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The role of teachers in guiding student peer interactions: conceptions of pre-service teachers

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Abstract
Teachers play a pivotal role in guiding students' peer interactions, yet the nature of this role warrants further investigation. This study addresses this gap by investigating second-year pre-service classroom teachers' conceptions of this role, both before and after a course that integrated theory and practice in interaction and socioemotional skills. The analysis of pre-service teachers' written conceptions revealed a spectrum of roles, which were then clustered into broader role profiles. Overall, roles pertaining to organization and management, as well as instructional roles, were prioritized over those concerning socioemotional support. However, notable shifts in conceptions were observed over the course, indicating an evolving understanding. The findings suggest that teacher education programs should place greater emphasis on providing pre-service teachers with opportunities to reflect on, experiment with, and practice a variety of teacher roles—ultimately expanding their role repertoire and strengthening their ability to flexibly adapt their roles to the needs of interacting students.

Keywords Roles · Guidance · Peer interaction · Group dynamics · Pre-service teacher · Teacher conceptions

1 Introduction

Peers strongly influence each other's development and learning (Bronfenbrenner & Morris, 2006; Sheffler & Cheung, 2024). Positive peer interactions are not only associated with an array of beneficial academic outcomes—such as enhanced engagement and achievement—but they also contribute to socioemotional well-being (Wentzel & Edelman, 2016). Peer activities serve also as an essential platform

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for students to develop interaction and collaboration skills, which are increasingly important in today's interconnected world (Heinimäki et al., 2021; Topping et al., 2017). Educational institutions have always played a central part in enhancing positive peer interactions among students, which was recently further underscored by the COVID-19 pandemic and the consequent long periods of remote learning, limited social encounters, and reduced opportunities for meaningful student contact.

While peer interactions are essential, merely providing opportunities for such interactions is rarely sufficient to guarantee positive results for learning or group dynamics (Kreijins et al., 2003). This highlights the crucial role of teachers in guiding these interactions (van Leeuwen & Janssen, 2019). Nevertheless, although role is one of the most fundamental concepts in social psychology (Biddle, 1979; Forsyth, 2014), there remains no consensus on what the teacher's role should encompass, and research on this role remains limited compared to research on guidance of individual students or entire classes (Duran et al., 2019; Ruys et al., 2014).

This study aims to examine pre-service teachers' (PSTs') conceptions of the teacher's role in guiding peer interactions. *Conceptions* can be understood as the meanings, understandings, and mental representations that individuals attach to a particular phenomenon (Cheng et al., 2016; Dejene, 2020; Lutovac & Körkkö, 2024). In this context, the concept of *role* encompasses the diverse strategies, behaviors, and actions that teachers can employ to guide and support peer interactions (Wright, 1987). Conceptions of this role, therefore, provide a valuable lens through which to explore the practices that PSTs consider most critical for effective guidance. An enhanced understanding of PSTs' role conceptions would offer important insights for teacher education programs, given that personal conceptions are known to ultimately shape actual teaching practices (Blömeke & Kaiser, 2017; Cheng et al., 2016; Dejene, 2020; White & Chant, 2014).

The study's analytical approach is designed to offer nuanced insights into conceptions of the teacher's role by both identifying specific roles and providing a holistic perspective on them through the construction of role profiles, thereby reflecting their multifaceted nature (Heinimäki et al., 2021; Lehmann-Willenbrock et al., 2016). Finally, this study not only aims to catalogue these roles and role profiles but also to trace their evolution in PSTs' conceptions during a course that combines theory and practice. This longitudinal aspect deepens the study by providing insights into how conceptions may evolve through the interplay of newly acquired pedagogical knowledge and practical teaching experiences (Varis et al., 2023; von Wright, 1997; White & Chant, 2014).

In the following, we first briefly discuss students' peer interactions to set the stage for the subsequent examination of the teacher's role in guiding these interactions.

1.1 Students' peer interactions

According to the bioecological model of human development, children's immediate environment, known as their microsystem, is the principal arena for their social and academic development (Bronfenbrenner & Morris, 2006). In educational settings, students' peers and teachers are essential components of such a microsystem,

and, from a socio constructivist perspective, they influence each other through social interactions (Hamre et al., 2013).

In peer interactions, both cognitive and emotional processes are inherently social, dynamically evolving, and closely intertwined within specific interpersonal contexts (Isohätälä et al., 2018). Cognitive interactions allow peers to enhance each other's learning through high-level actions such as questioning, explaining, reasoning, argumentation, and connecting ideas (Kreijins et al., 2003; Volet et al., 2017; Wong & Adesope, 2024). In turn, socioemotional interactions establish a relational space conducive to productive interactions and group dynamics (Isohätälä et al., 2018). For example, behaviors such as active listening, empathetic responses, and offering praise and comfort cultivate an inclusive, respectful, and mutually encouraging climate (Salo et al., 2022) that promotes not only group cohesiveness but also a sense of "we-ness", contributing to a psychologically safe environment where students feel secure expressing themselves (Farmer et al., 2011).

Unfortunately, students do not always engage in such productive interactions (Kreijins et al., 2003). Various factors can inhibit effective collaboration, such as inadequate interaction skills, unequal participation, shallow engagement with the learning material, and distraction with off-topic discussions (Topping et al., 2017; Volet et al., 2017). Negative interactions, such as exclusionary language, ignoring others, and dominating conversations, can further erode group cohesion, discourage active participation, and reduce motivation and engagement (Isohätälä et al., 2018). For example, Heinimäki et al. (2021) showed that a single student's negative socioemotional interactions could disrupt an entire small group's productive task engagement and, eventually, negatively influence the learning outcomes of all the students in the group. These notions highlight the teacher's critical role in facilitating an environment that is conducive to positive peer interactions and in monitoring various facets of peer interactions to provide optimal guidance.

1.2 What is the teacher's role in guiding students' peer interactions?

Guiding peer interactions can be considered a subject-independent core practice of teachers' professional competence (Matsumoto-Royo & Ramírez-Montoya, 2021). Nonetheless, although it represents valuable construct for operationalizing the complexity of teacher guidance, *the teacher's role* lacks a universal framework due to varied role definitions and contextual influences, such as student level, domain, and interaction mode. In the literature, the teacher's role in peer guidance is often vaguely and broadly defined, comprising an overarching role, such as that of a facilitator (Ramey & Stevens, 2023). While such broad definitions provide a useful, all-embracing view, they fail to capture fully the dynamic and situated nature of authentic peer interaction contexts (Heinimäki et al., 2021; Ramey & Stevens, 2023; Volet et al., 2017). In these contexts, teachers are required to flexibly adopt various roles, which can often co-occur in response to quickly changing situations and different aspects of peer interactions (Kaendler et al., 2016; van Leeuwen & Janssen, 2019).

While we lack nuanced role frameworks for guiding peer interactions, attempts have been made to distinguish different teacher roles both in traditional classroom

settings and within specific educational contexts. For example, in one of the earliest frameworks, Wright (1987) offered a simple but dual-focused view of teacher roles as "instructional and managerial." Regarding more specific contexts, the widely applied framework of Harden and Crosby (2000) identifies as many as 12 roles for medical educators that incorporate both pedagogical and subject-specific expertise (e.g., planner, role model, and information giver). In turn, Grammens et al. (2022) categorized online teaching roles as instructional, managerial, technical, communicational, and social based on a systematic literature review. In two recent studies, Lutovac and colleagues (Lutovac & Körkkö, 2024; Lutovac et al., 2024) examined Finnish pre- and in-service teachers' conceptions of the nature of teachers' current work. One aspect of that work highlighted by both groups was the experience of increasing fragmentation, which they felt contributed to growing expectations to act in multiple different roles—such as social worker, psychologist, therapist, special education teacher, nurse, or even police officer.

Such contemporary expectations and demands concerning teachers' work also impact their role in guiding peer interactions. Indeed, students' peer interactions are increasingly emphasized as crucial for learning and development (e.g., OECD, 2019), prompting calls for teachers to integrate practices into their teaching that promote peer interaction and collaboration (for the Finnish context, see Juvonen & Toom, 2023; Valli, 2021). At the same time, however, feelings of uncertainty and inadequacy related to peer interaction guidance have been observed (Kaendler et al., 2016; Körkkö et al., 2024; Ruys et al., 2011). In addition to the pressure to assume multiple roles, experiences of uncertainty and inadequacy may also stem from the broader pedagogical shift expected of teachers—from traditional, teacher-centered approaches, often grounded in directive transmission models, to more flexible, student-centered paradigms. Within these latter frameworks, teachers are increasingly expected to adopt more interactive roles that actively cultivate peer interaction and collaboration (Heinimäki et al., 2021; Ruys et al., 2014; von Wright, 1997).

Studies have shown that PSTs' prior conceptions, values, beliefs and experiences shape their personal stance on the continuum between teacher-centered and student-centered approaches (Dejene, 2020; Filippou et al., 2022). While many PSTs tend to gravitate towards more student-centered orientations during their education—a shift that is critical for effective peer interaction guidance (Ruys et al., 2011; Topping et al., 2017)—their initial conceptions and personal experiences influence the trajectory of this development. For example, Cheng et al. (2016), in a four-year longitudinal study of PSTs, found both stable and fluctuating trajectories in their conceptions of teaching along the teacher-centered–student-centered continuum. These shifts were mainly shaped by the accumulation of theoretical understanding and practicum experiences (see also Varis et al., 2023). In another longitudinal study, Ruys et al. (2014) interviewed PSTs at the end of their studies and again after they had spent some time in the profession, focusing on the challenges they experienced in implementing teaching practices grounded in peer collaboration. The participants reported several dilemmas when navigating their roles in response to the demands and needs posed by colleagues, students, the curriculum, and the classroom context—with the nature of these dilemmas shifting somewhat during their transition from PSTs to practicing teachers. Notably, in the most challenging situations, the participants

expressed a tendency to avoid peer activities altogether, indicating a shift away from student-centricity (see also Voss & Kunter, 2020).

On a more positive note, other studies suggest that PSTs' skills in guiding peer interactions and collaboration tend to increase over time during teacher education (Ruys et al., 2011), even as the result of short-term pedagogical training (Kaendler et al., 2016). Continued development of these skills through increased experience and professional knowledge has been observed in observational studies comparing PSTs and in-service teachers, showing, for example, that in-service teachers more sensitively notice the variety of students' needs during peer activities (Li, 2024).

Altogether, these considerations point to the importance of gaining a better understanding of PSTs' conceptions of the teacher's role in guiding peer interactions, and, further, the way these conceptions may evolve during their training.

1.3 The impact of teacher guidance on students' peer interactions

Ultimately, teachers' successful guidance of peer interactions helps meet students' basic psychological needs for autonomy, relatedness, and competence (Ryan & Deci, 2000) and equips them with the skills required to navigate their interactions and cope with and resolve their interaction challenges (Topping et al., 2017).

Regarding the nature of this guidance, a systematic review by van Leeuwen and Janssen (2019) suggested that effective teacher guidance extends beyond mere academic assistance—such as answering students' questions about the learning content or offering task-related instructions—to explicitly helping students with collaborative strategies and planning and fostering their collaboration and cohesion at the socioemotional level. In addition to these situational interventions, design-focused research has underscored the teacher's more subtle influence as an "invisible hand" that strategically organizes activities to foster students' social interactions and nurture their relationships within their "peer ecologies" (Farmer et al., 2011). More specifically, previous research often recommends that such activities are designed to be sufficiently complex in relation to the skill level of the students so as to necessitate active teamwork and co-construction of knowledge (Topping et al., 2017). This approach discourages purely individualistic work and competition among students and, instead, fosters their collective engagement and collaboration (Kreijins et al., 2003). Notably, the composition of student groups in these activities can also help achieve various pedagogical goals. Teachers can draw on their awareness of students' background factors and skills to create groups that advance specific learning objectives (Topping et al., 2017). For example, heterogeneous groups have been proven to enable more skilled members to scaffold less-skilled peers within their zone of proximal development (Wentzel & Edelman, 2016), provided the collaborating students possess good interaction and socioemotional skills (Salo et al., 2022).

Ouyang and Xu (2021) made a notable contribution by not only proposing beneficial roles for teachers but also empirically studying the impact of such roles during online collaborative concept mapping. Their findings indicated that the roles of cognitive contributor, group regulator, and social supporter had diverse effects on specific facets of peer collaboration, such as discourse quality, metacognitive

engagement, and overall performance. For example, when a teacher enacted the role of cognitive contributor, the peer discourse was less active than when the teacher enacted the two other roles, especially, that of social supporter, which led to the most active discourse. However, the cognitive contributor role was associated with the highest quality of the final concept map, whereas the highest level of metacognitive engagement was observed when the teacher assumed the group regulator role. These findings demonstrate not only that the nature of teacher guidance plays a significant role in shaping students' peer interactions and learning outcomes, but also that effective guidance requires teachers to flexibly adapt their roles based on the nature of the situation and the needs of the interacting students (van Leeuwen & Janssen, 2019).

However, identifying and enacting the most appropriate role in a given situation can be complex and demanding for educators. One of the major challenges is balancing teacher control and student autonomy (van Leeuwen & Janssen, 2019). For instance, excessive teacher involvement or ill-timed guidance can inhibit the fulfilment of basic needs and the development of productive peer interaction, while inadequate teacher involvement or unsuitable guidance may deprive students of the necessary support (Topping et al., 2017; Wentzel & Edelman, 2016). Regarding the nature of teacher guidance, Ruys et al., (2012) analyzed PSTs' lesson plans for peer collaboration and discovered that social objectives were less emphasized than organizational and academic goals. This focus on the organizational and instructional aspects of peer work is also consistent with research on in-service teachers, such as that of Ryan et al. (2015), who reported that teachers were generally less skilled at promoting peer relationships than managing the classroom and delivering instructional guidance (see also Kreijins et al., 2003).

To this end, examining not only the nature of PSTs' conceptualizations of the teacher's role but also the specific roles they emphasize most and least can provide valuable developmental insights for PST education programs.

1.4 Aim and research questions

While the teacher's role in guiding peer interactions is well-acknowledged, systematic research in this area remains underdeveloped (Duran et al., 2019; Ruys et al., 2014). With the increasing centrality of peer activities in education, this study enriches the literature by analyzing PSTs' conceptions of this role. The study examines both specific roles and role profiles, and the possible evolution of these conceptions through a course blending theory and practical training in interaction and socioemotional skills. The guiding research questions (RQ) for this study are:

RQ1: What specific roles and broader dimensions related to teachers' guidance of peer interactions emerged from the PSTs' written conceptions?
RQ2: How prevalent were mentions of the different roles and dimensions overall, and how did they change from the beginning to the end of the course?
RQ3: What kinds of role profiles emerged from the clustering of specific roles?
RQ4: What patterns of stability or transitions in these profiles can be observed over time?

2 Methods

2.1 Research context and participants

This study draws on data collected from two iterations of a mandatory course for second-year students enrolled in a university-level teacher education program for PSTs preparing to become classroom teachers in primary schools. In the first iteration, 80 PSTs enrolled in the course while, in the second, 100 PSTs participated. In both iterations, 56 PSTs provided informed consent for research participation before answering the questionnaire used to collect the data for this study (see Sect. 2.2.). The median age of these research subjects was 22 years ($SD = 4.60$). Their prior teaching experience ranged from one to two months ($SD = 2.15$), and they had generally completed 71–80 study credits ($SD = 2.09$). Participation in the research was voluntary, and the PSTs could withdraw at any time without consequences. According to the guidelines of the Finnish National Board on Research Integrity (TENK, 2019), an external ethical review was not required as the participants were adults and the research design, which was questionnaire-based, adhered to the principles of informed consent. To ensure the participants anonymity, personal identifiers in the questionnaire responses were replaced with pseudonyms. However, ethical approval was subsequently sought and obtained from the Ethics Committee for Human Sciences at University of Turku for data collection during the second iteration of the course (approval number 54/2022). While the principles and practices of data collection remained consistent, the inclusion of video data from teaching practicums in subsequent studies necessitated this external ethical review.

The semester-long course aimed to enhance PSTs' interaction and socioemotional skills, aligning with the prevailing research literature, which emphasizes the significance of teacher-student interactions for high-quality instruction and learning (e.g., Hamre et al., 2013). For context, teacher training in Finland is research-based, consisting of a five-year program that leads to a master's degree. Although the profession is carefully regulated, classroom teachers enjoy considerable autonomy over their teaching practices, including pedagogy related to peer interaction (Juvonen & Toom, 2023).

The course tackled effective teacher-student interactions from multiple perspectives, including dialogical teaching, socioemotional support, and peer interaction guidance. Various learning activities were integrated into the curriculum, such as interactive seminars, video clubs, group work, and reflective writings. Additionally, the course was linked to a seven-week extended guided practicum, performed in a multicultural primary school serving as a training school for PSTs. This was the second practicum these students had participated in during their studies, and it offered them an opportunity to contextualize theoretical concepts more deeply within real-world teaching situations.

After the practicum, seminars focused on peer interactions were scheduled. The first cohort attended two 90-min peer-focused seminars, and the second participated in a 135-min session. These sessions covered academic research-based

topics related to various aspects of peer interactions and their guidance. Moreover, the PSTs worked in small groups to discuss real-world challenges in peer interaction and guidance, which aimed to facilitate the integration of theoretical notions with their own experiences. The entire course culminated in a written task where the PSTs reflected on what they had learned.

2.2 Data

This study focused on a single open-ended question inviting PSTs to articulate how they conceived the teacher's role in guiding peer interactions The question was part of a longer questionnaire addressing PSTs' views and self-evaluations related to various topics covered in a course on teacher-student interactions (for more details, see Sect. 2.1. and Salo & Kajamies, 2024). Reflecting on the questions was considered beneficial for learning, and thus completing the questionnaire was a mandatory component of the course. The questionnaire was answered online at both the beginning and end of the course, with pre- and post-course responses collected approximately six months apart. Regarding the open-ended question, most of the PSTs offered thoughtful written responses that ranged from single sentences to multiple-sentence explanations. However, some responses were more concise, with extreme cases that featured single words.

To allow for robust pre–post comparison, the final dataset included only the responses of consenting PSTs who had answered the open-ended question at both the pre- and post-course measurements. This resulted in a sample of 50 PSTs from the first cohort and 48 from the second, totaling 98 PSTs and 196 responses.

2.3 Data analysis

The analysis of PSTs' responses involved two phases. First, the PSTs' conceptions were investigated using qualitative content analysis (Saldana, 2011) to identify specific roles and their dimensions based on a detailed coding scheme. Next, we combined these roles into profiles through cluster analysis and conducted statistical analyses to examine further the emerging patterns.

2.3.1 Development of the coding scheme for specific roles

First, responses from the pre- and post-course questionnaires were randomized to reduce potential biases, given the analytical interest in examining how the responses evolved over time. Then, the response document was imported to NVivo qualitative analysis software (version 1.6.1) to facilitate the development of the coding scheme.

The analysis process combined data-driven codes with insights from existing theoretical frameworks (e.g., Grammens et al., 2022; Hamre et al., 2013; Harden & Crosby, 2000; van Leeuwen & Janssen, 2019). In the initial phase, the first author reviewed all the responses to gain familiarity with the data, specifically highlighting instances when roles were explicitly articulated, such as the "teacher needs to act as a monitor." Through in vivo coding, those explicit expressions laid the foundation

for the initial coding scheme (Ketonen & Nieminen, 2023; Saldana, 2011). In the second phase, more implicit references to the teacher's role were also coded and incorporated into the evolving coding scheme; when required, new role categories were created based on these more implicit role descriptions.

When no new unique roles emerged, the saturation point was deemed to have been reached, after which the overall coding scheme was carefully reviewed. In this iterative phase, the merging of similar or synonymous roles (e.g., "observer" and "monitor") was considered. The authors regularly met to critically examine the emerging coding scheme and its constituent codes, indicators, and labels to make the necessary adjustments.

The final coding scheme comprised eight distinct roles, categorized into three broader dimensions based on their characteristics: Organization and Management Roles, Socioemotional Roles, and Instructional Roles. These dimensions were inspired by Hamre et al.'s (2013) Teaching Through Interactions framework, which, although initially developed to understand classroom interactions more broadly, offered a useful conceptual reference for cohesively organizing the roles we identified into broader dimensions.

2.3.2 Coding

Each response was analyzed using a "meaning unit" as the unit of analysis—that is, a single word, sentence, or even larger text segment that offered a coherent and identifiable idea about peer interaction guidance, such as naming and further explaining the function of a particular role (Saldana, 2011; van Es, 2009). This flexible approach enabled us to capture the richness and complexity of the PSTs' conceptions. Moreover, it allowed us to code multiple roles in a single response. This possibility was critical because initial familiarization with the data suggested that many responses cited more than one role.

Furthermore, our stringent coding protocol stipulated that only responses offering clear indicators of a teacher's specific role in peer interactions could be coded. For example, vague statements such as "the teacher plays an important role" that were not further elaborated were deemed unacceptable, as were responses that merely echoed the phrasing of the question, such as "the role is to guide peer interactions." Nevertheless, recognizing that such general responses could reflect initial understanding that might mature into more specific conceptions over the course of the semester, they were coded as "unclear" and included in further analysis.

2.3.3 Inter-rater coding reliability

The first author was responsible for coding the entire dataset, and the third author independently coded a randomly selected subset composed of 37.7% of all the responses to assess interrater reliability. This subset was drawn from both the pre- and post-questionnaires of both course iterations to ensure a balanced sample. The coders held regular meetings to review their independent analyses. Their discussions enabled them to understand the data more deeply and to make minor adjustments to

the coding scheme, particularly, to clarify the indicators or refine the boundaries of individual codes.

Interrater agreement was assessed using Cohen's Kappa statistic, a rigorous measure that accounts for the possibility of chance agreement. The Kappa value for the overall dataset reached 0.82, which indicates that agreement was nearly perfect, in line with the criteria outlined by Landis and Koch (1977). Even the individual code with the lowest Kappa value (0.64) fell within the range of "substantial agreement." All discrepancies between the coders were resolved through dialogue.

2.3.4 Identification of role profiles with cluster analysis

To achieve a more comprehensive representation of the roles, we combined the coded specific roles by constructing role profiles using the analytical approach employed by Heinimäki et al. (2021) and Lehmann-Willenbrock et al. (2016), specifically, cluster analysis: a data-mining technique designed to detect meaningful subgroups within a dataset (Everitt et al., 2012). It is important to acknowledge that these role profiles signify general tendencies within the data rather than the precise responses of each individual in a cluster.

We opted for the "K-Modes" algorithm over other clustering methods because it was the most valid method of handling our binary-formatted data (1 = particular role mentioned and 0 = particular role not mentioned). The analysis included both the pre- and post-course responses and was executed using Python (version 3.9.7), with the Pandas library (version, 2.0.3) and the "KModes" package (version 0.12.2). Based on visual inspection of several solutions, solutions including three to six clusters were finally more closely scrutinized with respect to their conceptual coherence and the distinctness of clusters they produced (Everitt et al., 2012).

3 Findings

3.1 Conceptions of specific roles and their grouping into broader dimensions (RQ1)

The following provides an overview of the eight specific roles identified in PSTs' conceptions and the three broader dimensions into which they were categorized, while Table 1 adds detailed descriptions and empirical examples.

Organization and management roles focus on facilitating peer interactions through planning, rule-setting, and progress monitoring. Roles within this dimension include *the Organizer*, who structures collaborative scenarios; *the Manager*, who establishes guidelines and intervenes as necessary; and *the Monitor*, who subtly oversees interactions to provide guidance when required.

Socioemotional roles emphasize the importance of creating a supportive environment and managing social dynamics. *The Encourager* promotes participation and inclusivity, while *the Harmonizer* assists in resolving conflicts when necessary, fostering a collaborative atmosphere.

Table 1 Descriptions and empirical examples of the role conceptions identified in the responses

Organization and management roles involve facilitating peer interactions by organizing tasks and scenarios, establishing and enforcing guidelines, and monitoring students' progress to be able to provide timely assistance and support when necessary		
Organizer (ORG)	ORG arranges tasks and scenarios to stimulate peer interaction and collaboration, including thoughtful classroom arrangements and group formations	"The teacher's role is to enable peer interaction situations" "The teacher organizes (spaces, groups, and topics) …" "The teacher should provide a good grounding for peer interaction, that is, create situations, environments, and groups where it can be practiced as smoothly as possible"
Manager (MAN)	MAN sets expectations and rules for peer interactions and ensures adherence to these guidelines	"The teacher creates the rules in the class for peer interaction" "Like an orchestra conductor, one must keep the situation in one's own hands and under control" "In my opinion, the teacher sets the boundaries within which students can operate"
Monitor (MON)	MON allows students to independently navigate their interactions while actively monitoring for signs that guidance or support may be required	"Active observation and sensitivity to who needs help, what help is needed, and where it is needed" "Important to give space to the group to act independently and initially participate only as a listener in the activity" "The teacher must constantly observe and listen to discussions…"

Table 1 (continued)

Socioemotional roles center on nurturing positive social interactions by ensuring equal participation, establishing a secure and inclusive atmosphere, motivating students to engage with their peers, and aiding students in resolving conflicts or disagreements		
Encourager (ENC)	ENC fosters a positive and inclusive atmosphere that makes students feel comfortable with actively participating and engaging in peer interactions	"The teacher has an important role in ensuring that the atmosphere in the class is such that everyone dares to participate in peer interaction" "A great responsibility … to ensure that everyone is heard in these situations and that no one is deliberately left out" "It's important for the teacher to encourage students to interact with peers, as it develops students' interaction skills"
Harmonizer (HAR)	HAR facilitates harmonious collaboration among students and assists in resolving conflicts or disagreements that may arise during their interaction	"The teacher … guides conflict resolution if the students need it" "The teacher has an important role, especially when there are problems in interaction that hinder learning" "The teacher acts as a kind of referee and guide, giving students space to solve problems and clarify disagreements if they are not too serious"
Instructional roles pertain to support for students' academic growth and co-construction through peer interactions by providing targeted instructional guidance, developing interaction and collaboration skills, and demonstrating effective communication and teamwork for students to follow		
Instructor (INS)	INS provides instructional guidance during peer interactions as well as strategic questions for reflection, hints, advice, and feedback to facilitate learning and deeper understanding	"The teacher supports, helps when needed, and, for example, provides guiding questions or discussion topics" "The teacher should guide students in the right direction and provide them with advice and tools for that" "The teacher should guide the students to the extent that they can proceed with the task more independently"

Table 1 (continued)

Modeler (MOD)	MOD demonstrates effective interaction and collaboration techniques, thus serving as a positive example for students to follow	"It's important to model what is expected of students and what they need to do" "… and the teacher must have good interaction skills that students can emulate" "… show … examples, from their own actions, of functional and respectful cooperation to their students"
Coach (COA)	COA enhances students' peer interaction skills through deliberate practice and instruction on effective collaboration methods	"Students should certainly be taught the basics of peer interaction and how to operate in a group…" "The teacher should instruct the students on how to interact well with their peers, and this should be practiced in itself, not just as a part of tasks related to subject content"

Instructional roles deal with enhancing learning through peer interactions. *The Instructor* offers direct educational guidance, *the Coach* fosters communication and collaboration skills, and *the Modeler* demonstrates effective interaction techniques.

3.2 Frequencies of specific roles and broader dimensions (RQ2)

As shown in Table 2, roles pertaining to the Organization and Management dimension were the most frequently identified in the responses. This was closely followed by Instructional Roles, while Socioemotional Roles were mentioned the least frequently. At the level of specific roles, that of Instructor was the most frequently cited, followed by Monitor and Encourager. This means that in each dimension, a primary, dominant role appeared to exist that was supplemented by less frequently cited secondary roles. Notably, Modeler was the least mentioned role of all.

The Chi-square goodness of fit test revealed that the dimensions were unequally emphasized in the data ($\times^2 = 23.8$, $df = 2$, $p < 0.001$). Pairwise comparisons with the Bonferroni correction (adjusted $\alpha = 0.0167$) confirmed a statistically significant difference between the Organization and Management and Socioemotional Roles ($\times^2 = 22.0$, $df = 1$, $p < 0.001$), as well as between the latter and Instructional Roles ($\times^2 = 16.54$, $df = 1$, $p < 0.001$). These findings indicate that Socioemotional Roles were underemphasized in the data. In turn, the frequencies between the Organization and Management and Instructional Roles did not differ significantly ($\times^2 = 0.41$, $df = 1$, $p = 0.52$).

Furthermore, pre- and post-course responses revealed remarkably similar patterns. Despite a maximum of six specific roles identified in some responses, on average, participants mentioned two roles at both time points (pre-: $M = 1.92$, $SD = 1.27$; post-: $M = 1.95$, $SD = 1.19$). Moreover, no significant change was observed in the representation of dimensions between the two measurement points (pre-: $M = 1.51$, $SD = 0.85$; post-: $M = 1.60$, $SD = 0.82$). Furthermore, the frequencies of dimensions remained stable over time, with slight increases in Organization and Management and Socioemotional Roles at the expense of Instructional Roles. At the specific role level, marked changes were noted: Monitor and Harmonizer Roles became more prominent, while the Coach Role declined. Nonetheless, only the change in the frequency of the Coach role was statistically significant according to McNemar's test ($p = 0.043$).

While the overall frequencies suggest stability from pre- to post-course responses across the entire data set, individual PST analysis revealed greater variation. The Jaccard similarity coefficient, at just 0.238, shows 76.2% of roles identified in post-course responses differed from pre-course responses at the individual PST level. With 70 unique role configurations discovered, from simple roles like Organizer to complex ones like Monitor, Manager, Instructor, and Coach, this variation points to notable shifts in PSTs' conceptions at the individual level, into which the role profiles were expected to provide further insights.

Table 2 Frequencies and proportions of the specific roles and dimensions

	Organization and management roles			Socioemotional roles		Instructional roles			Unclear	Total
	ORG	MAN	MON	ENC	HAR	INS	MOD	COA		
[a]Pre-	24 (12.1%)	26 (13.1%)	25 (12.6%)	28 (14.1%)	11 (5.6%)	38 (19.2%)	12 (6.0%)	24 (12.1%)	10 (5.1%)	198
			75 (37.8%)		39 (19.7%)			74 (37.4%)		
[a]Post-	22 (11.1%)	21 (10.6%)	36 (18.2%)	25 (12.6%)	18 (9.1%)	43 (21.7%)	13 (6.6%)	13 (6.6%)	7 (3.5%)	198
			79 (39.9%)		43 (21.7%)			69 (34.9%)		
[a]Pre- + Post-	46 (11.6%)	47 (11.9%)	61 (15.4%)	53 (13.4%)	29 (7.3%)	81 (20.5%)	25 (6.3%)	37 (9.3%)	17 (4.3%)	396
			154 (38.9%)		82 (20.7%)			143 (36.1%)		

For the abbreviations, refer to Table 1. "Unclear" refers to responses in which specific roles could not be discerned

[a]The upper rows refer to the frequencies of specific roles and the lower rows to the summed frequencies in the three dimensions

3.3 Role profiles (RQ3)

The most distinctive cluster solution we identified comprised five role profiles. The composition of most profiles was heterogeneous, involving a combination of different specific roles, while only one profile was completely homogeneously composed (see Appendix 1 for a detailed breakdown). These profiles are described below. Note that the numbers in brackets represent the total number of PSTs who belonged to each profile in the pre- and post-measurements; a breakdown by measurement point is provided in the following Sect. 3.4.

The *Autonomy Promoter* ($N^{overall} = 69$) is the most prevalent profile. It contains a balanced blend of the Monitor, Encourager, Harmonizer, Modeler, and Coach Roles. The Instructor and Manager Roles are notably absent. This configuration suggests an approach that prioritizes allowing students autonomy and agency to navigate their own peer interactions, while still providing them with the necessary skills and conducive environment to interact effectively.

The Inclusive Instructor ($N^{overall} = 47$) is anchored in the Instructor Role. This profile is also marked by a significant Encourager and Organizer presence. This combination highlights teachers who simultaneously promote both socioemotional well-being and academic success. They not only guide students academically but also strive to create an emotionally safe space where every student feels heard, valued, and comfortable participating.

The Monitoring Instructor ($N^{overall} = 34$) profile is predominantly characterized by the Monitor and Instructor Roles. These teachers find it essential to closely observe peer interactions, identify academic challenges as they arise, and provide immediate assistance.

The Managing Leader ($N^{overall} = 29$) profile is strongly centered on the Manager Role, with the other roles being less distinctive. This configuration portrays teachers as central figures who oversee and lead peer interactions.

The Undetermined ($N^{overall} = 17$) profile is unique in that it includes responses categorized as "Unclear" during the coding process, indicating the absence of any distinct role conceptualization.

3.4 Patterns of role profile stability and transitions (RQ4)

Only 31.6% of the PSTs exhibited the same profile in their pre- and post-course responses, while 68.4% transitioned to another profile. Figure 1 illustrates these transitions, while Appendix 2 provides a detailed transition matrix.

Regarding stability, the Autonomy Promoters and Monitoring Instructors were the most consistent. In turn, the Managing Leaders and Inclusive Instructors displayed a smaller retention rate. It was encouraging that only a small portion PSTs were identified as Undetermined at both time points. The most notable profile transitions were those of Managing Leaders and Monitoring Instructors shifting toward the Autonomy Promoter profile. Transitions in other directions occurred as well, such as from Autonomy Promoters to Inclusive Instructors and from Inclusive

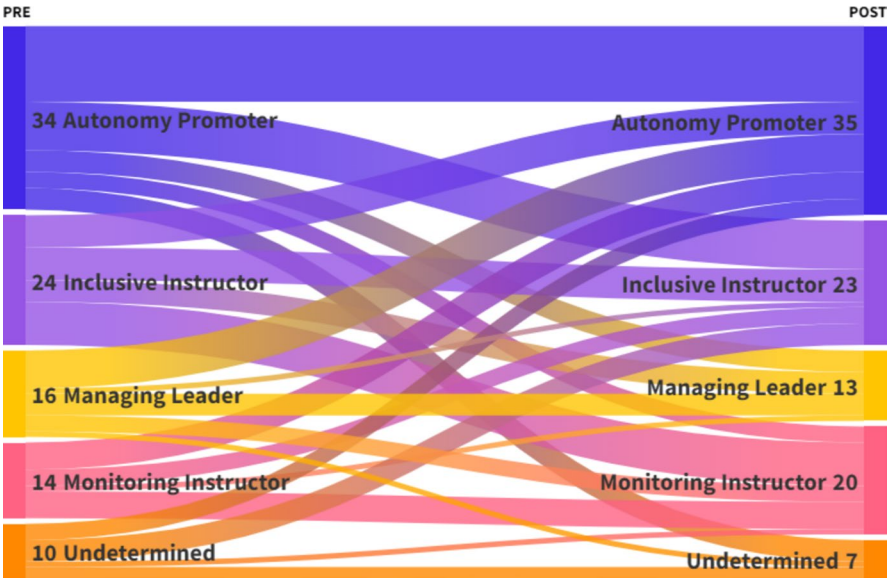

Fig. 1 Transitions and stabilities in the role profiles from the pre- to post-course measurement

Instructors to Monitoring Instructors. As shown in Fig. 1, transitions to the Managing Leader and Undetermined profiles were less notable.

In summary, the number of PSTs represented by the Autonomy Promoter and Inclusive Instructor profiles remained largely the same, whereas the Monitoring Instructor profile showed a notable increase over time. By contrast, the number of PSTs characterized by the Managing Leader and Undetermined profiles decreased.

4 Discussion

The aim of this study was to examine PSTs conceptions of the teacher's role in guiding peer interactions—a topic less studied than teacher guidance at the level of individual students or entire classes (Duran et al., 2019; Ruys et al., 2014). Utilizing qualitative content analysis of the PSTs' written reflections in the pre- and post-course questionnaires, followed by cluster analysis, we explored their conceptions and the evolution of those conceptions throughout a semester-long course.

4.1 Empirical insights

The PSTs' conceptions pointed to eight specific roles in three overarching dimensions: Organization and Management Roles, Socioemotional Roles, and Instructional Roles. These sets of roles, while unique, share similarities with frameworks established in other contexts. For instance, Grammens et al. (2022) described instructional, managerial, and social roles as integral components of their framework

for beneficial teacher roles in an online teaching context. Notably, in the present study, PSTs' rich conceptualization of as many as eight separate roles—each with a distinctive function—aligns with current research emphasizing the importance of teachers' ability to enact multiple different roles and flexibly adapt them to situational needs when guiding peer interactions (Kaendler et al., 2016; van Leeuwen & Janssen, 2019).

In terms of the prominence of these roles, our findings revealed that roles related to organization, management, and instruction were prioritized over socioemotional roles. This pattern aligns with earlier findings in studies of both pre-service (Ruys et al., 2012) and in-service teachers (Ryan et al., 2015). The observed underemphasis of socioemotional roles is concerning, given their critical function in supporting positive group dynamics and enhancing learning outcomes among interacting students (Ouyang & Xu, 2021; van Leeuwen & Janssen, 2019). Greater competence in this area would not only enhance the quality and success of peer interactions, but also strengthen teachers' own sense of self-efficacy, well-being, and job satisfaction, as recently pointed out by Körkkö and Lutovac (2024). They found that while teachers viewed collaboration with students as the most rewarding aspect of their work, challenges in managing peer interactions and relationships were experienced as taxing—with socioemotional competences playing a key role in addressing these challenges successfully. Thus, our findings reinforce existing calls (Körkkö & Lutovac, 2024; Näykki et al., 2022) for greater emphasis on developing teachers' socioemotional competencies, both in teacher education and in-service training.

The role profiles, formed by grouping specific roles into coherent clusters, offered additional insights into PSTs' role conceptions and their development over time. First, the Autonomy Promoter profile—the most prevalent both in the pre- and post-course measurements—can be seen to reflect a strongly student-centered conception of the teacher's role. This profile also resembles autonomy-supportive teaching practices (Reeve & Cheon, 2021), which are considered critical for promoting the fulfilment of students' basic psychological needs (Ryan & Deci, 2000). The prevalence of this profile thus runs counter to some earlier findings suggesting that PSTs typically hold more teacher-centered conceptions in the early stages of their teacher training (Dejene, 2020; Voss & Kunter, 2020). Considering both micro- and macro-level factors may help explain this finding, as well as the emergence of other profiles with notable student-centered components, such as the Inclusive Instructor. At the time of data collection, the participants—second-year classroom teacher students—were no longer at the very beginning of their teacher education but had already received initial training in the program. Moreover, the Finnish national curriculum is strongly grounded in constructivist, student-centered, and inclusive views of learning and teaching, which is naturally reflected in the contents of teacher education programs (Juvonen & Toom, 2023; Valli, 2021). Lastly, while PSTs bring their own personal conceptions of the teacher's role—as also evidenced in this study—these conceptions develop within a broader sociocultural and institutional context, shaped by societal expectations about what it means to be a teacher today (Filippou et al., 2022; Körkkö et al., 2024; Lutovac & Körkkö, 2024; Lutovac et al., 2024).

These contextual factors may also help explain why none of the profiles we identified were fully transmissive or entirely teacher-centered (e.g., dominated solely by

the Manager Role) but instead contained at least some elements of more facilitative roles such as the Coach or Encourager. This is a reassuring finding, given the fundamental premise that the successful cultivation of peer interactions necessitates granting students sufficient autonomy and agency (Kaendler et al., 2016; Topping et al., 2017; van Leeuwen & Janssen, 2019).

Moreover, our findings, particularly the decline of the Managing Leader profile over time, suggest continued movement away from teacher-centered approaches. On the other hand, the Monitoring Instructor profile gained significant traction, hinting at a potential shift toward acknowledging the need for stronger instructional guidance. Nonetheless, closer inspection reveals that this increase signifies growing awareness of the critical interaction between monitoring and instruction. Indeed, effective monitoring has been referred to as an important prerequisite for successful fulfilment of other roles, providing teachers with valuable insights into the diverse support needs of interacting peers, enabling them to adapt their role appropriately (van Leeuwen & Janssen, 2019). Echoing Osuna and Munson (2024), it is thus essential to incorporate more scenarios focused on observing student interactional dynamics into teacher education and in-service training to better equip teachers with the skills to make informed decisions on when and how to intervene in peer activities.

The "fine line" that "teachers are required to walk... between explaining sufficiently and explaining too much" and the need to "find a balance in how much control teachers should take over students' collaborative process" (van Leeuwen & Janssen, 2019, p. 84) can further explain the transitions we identified in the PSTs' conceptions. For instance, those who transitioned from Autonomy Promoters or Inclusive Instructors to more directive or teacher-led profiles might have done so to reconcile the theoretical ideal of student autonomy and socioemotional sensitivity with the practical challenges faced in classroom management during their practicum. On the other hand, those who gravitated toward the Autonomy Promoter or Inclusive Instructor profiles might have found that their studies emphasized the value of granting students' greater autonomy and socioemotional support. Indeed, the observed profile transitions seem to reflect, at least to some degree, an attempt by the PSTs to harmonize their evolving theoretical and practical insights. These interpretations are supported by prior evidence showing that PSTs' conceptions of the nature of teaching and their future role as teachers can fluctuate during their training as they attempt to integrate—and sometimes reconcile tensions between—new knowledge, practical experiences, others' expectations, and their own uncertainties (Cheng et al., 2016; Juvonen & Toom, 2023; Körkkö et al., 2024). These dynamics might also partly underlie the challenges observed by those in the Undetermined profile in clearly articulating any distinctive teacher roles.

Further, the present study extends existing research by showing that most PSTs exhibit changes in their conceptions of peer interaction guidance—a specific topic that, to date, has not been examined longitudinally during teacher education. The finding that significant changes can occur even within a single semester offers an additional contribution, as related studies have typically employed longer timeframes to capture such developmental shifts (e.g., Cheng et al., 2016; Dejene, 2020; Varis et al., 2023). However, consistent with Varis et al. (2023), who identified a subgroup

of Finnish PSTs whose teaching beliefs and professional identities remained stable after their first year, it must be noted that our findings also revealed PSTs who showed no visible change in their conceptions across the two measurement points.

4.2 Practical implications

This study provides important practical insights into the field of teacher education. Previous studies have suggested that offering teachers structured, research-based opportunities to reflect on their personal conceptions and practices is vital for their professional development (Osuna & Munson, 2024). In this context, scientific concepts serve a critical function as instruments that help PSTs shift away from mere "folk psychology" toward a more research-based perspective (von Wright, 1997). In our findings, evidence of these rudimentary conceptions was most apparent in the responses that characterized the teacher's role as merely "important" or that used ambiguous terms such as "guide" or "support" without further elaboration. From this perspective, the importance of providing PSTs with support and resources to reflect on and develop their conceptions of peer interaction guidance cannot be overlooked, especially given the well-established link between conceptions and actual teaching practices (Blömeke & Kaiser, 2017; Cheng et al., 2016; Dejene, 2020; White & Chant, 2014).

Consequently, it is suggested that the rich role descriptions derived from this study can serve as useful tools for teacher educators. At the most general level, exposure to topics related to peer interaction guidance may serve as an important vehicle for promoting a more student-centered approach to teaching among PSTs. More specifically, the framework presented in Table 1 and the associated role profiles can be used to support PSTs' reflection on their own teaching experiences and practices. As a starting point, the roles we identified, and their descriptions, could function as a concrete research-based resource for articulating PSTs' current conceptions and exploring the underlying factors shaping them. Engaging in such reflection—not only individually, but preferably in collaboration with a teacher educator and fellow PSTs (see Näykki et al., 2022; Tiainen & Lutovac, 2022)—could provide PSTs with valuable insights into their typical guidance roles and enhance their awareness of the broader spectrum of roles.

These exercises could be followed by in-depth discussions about the practical functions of different roles in supporting peer interactions. While this study did not collect empirical evidence on the impact of these roles on peer interactions, some general practical insights can still be drawn. All the roles we identified—including those related to organization and management, socioemotional support, and instructional guidance—can be viewed as useful for supporting specific aspects of peer interaction (Topping et al., 2017; Wentzel & Edelmann, 2016). However, the key lies in developing PSTs' ability to sensitively identify when a particular role is required and dynamically adapt their guidance according to situational demands (Kaendler et al., 2016; van Leeuwen & Janssen, 2019).

Developing this ability requires a broadening of PSTs' role repertoires, particularly in light of our finding that, on average, PSTs mentioned only two roles in their

responses at both measurement points. Our findings also suggest that special attention should be paid to fostering socioemotional roles, given their relatively limited emphasis in the data. The need to expand role repertoires is especially urgent for those who may hold narrow, one-size-fits-all conceptions of the teacher's role. While none of the role profiles identified in this study typified a single, rigid role orientation, the Manager Leader profile could be interpreted as both the most one-dimensional and the most teacher-centered among them. Although student-centeredness is a key prerequisite for effective peer interaction guidance (Ruys et al., 2011; Topping et al., 2017), it is equally important to emphasize the need for balance between teacher guidance and student autonomy. Students benefit from structure and support, but this should not come at the expense of their autonomy (van Leeuwen & Janssen, 2019; Wentzel & Edelman, 2016).

Finally, our findings suggests that the interplay between theoretical knowledge and practical experiences plays an important role in shaping PSTs conceptions. Therefore, PSTs should be provided with hands-on opportunities to experiment with a variety of roles—including those outside their typical repertoire—during real-world teaching scenarios (see Juvonen & Toom, 2023). A study by Ruys et al. (2011) indicated that PSTs might become more critical of their own skills in guiding peer collaboration as they accumulate more pedagogical knowledge about this guidance, potentially contributing to uncertainty and confusion about their role (see Körkkö et al., 2024; Lutovac & Körkkö, 2024). Therefore, it is crucial that these practical opportunities are well-supported and structured, for instance, through teaching practicums where teacher educators and classroom teachers can provide meaningful mentoring for PSTs.

4.3 Limitations and future directions

The ecologically valid setting of this study, which included PSTs from two iterations of the same course offered to prospective classroom teachers at one institution, nonetheless contains some limitations. First, the generalizability of the findings may be somewhat restricted to this specific educational and national (Finland) context. Future research could therefore include PSTs from a wider range of educational and cultural contexts. It would also be valuable to compare the conceptions of PSTs with those of experienced in-service teachers and with those studying to become subject teachers. Furthermore, since conceptions may not always fully align with actual practices, future studies should explore this possible incongruence by, for example, comparing observations of teachers' classroom practices with their stated conceptions (Tiainen & Lutovac, 2022).

Second, the absence of a control group and the relatively brief focus on the topic of peer interaction guidance on the course—a situation common in typical teacher education curricula—make it challenging to determine the degree to which the PSTs' post-course conceptions were influenced by the course activities and practicum experiences or resulted from a natural evolution of their ideas (cf. Ruys et al., 2011). This limitation highlights the need for comparative studies and intensive longitudinal research

that closely follows the development of PSTs over the entire course of their teacher education.

Third, the reliance of this study solely on written data contains inherent limitations. Thus, integrating background and demographic factors variables could provide addition understanding (Juvonen & Toom, 2023). Future research could also gain insights from in-depth interviews with PSTs whose conceptions either remained unchanged or changed significantly, exploring the reasons behind notable shifts, such as the significant decline of the Coach Role observed in this study.

Finally, since this study focused on conceptions, perhaps the most critical next step is to empirically examine the potential impact of the different teacher roles we identified on peer interaction processes and outcomes. One possible approach, used by Ouyang and Xu (2021), would involve controlled settings in which the teacher is instructed to enact a specific role. The effects of this role on selected peer interaction processes and outcomes could then be measured and contrasted with scenarios in which the teacher enacts a different role. However, considering that peer interactions constitute a dynamic system in which teachers must flexibly adapt their roles in response to emerging needs (Bronfenbrenner & Morris, 2006; Heinimäki et al., 2021; Kaendler et al., 2016; van Leeuwen & Janssen, 2019), a more ecologically valid analytical approach may be preferable. Such an approach could involve detailed video-observations or qualitative studies in authentic classroom settings, offering detailed insights into how teachers adjust their roles over time and how these adaptations influence peer interactions. Ideally, these types of studies would be embedded in PSTs' teaching practicums and in-service training programs, providing participants with structured opportunities to experiment with different roles and engage in supported retrospective reflection to further deepen their learning of these experiences.

4.4 Conclusion

By examining PSTs' conceptions, this study advances our understanding of teachers' roles in guiding student peer interactions. The findings underscore the value of using diverse methodological approaches at different analytical levels to uncover how these conceptions evolve during teacher education. Our key results highlight the broad spectrum of roles recognized by PSTs while also revealing a critical gap in the acknowledgment of socioemotional roles. This calls for curricular attention in teacher education programs, including opportunities for PSTs to reflect on, experiment with, and practice different roles throughout their training—ultimately supporting their ability to adapt their guidance flexibly to the needs of interacting students.

Appendix 1: Detailed breakdown of the role profiles

	Autonomy Promoter	Inclusive Instructor	Monitoring Instructor	Managing Leader	Undetermined
Organizer	20 (29.0%)	12 (25.5%)	6 (17.6%)	8 (27.6%)	–
Manager	–	11 (23.4%)	7 (20.6%)	29 (100%)	–
Monitor	21 (30.4%)	–	34 (100%)	6 (20.7%)	–
Encourager	19 (27.5%)	17 (36.2%)	9 (26.5%)	8 (27.6%)	–
Harmonizer	11 (15.9%)	5 (10.6%)	8 (23.5%)	5 (17.2%)	–
Instructor	–	47 (100%)	34 (100%)	–	–
Modeler	13 (18.8%)	6 (12.8%)	5 (14.7%)	1 (3.4%)	–
Coach	19 (27.5%)	6 (12.8%)	6 (17.6%)	6 (20.7%)	–
Unclear	–	–	–	–	17 (100%)

Appendix 2: Pre–post transition matrix of role profiles

Pre	Post				
	Autonomy supporter	Inclusive instructor	Monitoring instructor	Managing leader	Undetermined
Autonomy Supporter	14 (41.2%)	9 (26.5%)	3 (8.8%)	4 (11.8%)	4 (11.8%)
Inclusive Instructor	6 (25.0%)	6 (25.0%)	8 (33.3%)	4 (16.7%)	–
Monitoring Instructor	5 (35.7%)	3 (21.4%)	5 (35.7%)	1 (7.1%)	–
Managing Leader	7 (43.8%)	1 (6.2%)	3 (18.8%)	4 (25.0%)	1 (6.2%)
Undetermined	3 (30.0%)	4 (40.0%)	1 (10.0%)	–	2 (20.0%)

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Declarations

Competing interests The authors have no competing interests to declare that are relevant to the content of this article.

Ethical approval The study adhered to the ethical requirements set forth by the Finnish National Board on Research Integrity (TENK). All participants were adults, and participation in this questionnaire-based study was entirely voluntary, based on informed consent. Participants had the option to withdraw at any time without any consequences. Further ethical approval was obtained from the Ethics Committee for Human Sciences at the University of Turku (Humanities and Social Sciences Division, approval number 54/2022) for the second wave of data collection. This additional review was necessitated by the requirements of other studies using this data, as detailed in Sect. 2.1. in the manuscript.

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