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Profiles of Teaching Practices and First and Third Graders' Reading Skills in Finland and Estonia

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Abstract

The Early Childhood Classroom Observation Measure was used to observe 91 first-grade and 70 third-grade teachers in Estonia and Finland. Using a person-oriented approach, four profiles of teaching practices were identified in grade 1: the child-centred style, teacher-directed style, child-dominated style and a mixture of the child-centred and teacher-directed styles. An additional profile, the extreme-child-centred style, was found in grade 3. Children taught by child-centred teachers showed the highest reading skills, whereas children taught by child-dominated teachers showed the lowest skills. More Estonian than Finnish teachers applied the child-dominated style in grade 1 and the extreme-child-centred style in grade 3.

Keywords: child-centred practices, teacher-directed practices, child-dominated practices, reading skills, primary school

Highlights

- Using person-oriented approach to identify different profiles of teaching practices
- We found a *mixture of child-centred and teacher-directed style* and an *extreme-child-centred style*
- Promising benefits of a *mixture of child-centred and teacher-directed style* in grade 3
- *Extreme-child-centred style* don't guarantees the best benefits to reading fluency as showed in grade 3
- Estonian teachers used high proportion of less beneficial practices when compared with Finnish teachers

Profiles of Teaching Practices and Reading Skills at the First and Third Grade in Finland and Estonia

There is substantial evidence to show that teaching practices play an important role in early learners' academic performance (Early et al., 2007; Hamre & Pianta, 2005; Lerkkanen et al., 2016). Teachers' practices are typically based on their own beliefs and philosophy of teaching, as well as their education and experience (Stipek, Daniels, Galluzzo, & Milburn, 1992; Stipek, Givvin, Salmon, & MacGyvers, 2001). Although the associations between teaching practices and child outcomes have been studied in authentic classroom settings, only a few studies have applied a person-oriented approach to identify subgroups of teachers who show different teaching practices. By going beyond a variable-oriented approach and by using person-oriented methods, the present study aimed at identifying subgroups of teachers in Finnish and Estonian primary school classrooms on the basis of their teaching practices as measured by the Early Childhood Classroom Observation Measure (ECCOM; Stipek & Byler, 2005). The study further examined the extent to which these subgroups differed in terms of children's reading skills in the first and third grades.

Teaching Practices and Academic Outcomes

Teachers vary in the practices they use when interacting with pupils and instructing them in the classroom (e.g., Connor, Son, Hindman, & Morrison, 2005). The previous literature has typically focussed on child-centred and teacher-directed practices when analysing the role of instructional approaches in children's skill development (Lerkkanen et al., 2016; Pressley et al., 2003). Recently, child-dominated practices also have been under investigation (Kikas, Peets, & Hodges, 2014; Kikas, Silinskas, Jõgi, & Soodla, 2016). *Child-centred* practices, which are based on the constructivist theories of learning and teaching (Piaget, 1985; Vygotsky, 1978; for an overview, see Bransford, Brown, & Rodney, 2000), are based on the assumption that children are active learners who construct knowledge based on

their prior understanding and experiences. Children's initiatives and interests are emphasised and children are given an appropriate level of autonomy and an active role in decision making in the classroom. Teachers also actively use guidance and scaffolding to assist children in developing their own knowledge and understanding and provide possibilities for children to explore and manipulate objects (Stipek & Byler, 2004). In turn, *teacher-directed* (i.e., didactic) practices, with an emphasis on concrete and rote learning (Stipek & Byler, 2004), stress that teacher make most of the decisions, control the instructional activities, and emphasise the importance of facts and training basic skills. In child-centred practice and in teacher-directed practices the teachers' role is active in guiding and instructing children. By contrast, in *child-dominated* practices, teachers provide children with little direction, control or feedback (Kikas et al., 2014, 2016; Stipek & Byler, 2005). The classroom rules are often unclear and there are no systematically designed learning tasks present. Teachers, however, may interrupt and control activities when the children's behaviour is out of control (Stipek & Byler, 2005). In the present study, we examined teaching practices in light of the above-mentioned three definitions, using an observational instrument developed by Stipek and Byler (2004; 2005), the Early Childhood Classroom Observation Measure (ECCOM).

Because teachers who use different teaching practices have been shown to vary in their instructional emphases (Stipek and Byler, 2004), it can be assumed that each teaching practice plays a different role in different reading skills, that is, in basic skills, such as decoding, and in more advanced reading skills, such as comprehension. Previous studies have shown that the beneficial effects of different teaching practices on academic outcomes vary depending on the skill domain, skill level, and on the age of the children. For example, child-centred practices, in general, have a positive impact on kindergarteners' reading performance (Marcon, 1999), first graders' reading fluency (Lerkkanen et al., 2016; Perry, Donohue, & Weinstein, 2007), and the development of reading comprehension (Block, Parris, Reed,

Whiteley, & Cleveland, 2009). Teacher-directed practices, in turn, have been found to be beneficial for kindergarteners' and first graders' basic reading skills, such as letter knowledge and word recognition skills (Stipek et al., 1998; Stipek, Feiler, Daniels, & Milburn, 1995). However, little research has been conducted on the effect of teacher-directed practices on more advanced reading skills, such as reading comprehension. A recent study by Kikas et al. (2014) showed that the effect of child-dominated practices was moderated by children's skill level in the classroom. In classrooms with high initial math skills, child-dominated practices were positively associated with spelling skills and task-persistent learning behaviour, while in classrooms with low initial math skills the impact was negative. Given the importance of reading development at this age (e.g., Adams, 1990; Landerl & Wimmer, 2008),the present study focusses on the development of reading skills during the early school years.

Teaching Styles

In authentic classrooms, however, teachers' use of teaching practices is more complex. Instead of employing predominantly one practice, they may use a combination of different practices (Pressley et al., 2003; Rasku-Puttonen et al., 2011). The predominant use of a specific teaching practice or combinations of different teaching practices can be described as teaching styles (Kikas et al., 2016). Teaching styles refer to patterns or profiles of teaching practices. However, most of the previous research has been variable-oriented and has examined teaching practices in terms of specific dimensions. Studies aimed at identifying different teaching styles and their combinations are rare. As far as we know, only two previous studies have sought to identify subgroups of teachers with different profiles of teaching practices as measured by the ECCOM (Kikas et al., 2016; Rasku-Puttonen et al., 2011). In both studies, one in kindergarten and another in first grade, four teaching styles were identified: the *child-centred style*, *teacher-directed style*, *child-dominated style* and *a mixture of the child-centred and teacher-directed style (mixture teaching style)*. Both studies

also found that most teachers showed a child-centred style. The second largest group was those with mixture teaching style. Furthermore, Rasku-Puttonen et al. (2011) found that more kindergarten teachers used the *teacher-directed style* and *mixture teaching style* in Finland than in Estonia, and that more kindergarten teachers used the *child-centred style* and *child-dominated style* in Estonia than in Finland. So far, teaching styles have not been examined in later primary school grades using the ECCOM procedure.

Educational System and Reading Acquisition in Finland and Estonia

The Finnish and Estonian school systems are rather similar. In both countries, compulsory formal education consists of nine years of comprehensive school, beginning in the year the child turns seven and continuing with the same class teacher for the main subjects. In addition, the academic demands in the early years of primary school are similar in both national core curricula (Finnish National Board of Education, 2014; Vabariigi Valitsus, 2011/2014). For example, in both countries, initial reading instruction in these transparent languages is based on phonics. Both countries emphasise practice in reading fluency and comprehension in grade 1 and their curricula include 6-7 hours of literacy lessons per week during the first two school years.

Teacher training is also similar in both countries. Constructivist learning theories and related teaching methods are introduced, and the individualisation of instruction is valued. However, Estonia and Finland have experienced very different histories, which are reflected in their educational systems. Until 1991, when Estonia was part of the Soviet Union, authoritarian management practices and teacher-directed teaching methods were commonly applied in schools. Even in primary schools, teacher-directed methods (e.g., whole-class teaching, teacher-talk and assessing factual knowledge) were the predominant modes of instruction (Ruus et al., 2008). Although reforms in schools and teacher education institutions have taken place over the last two decades, changes in values, beliefs and

practices take time. Empirical studies have shown that Estonian teachers hold a variety of child-rearing values (Tulviste & Kikas, 2010) and that teachers' preference for teacher-directed teaching methods depends on their age and experience: teacher-directed approaches are favoured more by older and more experienced teachers than by younger teachers (Palu & Kikas, 2007). In Finland, child-centred practices, adaptation of instruction according to students' skills and individualised support for learning are highly valued and also evident in primary school teaching practices (Lerkkanen, Kikas, et al., 2012; Nurmi et al., 2013).

In terms of learning to read, Finnish and Estonian languages have shallow orthographies and high transparency which affects reading skills development: the acquisition of decoding skill and reading accuracy progresses faster in shallow orthographies than deep orthographies (Seymour, Aro, & Erskine, 2003). Both Finnish and Estonian children have shown high-level reading results in the Program for International Student Assessment (PISA; OECD, 2012). However, the two countries vary in the time when children's reading instruction begins. Whereas in Finland formal reading instruction begins in primary school (at age 7), in Estonia it begins in kindergarten (at age 6) (Soodla et al., 2015). In Estonia, children are taught to decode and spell simple words already in kindergarten (Vabariigi Valitsus, 2008/2011), while in Finland no systematic reading instruction takes place in kindergarten. Thus, it can be assumed that more emphasis is placed on the learning of basic reading skills in first-grade reading instruction in Finland than in Estonia. Moreover, as the reading skills of Finnish first graders are more heterogeneous (see also Soodla et al., 2015), more individualization in reading instruction, in accordance with the child's reading skills, is needed.

The Present Study: Research Questions and Hypotheses

Previous studies on the importance of different teaching practices in the development of students' reading skills have some limitations. First, most of the previous studies have

examined only one or two types of teaching practices or the composite score of two practices (Lerkkanen, Kiuru, et al., 2012; Perry et al., 2007). Although researchers have claimed that it is important to examine mixtures of teaching practices, such as the combination of didactic and constructivist practices (see Pressley et al., 2003), empirical research on such combinations is rare (for exceptions, see Kikas et al., 2016; Rasku-Puttonen et al., 2011). Second, child-dominated practices have rarely been examined in the field, limiting the formation of a broader view of teaching practices (for an exception, see Kikas et al., 2014; 2016). Third, most of the previous studies have been conducted in kindergarten and preschool classrooms, and only a few at the primary school level (for exceptions, see Lerkkanen et al., 2016; Kikas et al., 2016). Thus, the present study sought to identify subgroups of teachers who use different combinations of teaching practices, i.e., teaching styles (Kikas et al., 2016), in a sample of Finnish and Estonian primary school teachers, and to examine how these subgroups differ in terms of children's reading skills, i.e., fluency and comprehension. Specifically, the present study examined the following research questions:

1. What kinds of profiles of teaching practices (i.e., styles) can be identified in authentic classroom settings in grade 1 and grade 3? Based on previous findings (Kikas et al., 2016; Rasku-Puttonen et al., 2011), we expected to find four profiles: the *child-centred style*, *teacher-directed style*, *child-dominated style*, and a *mixture of the child-centred and teacher-directed styles (mixture teaching style)* (Hypothesis 1).

2. To what extent do Finnish and Estonian teachers differ in their use of teaching styles in grade 1 and grade 3? Based on the cultural and historical differences between the educational systems in Finland and Estonia (Kikas & Lerkkanen, 2011), we expected that a higher proportion of Finnish than Estonian teachers would use a child-centred style (Hypothesis 2).

3. Do children whose teachers use different teaching styles differ in their performance in reading fluency and reading comprehension in grade 1 and grade 3? Because both child-centred practices (e.g., Lerkkanen et al., 2016; Marcon, 1999; Perry et al., 2007) and teacher-directed practices (e.g., G. Adams & Carnine, 2003; Stipek et al., 1995) have been found to be positively related to basic reading skills, we expected that, in reading fluency, children in classrooms where teachers use a child-centred style, teacher-directed style or mixture teaching style would outperform children in classrooms where teachers use a child-dominated style (Hypothesis 3a). Moreover, because teacher-directed teachers have been shown to place less emphasis on high-order skills (Stipek & Byler, 2004; Tang et al., 2016), we expected that children in classrooms where teachers use a child-centred style or mixture teaching style would outperform children in classrooms where teachers use a teacher-directed style or child-dominated style in reading comprehension (Hypothesis 3b). In addition, in grade 1, we expected that children whose teachers use a child-centred style or teacher-directed style would show better reading fluency and comprehension than children in classrooms where teachers use a child-dominated style (Hypothesis 3c). For grade 3, no specific hypothesis was formulated, owing to the lack of empirical evidence.

Methods

Participants and Procedures

The total sample of the present study comprised 91 first-grade teachers (32 in Finland and 59 in Estonia) and 70 third-grade teachers (33 in Finland and 37 in Estonia), and the children in their classrooms. Both datasets were collected as part of other ongoing longitudinal studies; the FS study in Finland (Lerkkanen, Niemi, et al., 2006), and the KISS study and the READ study in Estonia (AUTHORS).

The Finnish sample. This study is part of an extensive age-cohort study from kindergarten to grade 4 conducted during the years 2006–2011. The sample comprised 1,132

children from 93 classrooms with their teachers. Thirty-two first-grade teachers (28 female, 4 male), and 33 third-grade teachers (24 female, 9 male) were observed on a voluntary basis in the spring semester, in 2008 and 2010, respectively. In the sample of observed classrooms, seven teachers and most of the children were the same at the two measurement points. Most teachers (86% of the first-grade and 97% of the third-grade teachers) had a master's degree or above. Teachers' work experience was measured by asking them to select from one of five options (1 = less than a year, 2 = 1–5 years, 3 = 6–10 years, 4 = 11–15 years, 5 = more than 15 years). The majority of the first- and third-grade teachers had more than 15 years' teaching experience (Median = 5, Mode = 5, for first grade; Median = 4, Mode = 5, for third grade). The schools were in two medium-sized towns and one less urban municipality in Finland. Mean class size was 19.22 (*SD* = 4.52) in grade 1 and 19.94 (*SD* = 5.88) in grade 3, which is the typical class size in Finnish primary schools. The average age of the children was 7.15 years (*SD* = .3) when they entered grade 1.

The Estonian sample. The Estonian grade 1 samples comprised teachers from two separate studies: 38 teachers (all female) and 869 children from the KISS study, and 21 teachers (all female) and 465 children from the READ study. All the teachers were classroom teachers and all of them had a master's level education. Thirty-eight first-grade teachers were observed in 2008 (from KISS) and 21 in 2012 (from READ). Thirty-seven teachers from the KISS study were observed two years later in grade 3; almost all of them were the same (only six teachers had changed). The majority of the first- and third-grade teachers had more than 15 years' teaching experience (Median = 5, Mode = 5, for both grades). The average class size was 19.72 (*SD* = 4.90) in grade 1, and 16.67 (*SD* = 4.59) in grade 3. The average age of the children when they entered grade 1 was 7.46 years (*SD* = .52) and 7.34 years (*SD* = .32) for the KISS and READ study samples, respectively.

Procedure. In both countries, the researchers contacted school principals and teachers first to inform them about the project and invited them to participate. Second, parents were asked to sign an informed consent for their children's participation. The children's and their parents' background information was measured at the start of each project.

During the spring term of the first and third grades (February–March), observations were conducted in classrooms by experienced observers (with a master's or doctoral degree in education or psychology). Before starting the observations, the observers were carefully trained until the intra-class correlation (ICC) reliability between two observers reached .81 or above for each subscale. The classroom observations were conducted following the procedures described in the ECCOM manual, and thus two observers, producing independent ratings, were always present in a classroom (Stipek & Byler, 2005; see also Lerkkanen et al., 2012). Each observation session lasted three lessons (i.e., at least half a day) and began at the start of the school day. All observations included at least one literacy lesson**.**

The Finnish FS children's reading skills were assessed at the beginning of the fall term of grade 1 (September) and at the end of grades 1 and 3 (April). The Estonian KISS children were assessed on their reading skills at the beginning of grade 1 (September–October) and at the end of grade 3 (April–May). In both countries, the grade 3 measurements of reading skills were performed with the same instruments (see Appendix). However, different measures of reading skills were used with the grade 1 Finnish FS sample and Estonian KISS sample. The Estonian READ children were assessed on their reading skills at the beginning of grade 1 (September–October) and at the end of grade 1 (April–May). The same reading skills measures were used as with the Finnish FS sample (see Appendix).

Measures

Classroom observations. The ECCOM (Stipek & Byler, 2004; 2005) was used to measure teaching practices on the extent (proportion of time) to which they were child-

centred, teacher-directed and child-dominated. Each practice is rated on 14 items and over the same three subscales: *management* (four items), *climate* (four items) and *instruction* (six items), as shown in Table 1. The rating scale is based on the percentage of the time that each type of practice is demonstrated during the observation: 1 = *the practice is rarely seen* (0%–20% of the time) to 5 = *the practice predominates* (80%–100% of the time). The use of each of the three teaching practices was independently rated by two observers. For example, at the end of the observation day, for a specific item (e.g., choice of activities), the use of a child-centred practices might be rated as 4, a teacher-directed practices as 3, and a child-dominated practices as 2 (Stipek & Byler, 2005). The mean scores of both observers were used in this study. The inter-rater reliabilities varied between .67 - .80, which can be regarded as good or excellent (Hallgren, 2012).

Insert Table 1 about here

Reading fluency. A group-administered subtest of the standardised reading test battery (ALLU—Reading Test for Primary School; Lindeman, 1998) was used to assess word-level reading accuracy and fluency in the grade 1 FS sample and READ sample, and grade 3 FS sample and KISS sample,. In this speed test, a maximum of 80 items can be attempted within a 2-minute time limit. For each item, a child was asked to read four (phonologically similar) words and draw a line connecting a picture and the word that semantically matched it. The score used in the analyses was the sum of correct answers (maximum 80). In this speed test, the score reflects both the child's fluency in reading the stimulus words and his or her accuracy in making the correct choice from among the alternatives. In a highly transparent language, such as Finnish and Estonian, only a fluency measure can differentiate between children's decoding skills across their primary school

years. According to the test manual (Lindeman, 1998), the Kuder–Richardson reliability coefficient was .97 in both grade 1 and grade 3. No floor or ceiling effects were detected.

In grade 1, different measures of reading skills (i.e., phoneme awareness or phoneme-grapheme correspondence, and the reading accuracy or fluency test) were used in the FS and in KISS samples. In the KISS sample, the tests included phoneme-grapheme correspondence and reading accuracy, whereas reading skills in the FS sample were measured as phoneme awareness (identification of the initial sound from the word) and reading fluency (word level reading accuracy and speed; ALLU test).

In the KISS sample, children's phoneme-grapheme correspondence was assessed with nine items. In the first five items, the children were shown pictures of familiar objects. Underneath each picture was a number of blank spaces corresponding to the number of letters in the word for the object represented in the picture; for example, 8 blank spaces appeared under the picture of the target word mesilane [bee]. The experimenter said the target word aloud and the child was shown one letter in the word (e.g., the grapheme E). The child's task was to mark where the letter should be placed in the series of blank spaces. In the remaining four items, the children were presented with three pictures each showing a different object. The child's task was to mark the object that corresponded to the word the experimenter said aloud. Although the objects were familiar to the children, they need to listen carefully to the names of the three objects, as they differed in the duration of the sounds (e.g., saba-saabas-sabas; keeb-kepp-keep). For each child, the sum of correct answers was calculated (maximum score = 9). Actual scores ranged from 1 to 9 ($M = 7.63$, $SD = 2.08$). Cronbach's alpha was .85.

In the test of reading accuracy, the KISS children were given a list of seven words that described objects needed in school (e.g., vihik [copybook]), objects that were not needed in school (e.g., suvi [summer]), and a non-word (raamatop, which looks very similar to the

word “raamat” [book]). The children read each word and marked whether the object it named was needed at school. Each correct answer scored 1 point. Actual scores ranged from 1 to 7. Cronbach's alpha was .83.

In the FS sample, the initial phoneme identification test (ARMI test battery; Lerkkanen, Poikkeus, & Ketonen, 2006) was also used. The children were shown four pictures of objects that were named aloud by the experimenter. The children were then asked to select the correct picture based on oral presentation of the initial phoneme of the target word. All the words comprised one to three syllables, with two vowels and eight consonants. The sum score was based on the number of correct items (maximum score = 10). Cronbach's alpha was .74.

Reading comprehension. A group-administered subtest of the standardised reading test battery (ALLU—Reading Test for Primary School; Lindeman, 1998) assessed the child’s reading comprehension skills in gleaning factual knowledge, concepts and inferences from text. The children were asked to answer 12 multiple-choice questions based on a silently read text. The children received 1 point for each correct answer (maximum score 12). The maximum time allotted was 45 mins. To ensure that task difficulty was optimal for each age, the texts and multiple choice questions of this normed test were different for grade 1 and grade 3. The topics of the texts were ‘Judo’ (grade 1) and ‘Operating a Camera’ (grade 3). The Kuder–Richardson reliability coefficients, drawn from the test manual, for the reading comprehension task in grades 1 and 3 were .85 and .75, respectively.

Mothers’ level of education. The children’s mothers’ level of education was measured on a scale of 1 to 3 (1 = basic education, 2 = high school education, 3 = college education and above). For the Finnish mothers, the distribution was 6.6% at level 1, 31.9% at level 2, and 61.5% at level 3. For the Estonian KISS sample mothers, the corresponding

percentages were 9.5%, 58.6% and 31.9%, and for the Estonian READ sample mothers 6.2%, 45.2% and 48.6%.

Analysis Strategy

Our first aim was to identify subgroups of teachers who use different teaching practices in classroom settings in grades 1 and 3. For this purpose, we utilised the mixture modelling (Mplus version 7.0; Muthén & Muthén, 2012). This method allowed us to identify teaching profiles (i.e., latent classes) from the observed data that differ from other profiles but that are homogenous within each group. Mixture modelling also provides statistical tests to evaluate the appropriate number of profiles. To do this, we used three criteria: (a) the model fits, (b) mean probabilities and numbers of teachers in the latent profiles, and (c) the interpretability of the identified profiles. The model fits were evaluated upon three criteria: the Bayesian information criterion (BIC), adjusted Bayesian information criterion (ABIC), and Akaike's information criterion (AIC). For the statistical testing of the number of latent profiles, we used the following tests: the Vuong-Lo-Mendel-Rubin test *(VLMR)*, Lo-Mendell-Rubin adjusted LRT test (*LMR*) and entropy value. Lower AIC, BIC and ABIC values indicate a better fit, and significant test ($p < .05$) results indicate a higher number of profiles. The highest log-likelihood value (log L) also indicates the best fit of the model. Classification quality was determined by examining the posterior probabilities and entropy values (as suggested by Celeux & Soromenho, 1996; entropy values range from 0 to 1, with 0 corresponding to randomness and 1 to a perfect classification).

Our second aim was to examine whether the Finnish teachers differ from the Estonian teachers in their teaching styles (i.e., profiles). To do this, we conducted a cross-tabulation analysis by using IBM SPSS statistical package. The chi-square test ($p < .05$) in the analysis provided the overall differences between the Finnish and Estonian teachers in the use of teaching styles. The adjusted residuals (t-values showing .05 deviation $-1.96 > x > +1.96$)

allowed us to compare differences in the use of each teaching style between the two countries.

Our last aim was to examine whether children whose teachers used different teaching styles differed from each other in reading fluency and comprehension. For this purpose, we conducted several ANCOVAs in which children's reading performance variables were compared in respect to their teachers' teaching style. In these analyses we controlled for the children's characteristics (i.e., age, gender), their mother's education level and previous reading skills to predict group differences in reading fluency and comprehension. The samples and control variables used in these analyses differed between grade 1 and grade 3 due to practical reasons. In the grade 1 ANCOVAs, we used the Estonian READ sample (21 teachers and 397 students) and the Finnish FS sample (32 teachers and 359 students). These samples had been administered the same measures of reading fluency and reading comprehension in grade 1 spring, and of reading fluency in grade 1 fall. In the grade 3 ANCOVAs, the Estonian KISS sample (37 teachers and 456 students) and the Finnish FS sample (33 teachers and 502 students) were used. These samples had used the same measures of reading fluency and reading comprehension in grade 3 spring. However, the FS and KISS grade 3 samples had not been administered the same measures for reading skills in grade 1. To deal with this limitation, we standardized each of the reading measures in grade 1 and computed a composite score for the children's previous reading skills. In the KISS sample (Z stands for standardized score), grade 1 reading skills were computed as Zphone-graph +Zreading accuracy; in the FS sample, grade 1 reading skills were computed as Zphoneme awareness+Zreading fluency.

Results

The descriptive statistics for the teaching practices subscales and items, separately for the Finnish and Estonian samples, have been reported earlier (Tang et al., 2016). Both the

Finnish and Estonian teachers' mean scores were slightly higher for *child-centred* practices than *teacher-directed* practices. The lowest means were found for *child-dominated* practices in both countries in both grades. Moreover, the Finnish teachers scored lower than the Estonian teachers in *child-dominated* practices, in both the first ($t = -3.95$, $p < .001$) and third ($t = -2.37$, $p < .05$) grades.

Latent Profiles of Teaching Practices

First grade teachers. In the mixture modelling procedure, we fitted models with different numbers of latent profiles (Table 2). The results of the model fits showed that the BIC, ABIC, AIC and log-likelihood values decreased as the number of classes increased. However, the VLMR and LMR tests suggested that the four-class solution was significantly better than the three-class solution, and that the five-class solution was not better than the four-class solution. The entropy value of the four-class solution indicated a very good classification (>.90). Each of the four groups had a high average value (>.92) for the probability of group membership, and none of the groups overlapped with one another, as indicated by other probabilities lower than .05. Finally, the interpretability of the four-class solution was best on theoretical grounds. Consequently, the four-class solution was selected.

Insert Table 2 about here

Table 3 presents the descriptive statistics for the four-class solution. In grade 1, the first and largest profile, i.e., teachers characterised by the use of the *child-centred style,* comprised 43% (39) of teachers with highest means for child-centred practices. The second profile, i.e., the users of the *teacher-directed style* consisted 11% (10) of the teachers with high means for teacher-directed practices and low means for the other teaching practices. The third profile, i.e., the users of the *child-dominated style,* comprised 11% (10) of teachers with highest means for child-dominated practices. The fourth profile, i.e., the users of the *mixture*

of child-centred and teacher-directed styles (mixture teaching style), consisted 35% (32) of teachers with nearly equal means for both child-centred and teacher-directed practices.

Next, we ran ANOVAs to examine whether the identified profiles differed in class size, teacher's age and teaching experience. However, none of the variables showed significant differences between the profiles.

Insert Table 3 about here

Finnish versus Estonian first grade teachers. Next, we examined the extent to which the Finnish and Estonian teachers differed with respect to the profile to which they belonged. The results showed that most teachers in both countries were in the latent profile labelled as *child-centred style*; in that group, there were slightly more Finnish teachers (47 % of the total number of Finnish teachers) than Estonian teachers (41 % of the total number of Estonian teachers). In the second largest latent profile, users of the *mixture teaching style,* there were 44 % of the total number of Finnish teachers and 31 % of the total number of Estonian teachers. In the third latent profile, users of the *teacher-directed style,* there were 9 % of the total number of Finnish teachers and 13 % of the total number of Estonian teachers. Finally, in the latent profile of users of the *child-dominated style,* there were 17 % of the total number of Estonian teachers and no Finnish teachers. We subsequently ran a cross-tabulation analysis between teaching styles and country. The analysis of the adjusted residuals showed that the Estonian sample contained significantly more teachers who used a *child-dominated style* (adjusted standardised residual = 2.5) than the Finnish sample (adjusted standardised residual = -2.5).

Third grade teachers. A similar mixture modelling procedure was conducted for the third-grade teachers. Our results for model fit (see Table 4) again showed that the BIC, ABIC, AIC and log-likelihood values decreased as the number of classes increased.

However, VLMR and LMR tests revealed that the five-class solution was significantly better than the four-class solution, and that the six-class solution was not better than the five-class solution. In addition, the entropy value of the five-class solution indicated a very good classification (> 0.91). Each of the five profile groups had a high average value (> .92) for the probability of group membership, and none of the groups overlapped with one another, as indicated by the values for the other probabilities, which were lower than .07. Consequently, we chose the five-class solution as our final solution.

Insert Table 4 about here

The first latent profile, i.e., users of the *extreme child-centred style*, comprised the teachers with extremely high mean levels for child-centred practices, and accounted for 13% (9) of all teachers. The second profile, i.e., users of the *child-centred style*, included the teachers with medium-high means on child-centred practices, and accounted for 30% (20) of all teachers. The third profile, i.e., users of the *teacher-directed style*, accounted for 15% (11) of the all teachers. The fourth profile, i.e., users of the *child-dominated style* accounted for 10% (7) of all teachers. The fifth profile, i.e., the users of the *mixture teaching style*, accounted for 32% (23) of all teachers.

Again, no significant differences were found between the profiles in relation to class size, teacher's age or teaching experience (see Table 5).

Insert Table 5 about here

Finnish versus Estonian third grade teachers. The results showed that most Finnish teachers fell into the latent profiles of users of the *child-centred style* (42%) and the *mixture teaching style* (42%), compared to 16% and 24% of the Estonian teachers. Fewer Finnish

teachers were in the latent groups of users of the *extreme child-centred style* (3%), *teacher-directed style* (9%) and *child-dominated style* (3%) compared to their Estonian counterparts: corresponding proportions 22%, 22% and 16%. The analysis of the adjusted residuals in cross-tabulation analysis revealed that the Finnish sample contained more teachers who deployed the *child-centred style* (adjusted standardised residual = 2.4) than the Estonian sample (adjusted standardised residual = -2.4). Moreover, the Estonian sample contained more teachers who deployed the *extreme child-centred style* (adjusted standardised residual = 2.3) than the Finnish sample (adjusted standardized residual = -2.3).

Teaching Styles and Children's Reading Skills

First grade. To examine whether reading fluency and reading comprehension would differ across the four latent profiles of teaching practices (i.e., teaching styles), we conducted ANCOVAs in which teaching style was an independent variable and the children's age, gender, mother's level of education, and children's reading fluency measured in first grade fall were included as covariates. The results showed that the four latent profiles differed from each other with respect to the children's *reading fluency,* $F(3) = 10.75$, $p < .001$, and *reading comprehension,* $F(3) = 5.49$, $p = .001$. The pairwise comparisons showed first that, in *reading fluency*, children with teachers in the *child-centred style* profile scored higher than children with teachers in the profiles of the *mixture teaching style* ($p < .05$) and the *child-dominated style* ($p < .001$). Children with teachers in the *mixture teaching style* profile performed better in *reading fluency* than children with teachers in the latent profile of the *child-dominated style* ($p < .01$). Second, children whose teachers were characterised by the *child-centred style* performed better in *reading comprehension* than children with teachers in the *child-dominated style* profile ($p < .001$). Since no differences were found between the latent profiles for class size, teacher's age or teaching experience, these variables were not included in the ANCOVAs.

Insert Figure 1 about here

Third grade. Children's reading performance was compared for five latent profiles by conducting ANCOVAs in which teaching style was an independent variable and the children's age, gender and mother's level of education, and their previous reading skills in grade 1 were covariates. The previous reading skills variable was a composite score of the standardized scores of the first-grade reading measures. The results showed that the five latent profiles differed in the children's scores for *reading fluency,* $F(4) = 10.99$, $p < .001$, and *reading comprehension,* $F(4)=4.73$, $p < .01$. First, the pairwise comparisons showed that children with teachers in the *child-centred style* profile had higher scores in *reading fluency* than children with teachers in the *teacher-directed style* ($p < .001$), *extreme child-centred style* ($p < .01$) and the *child-dominated style* ($p < .05$) profiles. Children whose teachers belonged to the *mixture teaching style* profile had higher scores in *reading fluency* than children with teachers in the *teacher-directed style* profile ($p < .001$). Second, the results showed further that children with teachers in the *child-centred style, extreme child-centred style* and the *mixture teaching style* profiles had higher scores in *reading comprehension* than children with teachers in the *child-dominated style* profile ($p < .01$; $p < .01$; $p < .05$; respectively). Since no differences were found between the latent profiles for class size, teacher's age or teaching experience, these variables were included in the ANCOVAs.

Discussion

This study is among the few that have investigated the profiles of teaching practices among primary school teachers. Four profiles were identified among the samples of Finnish and Estonian grade 1 teachers: the *child-centred style*, *teacher-directed style*, *child-dominated style*, and *mixture teaching style*. In grade 3, an additional profile, the *extreme-child-centred style*, was identified. There were also differences between the Finnish and Estonian teachers

in their teaching profiles. Namely, in grade 1, a higher proportion of Estonian than Finnish teachers used the *child-dominated style*, and a higher proportion of Finnish than Estonian teachers used the *child-centred style*. However, in grade 3, a lower proportion of Estonian than Finnish teachers used the *extreme-child-centred style*. Children in classrooms where the teacher deployed the *child-centred style* showed better performance in reading fluency and reading comprehension than children whose teachers deployed the *child-dominated style*.

Profiles of Teaching Practices in Grade 1 and 3

Our first aim was to examine what kinds of profiles of teaching practices can be identified among first and third grade teachers. In line with Kikas et al. (2016) and Rasku-Puttonen et al. (2011), we also identified four profiles in grade 1: the *child-centred style*, *teacher-directed style*, *child-dominated style* and *mixture teaching style*. This result was consistent with Hypothesis 1. In grade 3, we found one additional profile, namely the *extreme-child-centred style.* This profile differed from the profile of the *child-centred style* in that the teachers in the profile of the *extreme-child-centred style* had very high scores for child-centred practices but rather low scores for teacher-directed practices.

The results also showed that, in both grades, the *child-centred style* (if counted together with the *extreme-child-centred style*) represented the largest group of teachers, almost half of all participants. These findings show good fit with the recent core curricula and teacher education practices implemented in both Finland and Estonia (Kikas & Lerkkanen, 2011; Sahlberg, 2011; Vitikka, Krokfors, & Hurmerinta, 2012). Both national core curricula emphasise teacher sensitivity to students' individual differences in competence and interests, regard for students' perspectives, a warm and supportive classroom climate, and the importance of collaboration and interaction in the classroom (Finnish National Board of Education, 2014; Vabariigi Valitsus, 2011/2014). Moreover, pre-service teacher training in both countries reflects the constructivist theory of learning and teaching. For these reasons, it

is understandable that most of the teachers were found to deploy child-centred teaching practices. However, the emergence of the *extreme-child-centred style* in grade 3 may reflect the fact that some teachers greatly emphasise child-centred practices over other teaching practices.

In addition, the results showed that about one-third of the teachers deployed the *mixture teaching style* in grades 1 and 3. This result is in line with previous studies conducted in preschool and kindergarten (Rasku-Puttonen et al., 2011), and in primary school (Kikas et al., 2016). Both studies found that teachers in the *mixture teaching style* profile represented about 30% of all teachers. The present results correspond with the proposition by Pressley et al. (2003) that, in an authentic classroom, teaching practices may involve both direct transmission and constructivist elements; this they called 'balanced teaching'.

Differences in the Profiles of Teaching Practices between Finland and Estonia

Our second aim was to compare Finnish and Estonian teachers in their teaching styles. The results partly supported Hypothesis 2 in that some of the Estonian teachers, but none of the Finnish first grade teachers, deployed the *child-dominated style* in grade 1. In grade 3, however, the number of Finnish and Estonian teachers who used the *child-dominated style* did not differ significantly. One reason for the difference in grade 1 may be related to the fact that Estonian children are taught decoding in kindergarten (Soodla et al., 2015) whereas systematic reading instruction in Finnish schools begins in the first grade. It is likely that Estonian children need less support than Finnish children in acquiring basic reading skills in grade 1, as Estonian children have already mastered these skills before entering primary school. Therefore, the use of the *child-dominated style* by some Estonian teachers might be related to the children's higher level of reading skills in the Estonian first-grade classrooms (see also Kikas et al., 2014). Later, in grade 3, when fluent reading skill has been acquired in

both countries, the average support needed in the classroom by Finnish and Estonian students might have become similar.

In grade 3, between-country differences emerged in the use of the *child-centred* and *extreme-child-centred styles*: more Finnish teachers deployed the *child-centred style*, whereas more Estonian teachers deployed the *extreme-child-centred style*. Together with the finding that Estonian teachers used the *child-dominated style* in grade 1, it is possible that the Estonian teachers may have somehow misinterpreted the meaning of child-centred practices. Given that they had mainly experienced teacher-directed practices during their own school days, the Estonian teachers might have interpreted child-centredness as letting children decide for themselves how to study and thus as not setting children any limits or providing them with sufficient guidance. The Estonian teachers may also exaggerate the benefits of constructivist practices and the importance of granting children autonomy, and in consequence use more often extreme child-centred practices. By contrast, the Finnish teachers tend to be more flexible in their classroom practices.

Teaching Styles and Reading Skills

The third aim of this study was to examine the extent to which children's reading fluency and comprehension in grade 1 and grade 3 differed according to the teaching styles employed by their teachers. After controlling for child age and gender, previous reading skills and mother's level of education, the results showed that, in grade 1, children who were in classrooms characterised by the *child-centred style* showed the highest performance in reading fluency and reading comprehension, whereas children whose teachers applied the *child-dominated style* had the lowest reading performance. In grade 3, children whose teachers deployed either the *child-centred style* or *mixture teaching style* performed better on reading fluency and reading comprehension than those taught by teachers who used the *child-dominated* or *teacher-directed styles*. Overall, these results partly supported Hypotheses 3a,

3b and 3c. They are also in line with previous studies on the role of teaching practices (Block et al., 2009; Lerkkanen et al., 2016; Perry et al., 2007) that have found constructivist teaching to be associated with high levels of reading fluency in the first grade (Lerkkanen et al., 2016; Perry et al., 2007) and reading comprehension (Block et al., 2009) among lower primary students. However, children whose teachers deployed the *extreme-child-centred style* showed lower reading fluency than those in the *child-centred style* classroom in grade 3; however, no differences between the two groups were found in reading comprehension. These results suggest that, although the *child-centred style* teaching has, overall, stronger associations with children's reading performance than the other styles, particularly the *child-dominated style*, the extreme end of this style is not further positively related to children's reading performance. It should be noted that the teachers in the profile characterised by the *extreme-child-centred style* placed strong emphasis on child-centred practices while scoring lower in the other practices, whereas the teachers in the profile characterised by the *child-centred style*, had medium scores in child-centred practices along with low to medium scores in the other practices. One explanation for the absence of an association between reading performance and the *extreme-child-centred style* may be that the teachers who employed this style also showed a very low level of teacher-directed practices. In other words, some use of teacher-directed practices might be beneficial for children in the early phases of reading skills development. Overall, our results suggest that a combination of practices or balanced teaching practices has stronger associations with children's reading skill development than an extreme emphasis on specific teaching practices. It should also be noted that the associations between teaching practices and reading skills may be also highly dependent on children's skill level, because teachers need to adapt their practices according to the child's individual needs in the classrooms. However, further studies are needed to investigate this in more detail.

Our results also showed that children who were taught by teachers with the *child-dominated style* had the lowest reading fluency and reading comprehension skills in both grades. Previous research has demonstrated that instruction with minimal guidance often fails to produce effective learning (for a review, see Kirschner, Sweller, & Clark, 2006). These results are understandable in that the teacher's role in child-dominated practices is minimal when compared to child-centred and teacher-directed practices. The teachers using the *child-dominated style* tend to give their students full autonomy; presumably, they believed that students can construct knowledge by themselves and study by following their own interests (Kikas et al., 2016; Stipek & Byler, 2005). However, child-dominated teaching practices do not seem to recognise children's individual needs and individual differences in learning and skills development (Kirschner et al., 2006), and teachers using these practices do not adapt their instruction or support to meet the needs of each child in the classroom.

Our results also showed some differences between grades in the associations between the *teacher-directed style* and reading skills. In grade 1, the performance in reading fluency and reading comprehension of children taught by teachers using the *teacher-directed style* fell in between that of the children taught by teachers using the *child-centred style* and that of the children taught with the *child-dominated style*, whereas in grade 3, these children showed the poorest level of reading fluency. Previous studies have shown that teacher-directed practices are detrimental for early learners' motivation (Lerkkanen, Kiuru, et al., 2012; Stipek et al., 1998, 1995). Since the development of reading fluency is strongly linked with reading motivation—the more you read, the more fluent you become—it is understandable that children who were taught by teachers using the *teacher-directed style* showed lower reading fluency in grade 3. This finding implies that although teacher-directed teaching may predict children's basic reading skills, such as decoding in the early grades, this style of teaching does not lead to improvements in reading fluency later on. Moreover, the results of the

present study did not support Hypotheses 3a and 3c that children taught with the *teacher-directed style* would show better reading fluency in grade 1 than children taught with the *child-dominated style*. One reason may be due to the orthographic transparency of both Finnish and Estonian languages. It is plausible that in countries with transparent language children learn to read easier and faster without too much emphasis on drills and practices of decoding and spelling that typify *teacher-directed* teaching practices.

The results showed further that the children whose teachers employed the *mixture teaching style* had the highest reading skills scores in grade 3 despite showing an in-between level of performance in grade 1. It may be that combining the potential benefits for motivation and skills of constructivist practices and didactic practices can provide flexible and effective support for children's self-regulation and behaviour and yet still create a warm classroom atmosphere and climate. One possible explanation for these results is that such a mixture of teaching practices supports autonomy while also providing children with structure. For example, Jang et al. (2010) found that teacher provision of structure and support for autonomy was the most beneficial combination for promoting students' engagement in learning activities. As little teaching observation research has examined the use of mixtures or combinations of teaching practices, more studies on the topic are needed.

Limitations

The present study has some limitations that need to be considered before generalising the research findings. First, the sample of teachers was relatively small (91 in grade 1 and 70 in grade 3). This might have limited the power of the statistical tests. Second, for practical reasons, we controlled for reading fluency when we investigated reading comprehension. Although reading fluency typically predicts reading comprehension, the ideal situation would nevertheless be to use identical measures as a covariate. Moreover, because identical measures had not been used to assess grade 1 reading skills in the Finnish and Estonian grade

3 samples, the grade 1 reading scores of these two samples were standardized to compute a composite score, which was then used as a covariate. Third, the datasets used in the grade comparisons were cross-sectional. Fourth, teaching practices were observed over three lessons, including at least one literacy lesson but also other subjects. Therefore, we cannot draw any detailed conclusions on specific literacy instruction practices or the effectiveness of methods. However, Stipek and Byler (2004) have suggested that the ECCOM focuses on the general characteristics of teaching practices in the classroom during the school day rather than on subject matter contents.

Conclusions and Implications for Teacher Training

By using a person-oriented approach, the present study identified different teaching styles, i.e., patterns of teaching practices, among Finnish and Estonian primary school teachers. The results also suggest that both a child-centred teaching style and a teaching style including both child-centred and teacher-directed elements were typical among teachers of students whose reading performance developed better, whereas the child-dominated style and an extreme form of child-centred style were associated with a less positive development of children's reading performance. The results indicate that teaching styles which require teachers to take a more active role benefit children's reading skills during the early years of primary school. The associations between the *teacher-directed style* and reading skills were weaker in the third grade than in the first grade, whereas the mixture teaching style showed stronger associations with reading skills in the third grade.

Our findings have also some implications for teacher training. First, teacher training needs to be more precise and give concrete examples of the differences between teaching practices and their specific benefits. This seems to be especially important in the case of child-centred practices vs. extreme-child-centred practices. The extreme form of child-centred practices does not seem to provide any additional benefits for children's reading

fluency. Second, more effort is needed to introduce the possible negative consequences of the *child-dominated style*. Although the idea of giving the child full autonomy seems appealing to some teachers, our results showed that this teaching style is detrimental for reading skills, especially at the lower primary school level. Third, the promising finding from our analysis on the use of the *mixture teaching style* in grade 3 should be further studied and understood to encourage teachers to use a flexible repertoire of teaching practices suited to their learners' needs.

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Table1

Description of the teaching practices, subscales, and items used in the ECCOM

	Teaching Practices		
Subscale and item	*Child-Centred*	*Teacher-Directed*	*Child-Dominated*
Management			
1. Child Responsibility	Children are allowed to take responsibility to the degree that they are able.	Children are not given opportunities to take responsibility (teacher control).	No one seems to take responsibility for maintaining an orderly environment.
2. Management	Teacher has clear but somewhat flexible classroom rules and routines.	Teacher has clearly communicated expectations and classroom rules that are rigidly adhered to.	There are no clearly defined expectations or rules. The classroom is chaotic.
3. Choice of Activities	There is a mixture of teacher and child choice.	Teacher makes most of the choices.	Children make most of the choices.
4. Discipline Strategies	Conflict resolution is smooth; consequences are appropriate and apply equally.	Discipline is imposed without explanation or discussion; consequences are inconsistent.	Teacher rarely disciplines.
Climate			
5. Support for Communication Skills	Teacher encourages children to engage in conversation and elaborate on their thoughts.	Teacher does not encourage children to engage in conversation (teacher-controlled conversation).	Teacher does not engage children in interactive conversation.
6. Support for Interpersonal Skills	Teacher provides opportunities for cooperative, small-group activities that promote peer interactions.	Teacher does not provide opportunities for children to develop interpersonal skills.	There are opportunities but no support for the development of children's interpersonal skills.
7. Student Engagement	Teacher attempts to engage all children in ways that will improve their skills and understanding.	Teacher engages children in rote activities (e.g., rigid expectations about being engaged in work).	Teacher makes no systematic effort to engage children in productive activity.
8. Individualisation of Learning Activities	Teacher is attentive to children's individual skill levels and adapts tasks accordingly.	Tasks are not flexible or adapted to children's individual needs (e.g., all do the same tasks).	Teacher does not address children's individual needs.

(Continued)

Table1. Continued

Subscale and item	Teaching Practices		
	Child-Centred	*Teacher-Directed*	*Child-Dominated*
Instruction			
9. Learning Standards	Teacher holds children accountable for attaining some individualised standard (assists and challenges children at their respective levels).	Teacher rigidly holds children accountable for completing work and for attaining a universal standard (e.g., standards are rigid and invariable).	Teacher does not hold children accountable for completing work and has no apparent standards.
10. Coherence of Instructional Activities	There are connections between and within academic lessons (concepts/skills are embedded into a broader set of goals).	Academic lessons are distinct and disconnected (concepts/skills are presented as an isolated set of facts or skills to be learned).	Lessons are disjointed and the focus is unclear (connections are on a superficial level with no unifying concept).
11. Teaching Concepts	Tasks and lessons are designed to teach identifiable concepts and develop understanding.	Tasks are designed to help children learn facts or procedures. Problem solving is constrained.	The specific concept of tasks is unclear.
12. Instructional Conversation	Teacher solicits children's questions, ideas, solutions or interpretations around a clearly defined topic.	Teacher dominates instructional conversation; children's participation is limited.	Teacher does not engage in instructional conversations with children, or topics are unfocused or unclear.
13. Literacy Instruction	Teacher provides a broad array of literacy experiences and instructional practices.	Teacher's literacy instruction places a heavy emphasis on phonics and paper-and-pencil tasks.	Teacher provides no instruction on phonics or reading comprehension strategies.
14. Math Instruction	Math instruction emphasises developing understanding.	Math instruction emphasises rote memorisation and drill and practice.	There is little evidence of math instruction or conversation about math concepts.

Notes: Based on Stipek and Byler (2005). Observers rate classrooms on each of the14 scale items, giving one code for Child-Centred, one code for Teacher-Directed and one code for Child-Dominated. All items are rated on *a scale of 1 to 5 (1=these practices are rarely seen, less than 20% of the time*; 5=*these practices predominate, 80%–100% of the time*).

Table 2

Indices for Mixture Models with Different Numbers of Latent Classes, Grade 1

Class	log L	BIC	ABIC	AIC	VLMR	LMR	Entropy	N
1	-335.72	698.50	679.56	683.43			1.00	91
2	-290.04	625.18	593.62	600.07	.00	.01	.98	11/80
3	-247.42	558.00	513.81	522.85	.04	.05	.89	11/29/51
4	**-228.00**	**537.20**	**480.39**	**492.00**	**.02**	**.02**	**.91**	**39/10/10/32**
5	-217.03	533.31	463.87	478.87	.44	.46	.92	10/30/38/4/9
6	-207.84	532.96	450.90	467.68	.35	.37	.89	4/30/24/10/14/9

Notes: log L = Log-likelihood; BIC = Bayesian Information Criterion; ABIC = Adjusted Bayesian Information Criterion; AIC = Akaike Information Criterion; VLMR = Vuong–Lo–Mendell–Rubin test p-value; LMR = Lo–Mendell–Rubin test p-value;

Table 3

Descriptive Statistics of the Four Profiles of Teaching Styles in Grade 1

	Child-centred Style ***M(SD)***	**Teacher-directed Style** ***M(SD)***	**Child-dominated Style** ***M(SD)***	**Mixture Teaching Style** ***M(SD)***	***F value***
N	39	10	10	32	
Percentage	43%	11%	11%	35%	
Score of Child-centred Practices	3.71^{a} (.36)	1.59^{c} (.28)	1.98^{c} (.34)	2.66^{b} (.31)	161.97^{***}
Score of Teacher-directed Practices	1.87^{c} (.49)	4.13^{a} (.50)	2.50^{b} (.57)	2.91^{b} (.43)	67.80^{***}
Score of Child-dominated Practices	1.18^{c} (.28)	1.43^{bc} (.43)	3.54^{a} (.55)	1.45^{b} (.35)	116.89^{***}
Classroom size	18.92 (5.24)	19.55 (5.36)	20.89 (5.09)	19.91 (4.74)	ns
Teacher's age	43.33 (9.36)	46.8 (11.82)	37.2 (10.16)	39.94 (10.93)	ns
Teaching experience	*Med* = 5	*Med* = 5	*Med* = 4	*Med* = 4	ns
Less than a year	5.3%	10%	20%	9.7%	
1–5 years	5.3%	10%	20%	12.9%	
6–10 years	13.2%	-	10%	16.1%	
11–15 years	13.2%	10%	-	16.1%	
More than 15 years	63.2%	70%	50%	45.2%	

Notes. Pairs with the same subscript letters do not differ significantly (p>.05) based on ANOVA post-hoc comparisons. Tamhane's T2 was used when variances were not equal; in other cases, Bonferroni post hoc comparisons were used. *Med* = Median.

Table 4

Indices for Mixture Models with Different Numbers of Latent Classes, Grade 3

Class	log L	BIC	ABIC	AIC	VLMR	LMR	Entropy	N
1	-252.60	530.68	511.68	517.78				70
2	-210.46	463.41	431.91	440.93	.05	.05	.99	9/61
3	-182.06	423.61	379.51	392.13	.07	.08	.89	33/7/30
4	-167.16	410.79	354.09	370.32	.55	.57	.86	19/28/16/7
5	**-152.65**	**398.77**	**329.47**	**349.30**	**.03**	**.04**	**.93**	**23/11/9/20/7**
6	-142.91	396.27	314.38	337.81	.23	.25	.94	23/20/9/7/2/9
7	-133.22	393.90	299.40	326.44	.09	.10	.94	6/9/23/20/9/1/2

Table 5

Descriptive Statistics of the Five Profiles of Teaching Styles in Grade 3

	Extreme Child-centred Style ***M(SD)***	**Child-centred Style** ***M(SD)***	**Teacher-directed Style** ***M(SD)***	**Child-dominated Style** ***M(SD)***	**Mixture Teaching Style** ***M(SD)***	***F values***
N	9	20	11	7	23	
Percentage	13%	30%	15%	10%	32%	
Score of Child-centred Practices	4.65^{a} (.31)	3.53^{b} (.31)	1.68^{e} (.27)	2.13^{d} (.31)	2.68^{c} (.29)	159.28^{***}
Score of Teacher-directed	1.31^{d} (.28)	1.98^{c} (.29)	4.02^{a} (.46)	2.09^{bcd} (.82)	2.94^{b} (.42)	64.49^{***}
Score of Child-dominated	1.04^{b} (.13)	1.12^{b} (.15)	1.37^{b} (.39)	2.95^{a} (.37)	1.19^{b} (.22)	82.68^{***}
Classroom size	15.66 (5.78)	18.8 (5.54)	17.18 (5.15)	16.29 (2.69)	19.78 (5.76)	ns
Teacher's age	44.11 (13.10)	43.10 (9.30)	47.18 (9.69)	42.00 (9.51)	43.48 (10.07)	ns
Teaching experience	*Med* =5	*Med* =4.5	*Med* =5	*Med*=4.5	*Med*=4.5	ns
Less than a year	-	-	-	-	-	
1–5 years	11.1%	25%	9.1%	-	9.1%	
6–10 years	22.2%	15%	9.1%	33.3%	27.3%	
11–15 years	-	10%	-	16.7%	13.6%	
More than 15 years	66.7%	50%	81.8%	50%	50.0%	

Notes. The pairs with the same subscript letters do not differ significantly ($p>.05$) based on ANOVA post-hoc comparisons. Tamhane's T2 was used when variances were not equal; in other cases, Bonferroni post hoc comparisons were used. *Med* = Median.

Figure 1. Differences between the teaching styles on reading fluency and comprehension in Grade 1 and Grade 3.

Notes. Pairs with the same subscript letters do not differ significantly (p>.05) based on post-hoc comparisons; extr-cc = extreme child-centred style; cc = child-centred style; cd = child-dominated style; td = teacher-directed style; mix = mixture of child-centred and teacher-directed styles.

Appendix. Description of identical measures in reading skills

Identical measures of reading skills in ANCOVAs

	Finn FS	**EST-READ**	**EST-KISS**
1st grade fall	*reading fluency*	*reading fluency*	
1st grade spring	*reading fluency* *reading comprehension*	*reading fluency* *reading comprehension*	
3rd grade spring	*reading fluency* *reading comprehension*		*reading fluency* *reading comprehension*