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Fostering high-quality reading interactions in pre-service early childhood teacher education

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ABSTRACT

This intervention study aimed to foster and assess early childhood education (ECE) student teachers' professional competence at the beginning of their second year in Finnish higher education. A study module on child development and ECE pedagogy provided the students with knowledge and practice in identifying, implementing, and reflecting on high-quality interactions with children. The students' video-recorded picture book reading interactions with two preschool-aged children were assessed using the Classroom Assessment Scoring System (CLASS) Pre-K tool. The broad domain-level analyses showed high-quality emotional support and classroom organisation, but the quality of instructional support was relatively low. Behavioural-level analyses revealed that the students predominantly asked simple questions; they rarely posed complex questions or provided extensive feedback, and other types of discussions to boost children's higher-level thinking and language use were practically absent. After the study module, student teachers' self-reported closeness with children increased and conflict decreased. The findings are discussed from the perspective of fostering and assessing higher-quality instructional support in teacher preparation programmes.

1. Introduction

According to the common tenets of social constructivist theory (Vygotsky, 1978), bio-ecological system theory (Bronfenbrenner, 1986), and attachment theory (Bowlby, 1969), children learn and develop through interactions with others in the home and school contexts. In line with evidence on parents (Sameroff, 2009), abundant empirical research shows that the quality of children's interactions with their teachers is associated with later cognitive, social, behavioural, and/or academic development in early childhood education (ECE) and elementary classrooms (e.g., Birch & Ladd, 1997; Hamre et al., 2014; Leyva et al., 2015; Lippard et al., 2018; Mashburn et al., 2008). The teaching through interactions framework (Hamre & Pianta, 2007) has served as a theoretical foundation for assessing and fostering in-service teachers' professional competence, but the relevant research on pre-service teachers from higher education is still very limited. The goal of the present study was to foster Finnish ECE student teachers' interactions and relationships with preschool-aged children and to assess the efficacy of teacher training in the context of interactive shared book reading with two 3- to 5-year-olds.

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1.1. Assessing teacher–child interactions with the CLASS

It has become common to assess the quality of ECE classrooms using the Classroom Assessment Scoring System (CLASS). This observational tool was developed by Pianta et al. (2008) and has been widely applied and validated in studies on in-service ECE teachers in the United States (e.g., Burchinal et al., 2008; Curby et al., 2009; Hamre et al., 2013; Mashburn et al., 2008). The CLASS organises the quality of teacher–child interactions into a three-domain (latent factor) structure (Hamre et al., 2013; for more details, see Hamre & Pianta, 2007), based on 10 discrete dimensions and observable behavioural level indicators. To date, increasing numbers of psychometric studies are exploring the applicability of the CLASS among ECE teachers from socially, culturally, and economically diverse educational contexts (mostly in Europe, with a few in Asia and South America). These studies have generally indicated that the three-factor structure of the CLASS (after some adjustments) fits samples of preschoolers in Germany (von Suchodoletz et al., 2014), Chile (Leyva et al., 2015), and China (Hu et al., 2016).

The emotional support domain (dimensions: positive climate, negative climate, teacher sensitivity, and regard for student perspectives) reflects the emotional connections in the classroom and teachers' awareness of and responsiveness to children's social and emotional development. Emotionally consistent interactions are particularly related to improved social competence at the preschool age and to higher language, literacy, and social competence at the kindergarten age (Curby et al., 2009; Mashburn et al., 2008). Higher-quality emotional support seems to help preschoolers with challenging behaviours (Bulotsky Shearer et al., 2020) and older at-risk children (Hamre & Pianta, 2005) avoid unfavourable language and literacy outcomes. The classroom organisation domain (dimensions: behaviour management, productivity, and instructional learning formats) relates to teachers' organisation of time and activities and management of children's behaviour and attention. In a well-functioning classroom, children are interested, well-behaved, and engaged in learning tasks. Higher classroom organisation scores – often in combination with motivational and emotional indicators, such as task orientation – predict better language and/or literacy skills at the preschool age (Bulotsky Shearer et al., 2020; Dobbs-Oates et al., 2011). Finally, the instructional support domain (dimensions: concept development, quality of feedback, and language modelling) represents teachers' facilitation of learning at a higher cognitive level through support of children's conceptual and language development and thinking processes. Higher-quality instructional support has been associated with improved academic, language, and literacy skills among preschool-aged children (Bulotsky Shearer et al., 2020; Hamre et al., 2014; Mashburn et al., 2008), even one year later at the end of kindergarten (Burchinal et al., 2008). It should be noted that most CLASS studies on preschool education in the United States have sampled at-risk children from low-income families (e.g., Bulotsky Shearer et al., 2020; Curby et al., 2009; Dobbs-Oates et al., 2011), highlighting the need for further studies in culturally and socially inclusive ECE classrooms.

Despite the growing body of longitudinal evidence that statistically relates higher-quality interactions during preschool classroom activities and routines to children's improved social-emotional and cognitive outcomes (Hamre et al., 2014), recent meta-analyses exploring the combined predictive validity of the three broad CLASS domains, each of which is associated with three to four specific dimensions, have reported weak or no significant effect sizes, especially between instructional support and children's language and literacy outcomes (McDoniel et al., 2022; Perlman et al., 2016). These mixed findings regarding the potential of teacher–child interactions to support child outcomes raise concerns over what to observe and how to improve quality in ECE classrooms. Variations in predictive validity might be related to the level of CLASS analysis, given that the focus of previous ECE studies has been on the broader domain and dimension level rather than the more granular, behavioural level of analysis (see also molar and molecular discussion by Pianta et al., 2020). Focusing our study on behavioural-level analysis allows for a unique methodological assessment of the efficacy of a pre-service teacher preparation programme composed of teachable verbal and non-verbal acts that drive the quality of interaction in ECE classrooms.

There is also convincing evidence of an imbalance in in-service ECE teachers' competence in engaging preschool-aged children in warm and self-regulated interaction compared to promoting children's higher-level cognitive processing. Studies conducted in the United States (Hamre et al., 2014; Mashburn et al., 2008) and elsewhere (e.g., Hu et al., 2016; von Suchodoletz et al., 2014; Yoshikawa et al., 2015; for first-graders, see Cadima et al., 2010) have consistently demonstrated that the quality of emotional support and classroom organisation generally falls in the medium-to-high range, whereas the quality of instructional support is relatively low. This imbalanced pattern also emerged among in-service ECE teachers in Finnish samples of toddlers (Salminen et al., 2022) and kindergartners (Pakarinen et al., 2010), and one would expect to see the same pattern with preschool-aged Finnish children, the target age group of our study.

1.2. Enhancing teacher–child interactions using CLASS content

Considering the reportedly low quality of instructional support, it is important to foster teachers' competence in both ECE classrooms and higher education programmes, as professional growth is a continuum starting from pre-service education. A meta-analysis by Egert et al. (2020) revealed that high-quality in-service programmes in the United States were able to improve the quality of teacher–child interactions across all three CLASS domains. In-service programmes that made use of video-recorded interactions and self-reflection were especially effective for developing instructional support. The few prior studies on pre-service teacher preparation programmes have applied CLASS domain content (featuring the indicators and behavioural markers of the 10 CLASS dimensions) and fairly similar teaching practices, and they have been conducted in the first or last (third or fourth) academic year, during a semester-long internship (Hu et al., 2023; Joseph & Brennan, 2013; La Paro et al., 2012); in contrast, our study was carried out during the second year of the pre-service programme.

Some studies on pre-service programmes in the United States have used video-recorded training data to assess learning outcomes.

The ECE student teachers in the study by Joseph and Brennan (2013) moved systematically from *knowing* about and *identifying* high-quality interactions to *doing* and *reflecting* on their own and other students' recorded interactions with children. Each student posted six video clips of interaction, one for each of the CLASS dimensions, on a digital platform, after which the instructor and other students commented on the selections. The authors concluded that the pedagogical steps, including peer coaching and self-reflection, effectively improved the quality of interactions based on evaluations of the broad CLASS domains of the video clips. Similarly, the study by La Paro and colleagues (2012) used self-reflections on video-recorded interactions as well as peer discussions and feedback from the instructor in small-group meetings. Interestingly, the learning outcomes based on the training videos showed a significant decline in emotional support and a non-significant increase in instructional support, which is in partial contrast with the findings of a well-controlled pre- and post-test Chinese study by Hu and colleagues (2023). In that study, the ECE student teachers who received intensive individualised video-based coaching exhibited more improvement in emotional support during their internship than did the control group (no individualised coaching), but again there was no improvement in classroom management or instructional support. These pre-service studies confirm the higher-quality emotional support and lower-quality instructional support pattern among ECE student teachers just before graduation. By investigating whether Finnish pre-service ECE teachers show a similar imbalance in quality of interaction at the beginning of their second academic year, we address a key gap in the literature on the efficacy of pre-service education.

Some studies targeting the CLASS framework used only self-reports to evaluate pre-service teachers' learning outcomes. According to a study involving a mixed group of pre-service and in-service ECE teachers by Scott-Little and colleagues (2011; see also Hu et al., 2022), students' perceptions of the course design and delivery were positive, their understanding of the content of the training improved, and their beliefs and attitudes on these topics changed in a positive direction. In the present study, we collected both observational and self-reported data to assess the efficacy of pre-service education.

The study by Scott-Little and colleagues (2011) is the only intervention in higher education that combined CLASS-related training content with specific evidence-based information on language and literacy development and instructional strategies, such as dialogic reading and vocabulary expansion, to support children's development. Our intervention similarly integrates effective teaching practices, evidence-based findings on children's language and literacy development, and high-quality verbal and non-verbal pedagogical interactions into the CLASS framework.

Variation in the timing of teacher–child observation and in the content and format of the observed activities was found by Cabell et al. (2013) to systematically influence quality assessment and bias CLASS scoring. The authors suggest that selecting a focused and short-time daily activity for the CLASS observation, instead of the usual practice of random time-sampling, may result in a more reliable and comparable assessment. This suggestion is further supported by recent Australian findings (Thorpe et al., 2020; see also Kook & Greenfield, 2021), which showed that educationally focused formats and academic content inflated instructional support in ECE classrooms, whereas care activities and transitions decreased instructional support in that context.

1.3. Shared picture book reading interactions

Shared picture book reading has the potential to be developmentally effective for children, both in the home setting and in the ECE classroom. To accomplish this in keeping with the Vygotskian outlook, competent adults should adjust their reading activities, provide opportunities for language use, and give appropriate scaffolding and feedback to meet the developing child's needs and changing competence. Ninio and Bruner (1978) discovered that mother–child dyads, beginning as early as in infancy, construct mutual meaning during shared picture book reading in successive ritualised and predictable turns that have the structure of a dialogue led by the mother, who uses the pictures in the book to direct the child's attention and word learning. Early parenting studies, mainly based on cross-sectional and correlational designs, showed beneficial relationships between one-on-one reading interactions and children's vocabulary, language, and literacy development (Bus et al., 1995; Scarborough & Dobrich, 1994; for experimental designs, see Mol et al., 2008).

In one of the early, well-designed intervention studies on the effectiveness of shared book reading, Whitehurst et al. (1988) taught parents of preschool-aged children the basics of dialogic reading rather than directly reading the text to the child, which resulted in higher oral language outcomes for the children in the intervention group than for those in the control group. During dialogic reading, parents (and ECE professionals) encourage and actively engage with the child by prompting age-appropriate questions, expanding the child's verbalisations, providing feedback, extending the dialogue, and praising the child's efforts to tell the story. According to a systematic review by Houen et al. (2022), shared reading was the most represented setting in preschool classrooms for various teacher-initiated questions, responding actions, and collaboration to sustain rich co-constructed conversations and support children's language development.

Observations during shared picture book reading in ECE classrooms showed variation in how teachers engage and involve preschoolers in analytic discussions (Dickinson & Smith, 1994). Numerous intervention studies, most conducted with at-risk preschool-aged children (e.g., Wasik et al., 2006), have suggested that high-quality and frequent dialogic reading in ECE classrooms, especially in combination with reading at home, can support children's vocabulary and other language skills, story comprehension, and emergent literacy (Dickinson et al., 2003; Zevenbergen & Whitehurst, 2003; for a meta-analysis, see Mol et al., 2009).

Recent reviews and meta-analyses, exclusively including well-designed and randomised controlled trial interventions, have revealed smaller effects of parents' and professionals' dialogic reading on vocabulary and more mixed or non-specific effects on various oral language outcomes than those previously reported in less well-designed studies (Dowdall et al., 2020; Noble et al., 2019; U.S. Department of Education, Institute of Education Sciences, What Works Clearinghouse, 2007; 2015). In a well-designed intervention study, Milburn and colleagues (2014) used group instruction and individual coaching to foster ECE teachers' book-related

conversations with preschoolers in small groups. After the intervention, the teachers used more open-ended questions, gave more responsive feedback, and sustained longer conversations with more turns than the control group. Hence, dialogic reading interactions may be an optimal setting for both promoting and assessing professional development. Given the large intervention effects of parents' dialogic reading competence among typically developing children reported by Dowdall et al. (2020), it is vital to focus on fostering ECE student teachers' competence, as such evidence can provide means of understanding how improvements in child outcomes might be affected by the ECE classroom. Due to the poor predictive validity of the broad CLASS domains (e.g. McDoniel et al., 2022), we also include observations at the granular behavioural level, which is a novel methodological approach in the CLASS framework. This approach is in line with the study by Dickinson and Smith (1994), who revealed that detailed assessment at the utterance level showed more beneficial effects for children's later oral language development than a more holistic level of assessment.

2. The present study

The early childhood education and care (ECEC) system in Finland provides affordable high-quality childcare services for all 1- to 6-year-old children. All children under school age have a subjective right to ECEC, which comprises education and care to support their well-being, balanced development, and learning. In line with the strong inclusive approach to educational practice, children with special needs attend mainstream classrooms. In child care centres, as prescribed by the ECE legislation, multi-professional teams that are typically composed of three members with various levels of educational qualifications are responsible for a group of either 12 children or, if they are older than 3 years, 24 children. The ECE teacher, who is the pedagogical leader of the team, must hold a bachelor's degree in early childhood teacher education.

Our intervention aimed to foster the professional competence of ECE student teachers who participated in a pre-service teacher preparation programme at a Finnish university. The study module included a practical training period during the autumn semester of the second academic year (for more details, see 3.2). In line with the key competence domains specified by Metsäpelto et al. (2022), we taught content knowledge related to early high-quality teacher–child interactions and children's language and literacy development, and the student teachers analysed and reflected on video-recorded evidence-based practices for promoting co-constructed dialogues. The study addresses the following research questions about the efficacy of training based on provision of content knowledge and active practice (see Fig. 1 for the relationships between the study variables): (1) what is the quality of the ECE student teachers' pedagogical interaction during picture book reading as assessed by the broader domain and dimensional level as well as the more granular, behavioural level of CLASS Pre-K (Pianta et al., 2008)? To answer this question, the student teachers, at the beginning of their five-week practical training in a child care centre, were instructed to plan a 20-minute highly structured reading interaction during the study module with two preschool-aged children. In line with evidence on in-service teachers and pre-service teachers in their final academic year (e.g. La Paro et al., 2012; Yoshikawa et al., 2015), we hypothesised that the Finnish student teachers would display a lower level of instructional support than of emotional support. We did not expect to find variation in classroom organisation due to the highly structured format of the one-on-two shared reading activity. To capture more insight into the quality of the instructional support provided by the ECE student teachers, we next focused on a more detailed level of analysis (see Pianta et al., 2020): the frequency and duration of behavioural markers that represent the indicators of the CLASS dimensions (see Supplementary material for detailed descriptions of the adapted coding system). (2) Does pre-service training have a transfer effect on how ECE student teachers perceive closeness and conflict in their overall relationships with children as assessed before and after the study module and practical training

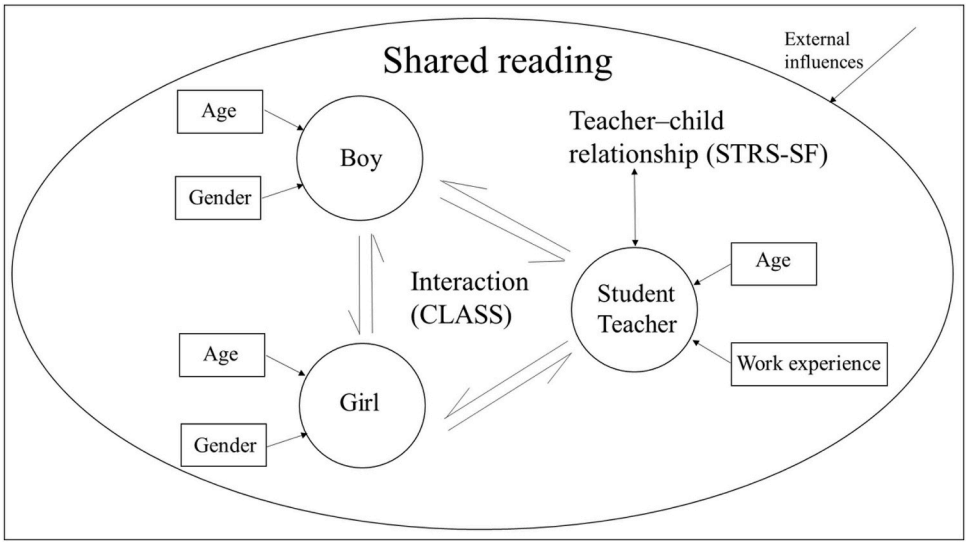

Fig. 1. A conceptual model of the interplay between teacher–child interactions and relationships (adapted from the model presented by Pianta et al., 2003).

period by a recently modified version of the Student–Teacher Relationship Scale – Short Form (STRS-SF; Whitaker et al., 2015; Yang et al., 2021, 2022)? The methodological novelty in this step lies in adapting the original STRS-SF (Pianta, 2001), which assesses a teacher's relationship with a specific child at the dyad level, for use with ECE student teachers – who do not yet have their own classrooms – to reflect on their relationships with children in general. (3) Are demographic characteristics, such as children's ages and student teachers' work experience, associated with the observed quality of the reading interactions during practical training and the student teachers' perceptions of the overall quality of their relationships with the children?

3. Method

3.1. Participants and procedures

The participants were second-year undergraduates who were studying in a university bachelor's degree programme in early childhood teacher education (180 ECTS credits in three academic years; for more details about the European Credit Transfer and Accumulation System, see the European Commission's website: https://ec.europa.eu). The curriculum of the degree programme was composed of several study modules (i.e. courses) with different learning goals, content, and materials. Almost all ECE student teachers (> 95 %) completed the predefined sequence of curriculum study modules in the recommended order within three academic years. The observation and questionnaire data reported here were collected during a professional study module on 'Language Development, Pedagogical Interaction, and Stories' (6 ECTS). The 100 students enrolled in the study module had completed approximately 60 ECTS credits, including one week of practical training (i.e. an internship) at a child care centre with 3- to 5-year-old children during their first academic year.

During the first lesson in September and the last lesson in December, the student teachers filled out an online questionnaire (Webropol) that collected written informed consent and contained items about their demographic characteristics and self-perceived overall relationship with children (the modified version of the STRS-SF). Of the 100 student teachers who completed the 15- to 20-minute questionnaire, 79 (females = 77) in September and 71 (females = 67) in December gave consent to use their answers in the current study.

During the study module (see 3.2), the students completed their second practical training in a child care centre. Each student collected written consent forms from the head of the child care centre and the parents of the children who would participate in the video recordings assessed by CLASS. In total, 59 of the 100 student teachers who returned the assignment agreed to have their videos used as research data. Only videos that met the following criteria were accepted: parents gave their consent, two children were present, there was good sound and visual quality, the session lasted at least 5 min, and the student teacher spoke Finnish and did not wear a mask. Ultimately, the recordings of 45 student teachers (41 females, 90 children in total) practicing in 35 different child care centres met our inclusion criteria. On average, the mean length of the 45 videos was around 14 min ($M = 13.94$, $SD = 2.40$).

The ECE student teachers' ages ranged from 19 to 43 years ($M = 25.20$, $SD = 5.98$). On average, their working experience was less than 1 year (range: 1 month to more than 2 years), including 16 students with less than 1 month of experience, 6 with less than 3 months, 8 with less than 12 months, 4 with less than 24 months, and 11 with more than 24 months. The boys' ages ranged from 24 to 65 months ($M = 47.58$, $SD = 9.64$), and the girls' ages ranged from 24 to 72 months ($M = 47.38$, $SD = 10.24$).

3.2. Study module: Content and teaching

The major goal of the study module was to develop ECE student teachers' professional competence in promoting young children's language and literacy learning, social interaction skills, and identity development over a 3-month period. Due to COVID-19, the university teachers, who are experts in developmental and educational sciences, adopted a hybrid model of teaching. The study module comprised online theory- and evidence-based lectures and tutorials (18 and 20 hours, respectively), supplemented with multimedia material on a digital platform and practical assignments.

Before the five-week practical training period commenced, the module included lectures (6 hours) about mono- and multilingual language acquisition in early childhood, such as those on concept learning, vocabulary growth, and grammar development, as well as lectures about literacy skills before school entry, such as those related to phonological awareness and decoding words. The lectures also provided information on high-quality verbal and non-verbal pedagogical interactions during play, reading, and other daily settings at home and in ECE classrooms, including the domains and dimensions of the CLASS framework. The assignments and tutorials focused on how to emotionally and instructionally motivate children and support their development, as well as on how to improve teacher–child relationships, including coverage of joint attention, posing age-appropriate questions (e.g., closed versus open-ended), providing feedback and praising the child's efforts, expanding on the child's responses, and extending dialogues. In line with a flipped learning format, in small group meetings online prior to discussions, the ECE student teachers worked independently on assignments based on training materials provided on the digital platform and video clips of lectures by leading experts. During the tutorials, each group of 13–19 students (4 hours/group) practiced observing recorded reading interactions by ECE professionals. Both before and after the practical training period, the university teacher stimulated discussions between the students, self-reflections, and peer evaluations to integrate theoretical concepts with practice.

To further foster evidence-based professional development, the ECE student teachers planned a picture book reading interaction with two 3- to 5-year-old children, a girl and a boy, based on the content of the study module. The students videotaped the reading interaction at the beginning of their five-week practical training period at the child care centre, during which time they also observed ECE teachers' and team members' activities with children and planned, implemented, and assessed various teaching activities

themselves.

3.3. Measures

3.3.1 Observation of teacher–child reading interactions

Before starting their practical training, the ECE student teachers were instructed orally and in writing how to plan and execute a 20-minute observation cycle on picture book reading and digitally return the video recording to the researchers. They were instructed to enrol two children, the girl and boy who were closest to 4 years of age, in the reading setting to maximise the target age of 3- to 5-year-olds and to prevent selection bias regarding the child's gender, age, needs, or cultural and familial backgrounds. The children and their parents were well informed about the reading setting, which was highly structured. After being seated with the two children in front of the camera, the student teachers read a picture book about the everyday lives of young children that was written by Sanna Pelliccioni and is called *Little Onni Goes to Child Care Centre* (in Finnish: *Onni-poika menee päiväkotiin*). Due to misinterpretation of the instructions, three students read a different story about the same character, *Little Onni Becomes a Big Brother* (in Finnish: *Onni-pojasta tulee isoveli*). A professional translator whose mother tongue is Finnish translated the videos into English.

We applied the CLASS Pre-K (Pianta et al., 2008) to code the one-on-two single-cycle setting. The 45 videos were coded on a 7-point Likert scale from 1 (*low quality*) to 7 (*high quality*) by both one of the authors not taking part in the study module and another external coder. The two independent observers were trained, certified coders who had passed the coder reliability test after a two-day training workshop provided by Teachstone. To ensure inter-rater agreement, 20 % of the ECE student teachers' videos were randomly selected and double coded. The inter-rater agreement within 1 scale point ranged from 89 % (positive climate, instructional learning formats, and quality of feedback) to 100 % (the remaining CLASS Pre-K dimensions). There was more variation in intra-class correlation coefficients, which ranged from 0.39 (positive climate) to 1.00 (negative climate) in the emotional support domain, from 0.72 (instructional learning formats) to 0.84 (productivity) in the classroom organisation domain, and from 0.43 (quality of feedback) to 0.71 (concept development) in the instructional support domain.

One of the coders utilised ELAN annotation software (version 6.1) to facilitate detailed moment-to-moment coding of the frequency and duration of behavioural markers, mainly representing indicators of instructional support (see Tables A.1–A.3 in Supplementary material for detailed descriptions of the indicators, behavioural markers, and examples).

3.3.2 Assessment of teachers' relationships with children

We used a Finnish translation of the modified version (Whitaker et al., 2015) of the original STRS-SF (Pianta, 2001) to assess how ECE student teachers perceived closeness and conflict in their overall relationships with children at the beginning and end of the study module. The modified version has been shown to be a valid and reliable measure for assessing relational processes, closeness, and conflict in the Finnish ECE setting (Yang et al., 2021). The instructions stated, 'Please assess how well each of the statements below currently applies to your relationship with children attending ECE settings. All relationships are individual, but in responding, please think about your relationships with children in general. Use the scale below to choose the appropriate response for each item.'

The self-report included two scales (see Table A.4 in Supplementary material for the 12 items and descriptive statistics). Closeness (6 items) represented the close, warm, and positive side of student teachers' perceived relationships with children, and conflict (6 items) characterised the negative and conflictual side of student teachers' perceptions of such relationships. Each item was rated on a 5-point Likert scale ranging from 1 (*definitely does not apply*) to 5 (*definitely applies*). The Cronbach's alphas of the closeness and conflict items for the whole sample were 0.69 and 0.58, respectively, before the study module and 0.71 and 0.64, respectively, after the study module.

Confirmatory factor analyses showed acceptable model fits for the expected two-factor Closeness and Conflict model before ($\chi^2 = 56.36$, $df = 43$, $p = .083$) and after ($\chi^2 = 37.21$, $df = 43$, $p = .720$) the intervention. Instead of using simple summary scores by giving all items equal weight, we multiplied the scale scores of closeness items (1, 3, 5, 6, 7, and 15) and conflict items (2, 8, 10, 12, 13, and 14) with the corresponding factor loadings after the intervention before summing the items. A higher score on Closeness represented closer relationships with children, and a higher score on Conflict represented more conflictual relationships with children in the ECE classroom.

4. Results

4.1. Analytic strategy

We first present the descriptive and test statistics of the three CLASS domains, dimensions, and indicators based on the frequency and duration of behavioural markers analysed during the ECE student teachers' shared picture book reading interactions in practical training. We then report how the student teachers perceived their overall relationships with children before and after the study module, as well as how the quality of the observed reading interactions is related to closeness and conflict in relationships and background characteristics. The distribution of the sample data was mostly within the normal range, with skewness below |2| and kurtosis below |7| (West et al., 1995). Due to the small sample size and non-normality of some indicators in the instructional support domain, we computed summary variables and mainly used the nonparametric Friedman test and Spearman correlations (SPSS version 27). To control for variation in the length of the recorded reading interactions, frequency rates and duration per 10-minute span were used in the statistical analyses and reported in all tables.

4.2. CLASS observations of reading interactions

The scale means (*SD*) of emotional support, classroom organisation, and instructional support were 5.92 (0.90), 6.30 (0.69), and 1.85 (0.76), respectively. The Friedman test suggested differences across the three scale means ($\chi^2(2) = 73.26$, $p < .001$). Post hoc analysis with the Wilcoxon signed-rank test confirmed the expected imbalance between high-quality emotional support and low-quality instructional support ($Z = -5.85$, $p < .001$). In the one-on-two setting, classroom organisation was higher than instructional support ($Z = -5.86$, $p < .001$) and even higher than emotional support ($Z = -2.70$, $p = .007$).

Regarding the dimensions of emotional support, the ECE student teachers did not express negativity during the reading interactions. The scale means (*SD*) of positive climate, teacher sensitivity, and regard for child perspective were 5.49 (0.76), 5.78 (0.77), and 5.60 (0.81), respectively, and the scores of the three dimensions were highly correlated with each other ($r_p(43) = 0.62–.81$, $ps \leq$

Table 1
Instructional support: Descriptive statistics of indicators, direct reading, and boys' and girls' engagement.

Indicators	Frequency *M (SD)* Median (Range) Skewness (Kurtosis)	Duration in sec *M (SD)* Median (Range) Skewness (Kurtosis)	AdjFrequency *M (SD)* Median (Range) Skewness (Kurtosis)	AdjDuration *M (SD)* Median (Range) Skewness (Kurtosis)
Simple questions (total of 1 and 2)	25.71 (15.62) 23 (2–86) 1.37 (3.61)	129.77 (74.15) 120.33 (8.96–374.02) 1.04 (1.58)	18.19 (10.00) 17.36 (2.24–51.73) 1.03 (1.83)	91.95 (46.95) 82.17 (10.05–224.97) 0.73 (0.73)
1. Yes-or-no questions[1]	14.73 (8.72) 13.00 (0–46) 1.27 (2.68)	71.09 (37.08) 64.59 (0–176.51) 0.66 (0.71)	10.60 (5.82) 9.23 (0–27.67) 0.90 (1.04)	51.32 (24.10) 53.75 (0–106.17) 0.01 (-0.29)
2. Request for labelling[1]	10.98 (9.00) 9.00 (0–40) 1.30 (1.64)	58.68 (48.13) 51.30 (0–197.51) 1.23 (1.22)	7.59 (5.86) 6.33 (0–24.06) 1.17 (0.94)	40.63 (31.40) 33.13 (0–121.38) 1.11 (0.79)
Complex questions (total of 3 and 4)	3.24 (4.49) 2 (0–22) 2.57 (7.49)	24.07 (33.02) 10.22 (0–148.35) 2.11 (4.70)	2.18 (2.80) 1.29 (0–13.42) 2.34 (6.33)	16.28 (20.94) 7.57 (0–90.53) 1.85 (3.45)
3. Open-ended questions[1]	2.40 (3.47) 1.00 (0–14) 2.03 (3.84)	18.41 (28.57) 5.67 (0–105.47) 1.91 (2.84)	1.60 (2.20) 0.73 (0–8.86) 1.86 (3.24)	12.35 (18.24) 3.81 (0–66.72) 1.74 (2.22)
4. Analysis and reasoning[3]	0.84 (1.76) 0.00 (0–11) 4.64 (26.00)	5.66 (9.91) 0.00 (0–51.97) 2.90 (10.64)	0.57 (1.10) 0.00 (0–6.71) 4.23 (22.66)	3.93 (6.41) 0.00 (0–31.71) 2.40 (7.38)
Extensive feedback (total of 5, 6, and 7)	9.38 (7.52) 7 (0–27) 0.80 (-0.32)	70.79 (58.46) 51.13 (0–231.50) 0.84 (-0.002)	6.35 (4.76) 4.92 (0–17.17) 0.81 (-0.26)	47.73 (37.69) 38.76 (0–144.36) 0.88 (0.21)
5. Extension[1]	1.60 (2.03) 1.00 (0–11) 2.60 (9.60)	7.34 (9.48) 5.25 (0–49.22) 2.49 (8.18)	1.10 (1.29) 0.71 (0–6.82) 2.26 (7.60)	4.92 (5.93) 3.43 (0–30.51) 2.30 (7.22)
6. Encouragement and affirmation[2]	1.36 (1.64) 1.00 (0–6) 0.92 (-0.20)	8.49 (10.71) 2.80 (0–34.57) 0.99 (-0.26)	0.92 (1.10) 0.63 (0–3.68) 0.86 (-0.45)	5.83 (7.59) 2.47 (0–27.43) 1.23 (0.59)
7. Providing information[2]	6.42 (5.56) 5.00 (0–19) 0.86 (-0.22)	54.95 (49.33) 41.74 (0–192.36) 1.08 (0.66)	4.33 (3.67) 3.36 (0–15.53) 1.03 (0.75)	36.98 (32.71) 29.17 (0–137.59) 1.21 (1.36)
One feedback loop[2]	4.38 (3.08) 4.00 (0–14) 1.02 (1.32)	28.86 (20.94) 24.98 (0–89.15) 0.85 (0.57)	3.24 (2.32) 2.57 (0–9.27) 0.81 (0.03)	21.25 (15.35) 17.33 (0–59.01) 0.67 (-0.23)
Two feedback loops[2]	4.11 (2.55) 4.00 (0–10) 0.44 (-0.23)	52.24 (39.00) 53.66 (0–158.20) 0.72 (0.28)	3.09 (1.96) 3.10 (0–7.99) 0.49 (0.02)	38.80 (28.41) 40.29 (0–115.06) 0.56 (-0.05)
Three or more feedback loops[2]	10.44 (3.83) 11.00 (2–19) -0.43 (-0.12)	334.67(178.50) 354.56 (25.68–753.32) 0.37 (-0.18)	7.34 (2.27) 7.36 (1.78–11.89) -0.28 (-0.14)	228.45 (102.14) 239.19 (33.13–459.69) 0.20 (-0.20)
Teachers' direct reading	21.71 (7.44) 22.00 (9–46) 1.22 (2.50)	366.66 (71.87) 373.71 (193.28–490.60) -0.72 (0.19)	15.62 (4.46) 15.46 (7.55–28.46) 0.75 (1.35)	273.50 (79.37) 265.02 (122.56–448.95) 0.21 (-0.35)
Boys' engagement	40.36 (23.52) 43.00 (4–104) 0.69 (0.54)	75.23 (59.29) 61.14 (4.65–292.26) 1.50 (2.95)	28.14 (14.72) 28.46 (4.49–68.84) 0.52 (0.23)	52.19 (37.99) 46.66 (5.22–193.46) 1.44 (3.11)
Girls' engagement	38.58 (21.18) 35.00 (7–99) 0.70 (0.22)	74.06 (47.32) 65.72 (6.29–202.62) 0.82 (0.38)	26.95 (12.74) 26.89 (5.86–61.93) 0.59 (0.27)	51.65 (29.47) 45.71 (6.46–126.75) 0.54 (-0.15)

Note.
[1] Language modeling dimension.
[2] Quality of feedback dimension.
[3] Concept development dimension.

0.001). This pattern of findings indicates that the reading interactions between the student teachers and children were positive, warm, and supportive, and the student teachers were sensitive and responsive to the children's needs.

As expected, few behavioural markers of classroom organisation were observed during the highly structured one-on-two reading interaction (see Table A.2 in Supplementary material). As revealed by the ELAN coding, the means (*SD*) of the adjusted frequency and duration totals of two indicators of behaviour management were 0.60 (0.81) and 2.67 (3.78) for clear behaviour expectations and 1.21 (1.97) and 5.00 (7.76) for redirection of misbehaviour, respectively, and such means (*SD*) of one indicator of instructional learning formats (clarity of learning objectives) were 0.84 (0.60) and 6.95 (5.42). In other words, the students only redirected the children's misbehaviour once per 10-minute period, and they set up behavioural expectations even less often. These findings suggest that the children were focused on the shared book reading and behaved well. We did not use the classroom organisation variables in further analyses.

With respect to the instructional support domain, Table 1 provides the adjusted frequency and duration totals of the indicators based on ELAN coding (see Table A.3 in Supplementary material for details). The CLASS indicators represented concept development (indicator: analysis and reasoning), quality of feedback (indicators: feedback loops, providing information, and encouragement and affirmation), and language modelling (indicators: open-ended questions and extension). We included two new indicators in the language modelling dimension that were not provided by the manual – yes-or-no questions and requests for labelling – because the student teachers often posed close-ended questions to the children during the reading session. Most of the concept development and language modelling indicators could not be coded because the ECE student teachers rarely or never behaved in such ways (for a list of excluded indicators, see *Note* of Table A.3 in Supplementary material).

On average (see Table 1), the student teachers asked a yes-or-no question every minute and asked the children to label a person, object, place, or emotion every 2 minutes; during a 10-minute period, they spent an average of 50 seconds asking yes-or-no questions and an average of 40 seconds asking labelling questions. The student teachers generally posed fewer than two open-ended questions requiring more than a one-word response and asked less than one analysis and reasoning (why and how) question to support children's higher-order thinking. During an average 10-minute period, the student teachers extended the children's responses once with a few words and gave concrete and explicit encouragement and affirmation once to increase children's involvement and persistence (note that minor feedback, such as smiling and nodding, were coded into feedback loops). Moreover, the students teachers generally provided four examples of additional information (a few sentences) to expand children's understanding of the picture book content.

Based on prior research (e.g., Dickinson & Smith, 1994; Silvén et al., 2003; Whitehurst et al., 1988), we computed three summary variables of seven indicators: simple questions, complex questions, and extensive feedback (see Table 1). The Friedman tests suggested differences across the summary variables for both adjusted frequency ($\chi^2(2) = 64.23, p < .001$) and duration ($\chi^2(2) = 46.69, p < .001$). Post hoc analyses with Wilcoxon signed-rank tests revealed that the ECE student teachers asked simple questions more often and spent more time on simple questions than on asking complex questions (Z = -5.84, $p < 0.001$ and Z = -5.82, $p < 0.001$, respectively) or providing extensive feedback (Z = -5.33, $p < 0.001$ and Z = -3.89, $p < 0.001$, respectively). They also provided extensive feedback more often than they asked complex questions, and they spent more time on the former than the latter (Z = -4.35, $p < 0.001$ and Z = -4.16, $p < 0.001$, respectively).

As shown in Table 1 (see also Table A.3 in Supplementary material), we coded the feedback loops across the whole reading interaction. One feedback loop contained two or three speech turns initiated by either the ECE student teacher or the children (turn one), either followed by the partner's response (turn two) or continued by either partner's feedback (turn three). The one, two, and three or more feedback loops represent the variation in the length of back-and-forth discussions between the student teachers and children. Shorter exchanges composed of one loop ($t(43) = -7.75, p < .001$) or two loops ($t(43) = -8.07, p < .001$) were less typical than longer discussions of three or more loops. Moreover, the ECE student teachers directly read the text of the picture book to the children almost half of the time ($M = 273.50$ seconds) during a 10-minute period, which implies that they were engaged with the children in discussions during the remainder of the shared activity. Boys' and girls' engagement in discussions was based on their utterances across the whole reading session. We found no gender differences in how often the ECE student teachers engaged the boy or the girl in discussion ($t(39) = 0.42, p = .68$); the student teachers spent equal amounts of time with both children during a 10-minute period ($t(39) = 0.10, p = .92$).

The correlations in Table 2 suggest that the less time the ECE student teachers spent directly reading the book, the more time they

Table 2
Emotional support, instructional support, direct reading, and boys' and girls' engagement: Spearman correlations.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Emotional support	-	.20	.06	.71***	-0.35*	-0.21	.65***	-0.70***	.24	.41**
2. Simple questions	.23	-	.31*	-0.16	-0.51***	-0.02	.25	-0.29	-0.18	-0.04
3. Complex questions	.11	.32*	-	.02	-0.11	.05	.14	-0.17	-0.002	.13
4. Extensive feedback	.73***	-0.004	.09	-	-0.20	-0.14	.58***	-0.57***	.35*	.12
5. One feedback loop	-0.38*	-0.49**	-0.22	-0.27	-	.22	-0.52***	.43**	-0.14	.04
6. Two feedback loops	-0.29*	-0.13	.03	-0.35*	.31*	-	-0.52***	.31*	-0.40**	-0.11
7. Three or more loops	.28	.35*	.22	.29	-0.25	-0.30*	-	-0.92***	.61***	.38**
8. Teachers' direct reading	-0.21	-0.29°	.03	-0.12	.69***	.51***	-0.06	-	-0.46**	-0.41**
9. Boys' engagement	.22	.27	.18	.29	-0.17	-0.39**	.55***	-0.14	-	.12
10. Girls' engagement	.57***	.26	-0.01	.22	-0.21	-0.23	.49**	-0.11	.14	-

Note. ***$p < .001$, ** $p < .01$, *$p < .05$, °$p < 0.1$. The correlations below and above the diagonal represent frequency and duration, respectively.

spent on positive emotional interactions, providing extensive feedback, and longer back-and-forth exchanges (i.e., three or more feedback loops). Emotional support was positively related to the frequency and duration of extensive feedback and time spent on longer exchanges; however, more often and more time spent reading was associated with a greater frequency of and duration of time spent on shorter back-and-forth exchanges (i.e., one and two feedback loops). Additionally, more time spent on reading was negatively associated with time spent on longer back-and-forth exchanges and extensive feedback.

As shown in Table 2, greater frequency and duration of asking simple questions were related to posing complex questions (greater frequency and duration), involvement in longer back-and-forth exchanges (greater frequency only), and involvement in short back-and-forth exchanges (lower frequency and duration). Note that the frequency and duration of simple questions were also negatively associated with direct reading, but the correlations did not reach significance ($p = .057$ and 0.054, respectively). Finally, more time spent in longer back-and-forth exchanges was related to less time spent in shorter back-and-forth exchanges (one and two feedback loops).

4.3. Self-Reports of Closeness and Conflict and CLASS observations

Of the 45 ECE student teachers whose CLASS observations are reported in this study, 40 (38 of whom gave their consent) filled out the STRS-SF before the study module and 44 (42 of whom gave their consent) after. The few missing values ($n = 5$ before and $n = 1$ after) were estimated by regression imputations in SPSS. To explore the effects of self-selection, we compared whether the students who agreed to have their reading interactions used as research data differed in perceptions of their overall quality of relationships with children from those students who did not agree. We found no group differences in self-reported closeness ($Z = -1.401$, $p = .161$) or conflict ($Z = -0.192$, $p = .848$) before the study module as assessed by the Mann-Whitney U test (for descriptive statistics, see Supplementary material). The results of the Wilcoxon signed-rank test showed that after the study module, there was an increase in self-reported closeness ($Z = -3.01$, $p = .003$) and a decrease in conflict ($Z = -3.20$, $p = .001$). The negative relationship between closeness and conflict was not significant before the study module ($r_s(41) = -0.24$, $p = .114$), and it approached significance after the study module ($r_s(41) = -0.29$, $p = .063$).

The ECE student teachers' perceptions of their overall relationships with children before the study module did not predict the quality of their reading interactions during practical training, as assessed by emotional support (domain level) and the indicators of instructional support at the behavioural level (ELAN; $r_s(41) = -0.001$ to 0.21, $ps > 0.05$). However, some aspects of the reading interactions predicted variations in the students' self-perceptions after practical training and the study module. More time spent on reading the text ($r_s(41) = -0.31$, $p = .043$) and more frequent engagement in shorter discussions (one feedback loop; $r_s(41) = -0.36$, $p = .020$) were related to less perceived relational conflict. In addition, more time spent engaging in longer discussions (three or more feedback loops) was related to more perceived relational conflict ($r_s(41) = 0.32$, $p = .038$). Finally, the more often the student teachers spent asking simple questions ($r_s(41) = -0.36$, $p = .017$) and the more time they spent on those questions ($r_s(41) = -0.35$, $p = .022$), the less closeness they perceived. With respect to child gender, the more frequent ($r_s(37) = 0.37$, $p = .019$) and longer ($r_s(37) = 0.40$, $p = .013$) spent in engagement with the boys in the shared reading activity, the greater conflict the student teachers perceived.

4.4. Relationships between background characteristics and CLASS observations

As shown in Table 2, the student teachers engaged both girls and boys in longer discussions (three or more feedback loops) during the reading session. The more time the ECE student teachers spent reading the text, the less time they spent engaging the children in joint discussions. However, the more often and longer the student teachers were engaged in two feedback loops, the less the boy (but not the girl) was involved in the discussion. Higher levels of emotional support were associated with more frequent and longer engagements with the girl (but not the boy) during the reading activity, while more extensive feedback was related to time spent engaging the boy (but not the girl). These gender-related analyses were run without the three students who had two girls and the one student who had two boys in the reading interaction. We found that only the boys' ages were negatively related to the frequency ($r_s(39) = -0.34$, $p = .029$) and duration ($r_s(39) = -0.34$, $p = .031$) of short discussions (one feedback loop; not shown in Table 2). This indicates that the student teachers engaged in short discussions with younger boys. Finally, the ECE student teachers who had more work experience tended to ask complex questions more often ($r_s(43) = 0.28$, $p = .067$). No other background characteristics were related to the CLASS observations or self-reports.

5. Discussion

Few studies of professional development have examined the effectiveness of fostering prospective ECE teachers' pedagogical interactions and relationships with children in higher education (for such studies, see Hu et al., 2023; Joseph & Brennan, 2013; La Paro et al., 2012; Scott-Little et al., 2011). In this intervention study based on the teaching through interaction framework (see Fig. 1), we present both observational and self-report data on Finnish student teachers enrolled in a study module in the beginning of their second academic year of a three-year BA degree programme. The study module was composed of online evidence-based lectures and tutorials on children's language development and early childhood pedagogy, supplemented with multimedia material on a digital platform and independent work on practical assignments. During the online small-group tutorials, the ECE student teachers observed and analysed recorded low- and high-quality pedagogical reading interactions, and the teacher stimulated discussions, self-reflections, and peer evaluations to integrate theoretical concepts with practice. For in-depth analysis of instructional and linguistic interactions, observations and discussions of recorded interactions can be more pedagogically effective than live observations (Egert et al., 2020).

We explored the quality of the ECE student teachers' reading interactions, based on the content of the study module, at the beginning of their practical training period using the CLASS Pre-K coding system (Pianta et al., 2008). The CLASS has been validated for coding several cycles of recorded or live ECE classroom interactions between in-service ECE staff and a large group of children. One strength of our study is that we did not adopt random time-sampling of classroom interactions, as the timing, content, and format of such observations can bias CLASS coding (Cabell et al., 2013; Thorpe et al., 2020). Instead, we assessed the quality of pre-service teachers' co-constructed conversations with two children in one educationally focused observation cycle. Prior research shows that dialogic reading interactions comprised of successive predictable turns may be a favourable context for promoting both professional development and children's developmental outcomes (Dowdall et al., 2020; Noble et al., 2019; U.S. Department of Education, Institute of Education Sciences, What Works Clearinghouse, 2007; 2015). Our detailed behavioural-level observations allowed us to capture important differences in dialogic reading among the ECE student teachers that can be used to provide focused and timely feedback to students and to improve teacher preparation programmes to more effectively support professional development.

Our findings indicate that in the beginning of their second academic year, Finnish pre-service teachers can provide warm and emotionally supportive interactions in a one-on-two setting with preschool-aged children, which is consistent with studies of Finnish in-service teachers in classrooms with groups of toddlers (Salminen et al., 2022) and kindergartners (Pakarinen et al., 2010). Medium- to high-quality emotional support has also been found among in-service ECE staff working in various educational contexts in America (La Paro et al., 2009; Leyva et al., 2015), Asia (Hu et al., 2016), and Europe (von Suchodoletz et al., 2014). It was not surprising that the highly structured reading setting, with only two children who were well informed about the activity before it began, resulted in high-quality classroom organisation.

As expected, the novice pre-service teachers displayed relatively low competence in promoting children's higher-level cognitive processing, which is aligned with in-service studies on qualified teachers and pre-service studies conducted in the beginning or at the end of teacher education in other cultural and educational contexts. Previous studies based on broad CLASS domains have shown compelling evidence of an imbalanced pattern of high emotional support and low instructional support (e.g., Hamre et al., 2014; Hu et al., 2016; La Paro et al., 2009; Leyva et al., 2015; Mashburn et al., 2008; Pakarinen et al., 2010; von Suchodoletz et al., 2014; Yoshikawa et al., 2015). Even though high-quality in-service programmes have been effective in improving instructional support (Egert et al., 2020), the few prior pre-service studies have not produced improvements in ECE student teachers' instructional support during their final academic years (e.g., Hu et al., 2023; La Paro et al., 2012; for self-reported improvement, see Hu et al., 2022).

To better understand how the second-year ECE student teachers provided feedback and supported children's thinking and language development, we coded the frequency and duration of various behavioural markers that serve as indicators of higher-level CLASS conceptualisation. The student teachers used, on average, half of the joint activity time to read the text of the picture book directly, while the remaining time was spent on discussions with the two children. The co-constructed discussions were mainly composed of sequences of simple questions, which are recognised as low-quality conceptual support (Pianta et al., 2008). A simple question requiring a one-word response, such as 'yes' or 'no' or naming something, can support children's cognitive development if the teacher then engages the children in a deeper elaboration of the concept or event in back-and-forth exchanges. The relationships between the CLASS observations indicated that the more emotional support the student teacher displayed during the reading interactions, the more they engaged the two children in longer conversations and provided extensive feedback. On the other hand, more time spent reading the text of the narrative picture book was related to shorter conversations and less time spent on longer discussions, extensive feedback, and emotional support. It is possible that the 20-minute time constraint, which is a common methodological choice in observational research, restricted deeper discussion. However, most of the students did not use the scheduled time for shared reading.

There is ample evidence that the shared reading of narrative picture books can provide a favourable context for promoting preschool-aged children's basic language competence (e.g., Dowdall et al., 2020; Noble et al., 2019). In terms of the long-term purpose of developing pre-service teacher education, it is the students' behaviour that can be changed by training to improve higher-level of abstraction. Even though the study module provided detailed instructions, the ECE student teachers seldom prompted high-quality instructional discussions during the one-on-two shared reading. They rarely asked complex open-ended (why/how) questions, which require longer verbal answers and deeper thinking than questions that require only rote responses, and they practically never attempted to promote analysis and reasoning discussions related to problem solving, prediction, classification, or evaluation. Moreover, language modelling behaviour, such as self- and parallel talk, advanced language, and discussions intended to foster concept development, as evidenced by activities involving creation and integration, were rarely observed or entirely absent. Our findings complement previous studies on how to provide feedback to ECE teacher students about the strengths and weaknesses of their teaching behaviour; therefore, our results contribute meaningfully to developing professional competence in teacher education.

Recent studies (Deng et al., 2023; Thorpe et al., 2020) have demonstrated that in-service ECE teachers' effectiveness in instructional support varies across learning activities (e.g., shared reading, math, and science) and settings (e.g., small or large groups and care activities). As language and conceptual learning can occur in any daily activity (beyond educationally focused content), a highly conscious and competent teacher will focus on academic learning even during care and free play activities. Rather than missing learning opportunities, the teacher will initiate discussions about the physical and social worlds: 'How many sausages do you have on your plate?' 'What happens when the snow melts?' 'Which ball rolls longer, the heavy one or the light one?' and 'Why is the boy crying?' Our findings suggest that more knowledge of and reflection on effective practice must be incorporated into teacher education programmes.

The intervention seemed to have a positive transfer effect on pre-service teachers' relational perceptions, as assessed by the modified STRS-SF, which adds to the existing evidence in this vein (for self-reports on other learning outcomes in higher education, see Hu et al., 2022; Scott-Little et al., 2011). After the study module and practical training, the ECE student teachers felt, on average, more closeness and less conflict in their overall relationships with children. The associations between reading observations and later

relational perceptions indicate that those students who spent more time on reading and engaging the children in shorter exchanges (one and two feedback loops) by asking for labels and posing yes-or-no questions, a pattern that may reflect book-related conversation, perceived their relationships as less conflictual. In contrast, those who were engaged in longer exchanges (at least three feedback loops), which may reflect more child-led rather than teacher-led discussions and hence a lack of success in sustaining book-related conversation, perceived more conflict in their relationships. These findings may represent different approaches to coping with feelings of (in)security and self-efficacy in reading settings.

For the ECE student teachers in this study, age was not related to the quality of their reading interactions. However, those who had more work experience tended to support children's higher-level thinking by posing more open-ended and why/how questions (for in-service ECE staff, see Pianta et al., 2005). In general, the student teachers engaged the boy and the girl equally in discussions, although some differences were found in terms of the child's gender and age: the more emotional support displayed during the reading activity, the higher the girl's involvement, and the younger the boy, the more the student teachers engaged the child in shorter exchanges. In addition, the more the student teachers engaged the boy, but not the girl, in the joint reading interaction, the more they perceived their overall relationships as conflictual, which may have consequences for later academic outcomes, as suggested by in-service teachers' self-reports of more distant and conflictual relationships with boys throughout the school years (Koepke & Harkins, 2008).

Several limitations should be noted regarding the generalisability of this study's findings. First, our intervention should be considered a pilot study of one Finnish ECE teacher preparation programme that incorporates some of the key competence domains perceived by Metsäpelto and colleagues (2022) as critical for the teaching profession in the Finnish educational context. Nevertheless, more robust multivariate data analyses with larger samples from various higher education programmes are needed to verify the findings in other educational and cultural settings. Second, we applied CLASS Pre-K (Pianta et al., 2008) coding to one highly structured observation cycle with a special focus on the content and format of the observed activities to increase the reliability and validity of assessing the moment-to-moment behavioural changes in instructional support (see also Cabell et al., 2013; Thorpe et al., 2020). We did not observe two or more cycles to explore improvements in shared book reading. Thus, future research could include multiple observations across time with larger child groups of various age levels and engaged in different learning activities, such as play, meals, music, and craft settings, to better represent the quality of daily pedagogical interactions during pre-service training. Third, the transfer effect of the study modules, as assessed by self-reports on close and conflictual relational processes, should be carefully interpreted because we did not include any control group in our pre- and post-test design.

Our intervention study contributes to a broader understanding of ECE student teachers' development of professional competence in higher education, which can help guide policy and practice decisions (McDoniel et al., 2022). It is one of very few studies on how to assess and improve teachers' instructional support, which generally falls in the low-quality range for both pre- and in-service teachers. This study extends the use of the CLASS coding system and the modified version of the STRS-SF as assessment tools to provide feedback about teaching and professional practices, to support ongoing professional development, and to estimate the effects of training in higher education. To promote higher-level thinking and language learning in children, improved training during teacher preparation programmes (see Houen et al., 2022; Milburn et al., 2014; Muhonen et al., 2022) should focus on supporting prospective teachers in the intentional use of more open-ended and reasoning questions and in sustaining longer book content−related conversations.

CRediT authorship contribution statement

Wenwen Yang: Writing – review & editing, Writing – original draft, Visualization, Methodology, Investigation, Formal analysis, Conceptualization. **Maarit Silvén:** Writing – review & editing, Writing – original draft, Visualization, Supervision, Resources, Project administration, Methodology, Investigation, Funding acquisition, Conceptualization.

Declaration of competing interest

none

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.ijer.2026.102961.

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