to its high autonomy at all levels of education, was selected as a case example to identify CL in ITE curriculum and showcase the challenges and the possibilities related to developing a curriculum that addresses CL implementation. The results showed that ITE curricula primarily support the development of pre-service teachers' knowledge of and skills in CL by providing opportunities for group work with peers and in-service teachers during teaching practicum. However, both the curricula and the ITE planning experts could have a more visible conceptual framing related to CL implementation. The ITE curricula do not offer specific strategies to cover CL as course theoretical content or provide explicit instructions for effective group work that would lead to true collaboration and joint progress in learning. The overall tendency is that students get the opportunity to work in groups. However, it is unclear how they would be guided to interact and contribute to the joint learning so that collaboration becomes a joyful and positive experience for all group members. While supporting student teachers with ample opportunities for group work, both with peers and skilled teachers, CL demands a set of systematised actions that can lead students to share their awareness of a common goal, coordinating individual and joint actions or the construction of knowledge in a learning situation (Zabolotna et al., 2023). Without providing instructions and support for CL, students are left on their own to decide how to collaborate, which often results in social loafing and "free-riding" (Gabelica et al., 2022). This aligns with previous findings suggesting that CL is often viewed primarily as a way of working and not as a comprehensive and complex process encompassing more than just dividing work between group members (O'Connor, 2020; Ruys et al., 2010). The Finnish case raises questions about the extent to which such guidelines must be explicit and how aligned the educational training should be across different universities.

In the following section, we discuss how CL is conceptualised in ITE as theoretical content and pedagogical approach in Finnish ITE and what opportunities it provides for developing and supporting pre-service teachers' CL skills.

The conceptualisation and implementation of CL in teacher education

From the perspective of the formal curriculum, our results indicate that in the Finnish context, like in many other countries, ITE curricula could benefit from more clarity regarding what knowledge students will acquire and what support they will get. How research-based knowledge and evidence of CL theories are transferred in the curricula documentation remains unclear. Finnish ITE curricula have yet to incorporate CL as study content, although its importance is widely recognised. This is to guarantee that tensions and challenges raised by different perspectives among those who will implement the curriculum and the conflicting forces that circumscribe the curriculum (e.g., societal demands, university constantly changing roles, etc.) can be negotiated, aligned and integrated into a coherent education programme (O'Connor 2020).

The Finnish ITE is also a good example of how flexibility and directiveness in curriculum construction must be balanced. While the absence of predetermined theoretical references allows for flexibility and dialogue between multiple theoretical approaches and practical implementations (Priestley, 2011), which is characteristic of FNCC as a democratic process of co-creation (Annala, 2022, September 09), it can also have the risk of weak support for student learning and professional development (Young, 2013). Our study found that, although collaborative work was mentioned as a teaching strategy across all curricula documents across Finnish ITEs, the necessary support for effective CL was not explicitly described. Elective courses aim to develop CL skills in students but lack explicit requisite knowledge that can build understanding of the complexities of the collaboration process. Previous empirical studies focusing on effective CL in different levels of education have shown that simply putting students into groups is insufficient for successful collaboration. Coordinated efforts, construction of unique solutions, and negotiation of meanings remain vital (Grau & Whitebread, 2012; Isohätälä et al., 2017; Koivuniemi et al., 2018). Merely listing CL concepts and ideas and assigning students to groups may not ensure their engagement, deep understanding, or acquisition of the necessary interaction skills. At the same time, we also know that pre service teachers need to be exposed to both theory and practice of learning/teaching methods and strategies.

However, the Finnish case also opens an interesting debate the role of operational curriculum. In the investigated ITE in Finland, *the perceived and operational curricula* addressed through the views of curriculum experts show a more explicit presence of theoretical frameworks and teaching practices related to CL. CL is introduced as both a work method and a teaching strategy, particularly by promoting group work in most courses. This supports students in developing collaborative skills essential to their professional development. The operational curriculum implies that the tension between developing twenty-first-century skills and imparting CL knowledge is resolved through applying diverse CL methods in practice. This finding calls attention to the possible gaps between the written and the lived curriculum, which to an extent, are expected in higher education (Weller, 2012). While the written curriculum might not include all the content or methods of a course, this may not mean that they are not addressed in practice. In Finland this “gap” can be even artificially created to ensure flexibility for teachers to innovate and differentiate their approaches along the lifespan of the curriculum. In such context, is then natural to include CL as a teaching method or strategy, especially considering students preference to learn through practice rather than theoretical concepts (Bengmark et al., 2024). It is common that Finnish ITE curriculum goes under triannual reformulations and the flexibility created between written and operational curriculum can ensure smoother transitions.

The results also suggest that using CL as a working method depends on how teachers recognise its importance and adopt it as their preferred pedagogical approach. It remains unclear to what extent CL is equated with group work and whether it is assessed based on comprehensive (meta-) cognitive, socio-emotional, and motivational processes (Grau & Whitebread, 2012). This issue is twofold. Firstly, while the interviewed experts understand the theoretical foundations of CL, how it is implemented in the classroom depends heavily on the teacher trainer. Secondly, there is a concern that Finnish teacher education curricula suffer from “unbundling of the formal curriculum” (p.163; Annala, 2023), resulting in an inconsistent and poorly developed curriculum. Transferring conceptual knowledge into professional education requires careful planning to ensure its success (Ruys et al., 2012).

Insight for the development of student-teacher knowledge and skills in CL

In Finnish higher education, teachers play a significant role in implementing CL practices and are responsible for ensuring the political dimension of curriculum development (Hakala & Kujala, 2021). Teachers and teacher educators have a decentralised role in educational processes, and they implement the curriculum and assessment practices autonomously, which has been considered one of the key points to Finnish success in education (Välijärvi et al., 2002). This study corroborates the idea of teachers’ autonomy incorporating CL pedagogical practices since it is their decision whether and how to implement a specific approach. Contradictions within this process are accepted to accommodate diverse viewpoints, theories and methods (Annala, 2023), supporting a democratic approach to curriculum development. As a result, teachers have been primarily focused on implementing group activities, which, as discussed before, may not adequately foster students' understanding of CL theoretical foundations and advancements. Meeting the requirements for effective collaboration, such as engaging in collaborative interactions and expanding cognitive reasoning, is crucial for future teachers (Chi & Wylie, 2014). However, this autonomy and accountability afford flexibility, a characteristic of the Finnish curriculum (Hakala & Kujala, 2021) that we identified in the interviews with experts.

Group activities are not a novel approach in Finnish education. Different methods, e.g., home groups, activate students and prompt the exchange of ideas (Juutilainen et al., 2018). Joint seminars allow students to develop expertise on a topic and share it with others (Leyva-Moral & Riu Camps, 2016). Nevertheless, this study demonstrates that there is room for developing approaches to teaching how to collaborate and what stands behind it from the theoretical perspective. Participants stressed the need for further developments incorporating CL as both a content and pedagogical approach in teacher education. However, the pedagogical strategies for integrating the required CL knowledge may vary, and it is important to consider the feasibility and implications of continuously expanding the content of teacher education curricula to integrate the required knowledge on CL.

Final considerations

Implications

First, there is a pressing need for discussions on integrating knowledge related to twenty-first century skills into teacher education curricula. This can be achieved by dedicating specific courses that would explore CL from different perspectives or by integrating CL concepts and methods into various mandatory courses. By combining theory and practice, pre-service teachers can effectively transfer CL knowledge and skills to future learning contexts (Ruys et al., 2014; Weinberger & Shonfeld, 2018).

Second, the formal curriculum should provide clearer directions for CL processes, emphasising its importance for teachers' professional development and work (LLLP, 2019; Stover & Holland, 2018), particularly in the context of educational diversification and multí-professional collaboration. Clear references can prevent disconnected and meaningless learning experiences, ensuring that students actively construct knowledge through theoretical and methodological understandings and approaches. It is crucial in the framework of twenty-first century skills to avoid repetitive practices without critical appraisal.

Third, to diminish the tensions between theory and practice identified in this study, a systematic approach to the teaching/learning process could be beneficial (Ruys et al., 2010). CL requires teacher mediation and specific conditions, thus, for example, discourse facilitating learning the skills and methods to implement CL (i.e., metatalk; Watson et al., 2021) could be useful. Incorporating metatalk can bridge experience, content, and method, supporting teachers from different disciplines in developing CL skills in a meta-learning manner. By thoroughly addressing CL in the operational curriculum, a balance can be struck between international guidelines and the autonomy laid out by FNCC.

Finally, advocating for a more explicit approach to CL in teacher education curricula, we base our argument on scientific evidence that links CL to significant learning outcomes, student wellbeing, psychological protection, and social development (Laal & Ghodsi, 2012; Peterson & Roseth, 2016; Tolmie et al., 2010). Experiencing a well-arranged CL activity will enable pre-service teachers to draw conclusions towards the usefulness of the approach and will motivate them to practice it in their future classrooms.

Limitations

Although the purpose sampling technique allowed for selecting key professionals involved in developing and implementing curricula, the study is also limited by the scope of their work as such professionals. A major concern in this study was the interpretations of subjective accounts that are deliberately related to work attributions. Future studies could include other agents in curriculum development, such as teachers and students. Particularly, we call attention to teacher trainers – the professionals responsible for guiding the students during their teacher training practices at dedicated schools. In Finland, teacher training happens in specific teacher training schools that are part of the university infrastructure. The teacher trainers perform a dual role, being responsible for teaching at the school (basic education level) and supervising teacher students in their training (higher education level). These professionals are in a privileged learning environment where it is possible to integrate theory and practice. They could have interesting insights on how CL can be implemented during students' education.

Moreover, the study doesn't account for the gaps between written and practised curricula Future studies could include observational longitudinal data collection and analysis of curriculum implementation, and perform an analytical plan to compare documents and practice.

Declaration of contribution

The first author contributed to framing the work and writing the body of the text, particularly the initial argumentations, results, and discussions. The second author contributed to the writing and conducted the interviews and initial analysis. The third author conducted the document analysis. All authors participated in the final editing of the article.

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Appendix. Content analysis of concepts and ideas of CL in the curricula for teacher education in Finland.

Category	Sub-category	Uni Eastern Finland	Uni of Helsinki	Uni of Jyväskylä	Uni of Oulu	Tampere University	Total
Elective courses in which CL appears as content	Group dynamics	11 (11.83%)	3 (4.61%)	2 (2.15%)	0	5 (5.10%)	21 (7.42%)
	Creating conditions for multi-professional cooperation/ collaboration	2 (2.15%)	2 (3.08%)	0	0	2 (2.04%)	6 (2.12%)
	Interpersonal skills or social skills	2 (2.15%)	5 (7.69%)	3 (3.23%)	2 (5.56%)	13 (13.27%)	25 (8.83%)
	The utilisation of peer feedback	0	1 (1.54%)	0	0	5 (5.10%)	6 (2.12%)
Elective courses in which CL appears as learning outcomes	Identify/ Observe/ Analyse / Understand/ Evaluate own interaction skills	1 (1.08%)	4 (6.15%)	0	0	11 (11.22%)	16 (5.65%)
	Participate in group dynamics and interactions	2 (2.15%)	2 (3.08%)	1 (1.08%)	0	3 (3.06%)	8 (2.83%)
	Structure/ Act/ Use/ Develop interpersonal skills to interact appropriately	2 (2.15%)	4 (6.15%)	0 (0.00%)	0 (0.00%)	13 (13.27%)	19 (6.71%)
	Work with specific groups/ Utilise in specific settings	5 (5.38%)	0 (0.00%)	0 (0.00%)	1 (2.78%)	4 (4.08%)	10 (3.53%)
Mandatory courses in which CL appears as content	Collaboration/ Cooperation in work environments or with specific partners in the work	1 (1.08%)	2 (3.08%)	5 (5.38%)	5 (13.89%)	2 (2.04%)	15 (5.30%)
	Collaborative assessment	5 (5.38%)	1 (1.54%)	0 (0.00%)	0 (0.00%)	2 (2.04%)	8 (2.83%)
	Group dynamics	5 (5.38%)	2 (3.08%)	1 (1.08%)	1 (2.78%)	0 (0.00%)	9 (3.18%)
	Interactional competence	4 (4.30%)	5 (7.69%)	23 (24.73%)	1 (2.78%)	6 (6.12%)	39 (13.78%)
	Learning in a group/ Collaborative environment	4 (4.30%)	1 (1.54%)	2 (2.15%)	8 (22.22%)	2 (2.04%)	17 (6.01%)
Mandatory courses in which CL appears as learning outcomes	Act/ Participate in collaboration/ Cooperation in work environments	7 (7.53%)	5 (7.69%)	8 (8.60%)	2 (5.56%)	7 (7.14%)	29 (10.25%)
	Act/ Participate in collaborative/ Cooperative learning environments	1 (1.08%)	4 (6.15%)	5 (5.38%)	2 (5.56%)	1 (1.02%)	13 (4.59%)
	Build/ Plan/ Evaluate group dynamics	2 (2.15%)	4 (6.15%)	6 (6.45%)	2 (5.56%)	0 (0.00%)	14 (4.95%)
	Evaluate/ Develop yourself and other as communicator	11 (11.83%)	1 (1.54%)	7 (7.53%)	3 (8.33%)	6 (6.12%)	28 (9.89%)

Note: To prevent distortion, the numbers have been normalised as the total number of courses varied among universities.