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Longitudinal associations of first-grade teaching with reading in early primary school

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ABSTRACT

The present study examined the longitudinal associations between first-grade teaching practices and children's reading skills development from Grade 1 to Grade 3. Using the Early Childhood Classroom Observation Measure (ECCOM), the teaching practices of 32 Finnish teachers were observed in Grade 1. Students' (N = 359) word recognition and sentence reading skills were assessed yearly from Grade 1 to Grade 3. The person-oriented analysis identified three profiles of teaching practices in Grade 1: child-centred teaching style, teacher-directed teaching style, and a mixed child-centred and teacher-directed teaching style. Furthermore, the results showed that children whose Grade 1 teachers used the mixed child-centred and teacher-directed style showed faster reading skills development than those who were taught with the teacher-directed style. These findings provided evidence that teachers' use of both child-centred and teacher-directed practices in the first school year promotes the best development of children's reading skills in early school years.

Introduction

Learning to read is influenced by children's cognitive and linguistic skills (e.g., Parrila, Kirby, & McQuarrie, 2004) as well as the teaching classroom practices they are exposed to at school (e.g., Carlisle, Kelcey, Berebitsky, & Phelps, 2011; Lerkkanen et al., 2016). Although the amount of research on teaching practices and reading is substantial, our knowledge of effective teaching for reading suffers from at least two main limitations. First, most studies to date have relied on a variable-oriented approach, whereas only a few have applied a person-oriented approach to identify subgroups of teachers with different patterns of teaching practices (i.e., teaching styles; Kikas, Silinskas, Jõgi, & Soodla, 2016). While variable-oriented approach provides valuable knowledge about how teaching-related variables, such as instructional support, are associated with students' reading skills and motivation (Pakarinen et al., 2011), this approach assumes that the population is homogenous – that is, the established association between instructional support and children's reading skills is the same for every pair of teacher and student. The person-oriented approach, by comparison, is based on the assumption that people within a sample or population are heterogeneous – that is the established association between variables varies across the sample. Therefore, person-oriented studies attempt to identify subgroups of individuals (e.g., teachers) within a sample and to examine how students' reading skills vary depending on teaching groups. One strength of the person-oriented approach is that it provides important information about how teaching-related variables function as a whole and how these exert a combined influence on child outcomes (e.g., Kikas et al., 2016; LoCasale-Crouch et al., 2007). Second, even fewer studies have sought to examine the longitudinal associations between teaching styles and the development of children's reading skills. Thus, the present study aimed, first, to identify subgroups of Grade 1 teachers based on their observed teaching, and second, to examine the prospective association of Grade 1 teaching styles and children's development of reading skills from Grade 1 to 3.

Teaching practices and teaching styles

Teachers differ in their use of teaching practices when interacting with their students. Two main teaching practices have been investigated in previous research (e.g., Lerkkanen et al., 2016; Marcon, 1999; Perry, Donohue, & Weinstein, 2007; Stipek, Feiler, Daniels, & Milburn, 1995). *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), assume that children actively construct knowledge based on their prior understanding and experiences. Teachers employing these practices value

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children's interests and initiatives, and provide support for their autonomy when organising learning activities. In contrast, *teacher-directed* (i.e., didactic) practices, based on traditional learning theories emphasising concrete learning (e.g., see Stipek & Byler, 2004), assume that basic skills should be acquired before moving to more advanced learning. In classrooms relying on these practices, the teacher makes most of the decisions, controls the instructional activities, and emphasises the importance of facts and basic skills. Some scholars have also described a third type of teaching practices, *child-dominated* practices (Kikas et al., 2016; Kikas, Peets, & Hodges, 2014; Stipek & Byler, 2005). Teachers who use these practices over-emphasise children's autonomy, providing them with little control, direction or feedback. Such teachers adopt a passive role in the classroom in contrast to those using child-centred and teacher-directed practices. These teachers may, however, interrupt and control activities when children's behaviour is out of control.

In authentic classroom instruction, teachers may predominantly employ one practice, or alternatively may use a combination of diverse practices (Good, Wiley, & Florez, 2009; Kikas et al., 2016; Pressley et al., 2003). Such predominant or combined use of different teaching practices can be described as *teaching styles* (Kikas et al., 2016). The vast majority of the previous research investigating classroom teaching has relied on variable-oriented approaches (e.g., Kikas et al., 2014; Perry et al., 2007), examining how a single aspect of teaching practices is related to specific child outcomes. For instance, Lerkkanen et al. (2016) examined child-centred practices and teacher-directed practices in Finnish first-grade classrooms and how these practices, as two separate variables, were related to children's reading and math skills. The researchers found that child-centred practices, but not teacher-directed practices, were significantly associated with both sets of children's academic skills. The results showed the extent to which Finnish first-grade teachers displayed child-centred or teacher-directed practices in the classroom level, and how these practices, *on average*, were related to children's academic skills across the first grade.

However, the variable-oriented approach is not able to inform us how teachers use these teaching practices synergistically in authentic classrooms. In other words, when using variable-oriented approach, we gain important knowledge at the mean level and correlations between the study variables from the homogenous sample assumption, but we do not know how these variables function together within a person or in heterogeneous groups. The person-oriented approach, by comparison, can provide information and understanding of different subgroups of variables. This approach has a special value in an authentic classroom context, in particular, as teachers typically do not rely on one type of practice, but rather deploy a combination of practices when instructing children and interacting with them (Rasku-Puttonen et al., 2011; Stipek & Byler, 2004). By using a person-oriented approach, it is possible to identify teachers who employ a combination of different practices. To the best of our knowledge, only two studies have sought to identify subgroups of teachers with different profiles of teaching practices (Kikas et al., 2016; Rasku-Puttonen et al., 2011). In both studies, one conducted in kindergarten and the other in first grade, four teaching styles emerged: a *child-centred style*, a *teacher-directed style*, a *child-dominated style* and a *mixed teaching style*. In the first three teaching styles, teachers relied on a predominant practice – that is, child-centred practices, teacher-directed practices, child-dominated practices, respectively, in their classroom. In the last teaching style, teachers flexibly combined child-centred and teacher-directed practices in the classroom.

Teaching practices and reading skills

According to the Simple View of Reading (SVR; Hoover & Gough, 1990), reading skills consist of two key related but separate components, decoding and linguistic comprehension, both of which have been found to account for a significant amount of variance in reading comprehension (Kendeou, Papadopoulos, & Kotzapoulou, 2013; Kendeou, Savage, & Broek, 2009). Decoding, or reading isolated words quickly and accurately, is the ability to connect graphemes and phonemes. In SVR model, decoding is typically operationalized by measures of the accuracy of word reading, suggesting that the measures of decoding should include timed measures of word recognition to capture the development of automaticity in word recognition (cf. word reading fluency). Linguistic comprehension is the ability to gain lexical information at the word level and derive sentence and discourse interpretations. In the present study, we have followed the theory of SVR and have focused on these two key components of reading skills at early school years namely, *fluent word recognition*, and *sentence reading fluency and comprehension*.

Previous studies have shown different benefits of diverse teaching practices on children's reading skills. For example, *child-centred* practices, in general, have a positive impact on kindergarteners' verbal skills (e.g., letter recognition and listening; Marcon, 1999), on first graders' word recognition (Lerkkanen et al., 2016; Perry et al., 2007; Tang et al., 2017) and on the development of reading comprehension in the early primary school years (Block, Parris, Reed, Whiteley, & Cleveland, 2009). *Teacher-directed* practices, by comparison, have been found to be beneficial for kindergarteners' and first graders' decoding skills, such as letter knowledge and word recognition (Stipek et al., 1998, 1995). Few studies have examined the relation between *child-dominated* practices and children's reading skills. A study by Chien et al. (2010) found that pre-kindergarteners in classrooms composed mostly of free play showed smaller gains in letter naming, letter-word identification and overall language and literacy skills as compared to peers in classrooms that included teacher-scaffolded learning, individual instruction, or group instruction.

The previous research in the field, however, has some limitations. First, many studies have utilised cross-sectional data, a method which does not permit to study the longitudinal relations between teaching practices and reading skills (for an exception, see Stipek et al., 1998). Hence, longitudinal studies are needed. Second, the majority of the previous studies have examined only one or two types of teaching practice (e.g., Lerkkanen et al., 2012; Perry et al., 2007). Thus, more systematic research on mixed teaching practices is needed. Although researchers have claimed that it is important to examine combinations of teaching practices, such as didactic and constructivist practices (Pressley et al., 2003), empirical research on these combinations is rare (for two exceptions, see Kikas et al., 2016; Rasku-Puttonen et al., 2011). Third, most of the previous studies have been conducted in preschool and kindergarten classrooms, and only a few in primary schools (for exceptions, see Kikas et al., 2016; Lerkkanen et al., 2016). Given that teachers play an important role in children's learning during the primary school years (Hamre & Pianta, 2001; Silver, Measelle, Armstrong, & Essex, 2005), and that early school experiences lay the foundation for later adjustment and achievement (e.g., Entwisle & Alexander, 1998; Yen, Konold, & McDermott, 2004), more studies focusing on the early primary school years are needed.

The present study

The present study intended to fill these research gaps in a unique way. Instead of using traditional variable-oriented analyses of individual instructional variables, this study identified profiles of teaching practices in Grade 1 classrooms by relying on person-oriented analyses, affording the possibility of uncovering how different practices are uniquely combined. Moreover, this study examined the longitudinal associations between Grade 1 teaching profiles and children's reading skills development from Grade 1 to Grade 3. Finally, the present study was conducted in Finland, a country lauded for its educational system (OECD, 2016). Though researchers (Välijärvi et al., 2007) have argued that Finnish high educational attainments are partly due to its high-quality teachers and effective teaching practices, there is a lack of

empirical research examining the relation between teaching practices and children's achievement in Finnish schools. Therefore more studies are needed to help us understand better Finland's high educational performance, thereby providing valuable information on effective teaching practices for the development of a critical academic skill, such as reading.

Two following research questions and hypotheses guided the present study:

1. What profiles of teaching practices (i.e., teaching styles) emerge in Finnish Grade 1 classrooms? Based on findings from previous studies in Finnish kindergarten classrooms (Rasku-Puttonen et al., 2011) and Estonian first-grade classrooms (Kikas et al., 2016), we expected to find four profiles, i.e., *child-centred style, teacher-directed style, child-dominated style, and a mixed style combining child-centred and teacher-directed styles* (Hypothesis 1).
2. To what extent are the identified teaching styles in Grade 1 associated with children's development of reading skills, namely word recognition and sentence level reading, from Grade 1 to Grade 3? Since both child-centred practices (e.g., Lerkkanen et al., 2016; Marcon, 1999; Perry et al., 2007) and teacher-directed practices (e.g., Stipek et al., 1995) have been found to be positively related to decoding skills, such as word recognition, we expected that, Grade 1 teachers' use of *child-centred style*, *teacher-directed style*, and the *mixed teaching style* would be associated with better *word recognition* development than the use of *child-dominated style* (Hypothesis 2a). Moreover, because teacher-directed teachers have been shown to place less emphasis on higher-order skills (Stipek & Byler, 2004), we expected that Grade 1 teachers' use of *child-centred style* or a *mixed teaching style* would be associated with better *sentence level reading* (includes fluency and comprehension) development than use of *teacher-directed style* or *child-dominated style* (Hypothesis 2b).

Method

Participants

This study is part of an extensive longitudinal study from kindergarten to Grade 9 in which both children and their teachers were included. Thirty-two teachers (28 female; M_{age} = 44.62 (*SD* = 10)), out of a total of 93 teachers, volunteered to participate in classroom observations in Grade 1 and were included in the present study. In total, 359 children who participated in the project were members of these 32 classrooms. Children were followed from Grade 1 to Grade 3. The mean age for children was 7.17 years (*SD* = 0.29) when they entered Grade 1; the mean class size was 19.30 students (*SD* = 5.60) in Grade 1, 19.04 students (*SD* = 5.75) in Grade 2, and 20.94 students (*SD* = 6.29) in Grade 3. These class sizes are typical for Finnish schools.

Most (86%) 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 = *> 15 years*). The majority of the first-grade teachers had > 15 years of teaching experience (*Median* = 5, *Mode* = 5). Teachers and parents were asked to give their written consent for their own and/or their child's participation in the study.

Procedure

Trained research assistants assessed children's reading skills during the fall term of Grade 1 (September 2007; T0) and during the spring term (April) of Grade 1 (T1; 2008), Grade 2 (T2; 2009) and Grade 3 (T3; 2010). Information of background variables (i.e., child's age and gender) was also collected in Grade 1.

During the Grade 1 spring term (February–March; T1, 2008), experienced observers (i.e., with a master's or doctoral degree in education or psychology) conducted classroom observations to determine teaching practices. Before starting their observations, observers were carefully trained until the inter-rater reliability (intra-class correlation coefficient; ICC) between two observers reached 0.81 or above for each subscale. The classroom observations were conducted following the procedures described in the Early Childhood Classroom Observation Measure (ECCOM; Stipek & Byler, 2005) manual, and thus two observers, producing independent ratings, were always present in a classroom. 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.

Measures

Classroom observations

The Early Childhood Classroom Observation Measure (ECCOM; Stipek & Byler, 2004, 2005) was used to measure the degree (i.e., proportion of time) to which teaching practices in a classroom were child-centred, teacher-directed and child-dominated. This scale has been validated to be used in Finland and Estonia (Tang et al., 2017). In this scale, each teaching practice was rated on 14 items (see Appendix A) distributed across three subscales: management, climate, and instruction Management, comprised of four items, refers to the ways and strategies that teachers employ to control the classroom and activities. Classroom climate, also containing four items, denotes the ways in which teachers support classroom interactions, including teacher-child and peer interactions, as well as teachers' affective tone and sensitivity towards children. Finally, Instruction consisting of six times, refers to the activities and behaviours teachers implement to deliver the knowledge and to support children's cognitive and language development. The rating scale is based on the percentage of time taken up by each particular practice during the observation (period): 1 = *practice is rarely seen* (0%–20% of the time) to 5 = *practice predominates* (80%–100% of the time). Across subscales, for each item, teachers receive three scores one for child-centred practices, another for teacher-directed practices and a final one for child-dominated practices (Stipek & Byler, 2005). For example, for the Choice of Activities item, the use of child-centred practices might be rated as 4 (corresponding to 60–80% of the time observed teachers and children made choices, the use of teacher-directed practices might be rated as 3 (i.e., 40%–60% time observed teacher made most of the choices), and the use of child-dominated practices might be rated as 2 (i.e., 20%-40% of the time observed children made most of the choices). For the Teaching Concepts item, a teacher may be rated his/her use of child-centred practices as 1 (i.e., 0%–20% time observed teacher taught identifiable concepts and developed understanding), his/her use of teacher-directed practices as 5 (i.e., 80%–100% time observed teacher helped children learn facts or procedure and with limited problem solving), and his/her use of child-dominated practices as 1 (i.e., 0%–20% time observed no/unclear teaching of specific concepts was present).

The rating of ECCOM is conducted after the whole period of visiting the classroom (about half-a-day). The target of this procedure is to get an overall impression of classroom teaching practices during a typical school day. The observers were required to provide their ECCOM scores immediately after the classroom visit and there was no time limit for the rating. Two observers independently rated the three teaching practices for each of the 14 items. The mean scores for the two observers were used in the analysis in this study. The inter-rater reliabilities were assessed using intraclass correlation coefficients (ICCs) with a two-way mixed, absolute agreement, average-measures procedure. The resulting ICCs were 0.88, 0.88, and 0.81, for child-centred, teacher-directed, and child-dominated practices respectively, and can be regarded as excellent (Hallgren, 2012).

Word recognition

A group-administered subtest of the standardized reading test battery (ALLU—Reading Test for Primary School; Lindeman, 1998) was

used to assess word-level reading fluency. 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 the 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 constructed by calculating the number of correct answers (the maximum value was 80). Owing to the nature of 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, only a speeded measure can differentiate children's decoding skills across their primary school years. According to the test manual, the Kuder–Richardson reliability coefficient was 0.97 in Grades 1–3. No floor or ceiling effects were detected.

Sentence level reading

The Test of Sentence Reading Efficiency and Comprehension (TOSREC; Wagner, Torgesen, Rashotte, & Pearson, 2010) was used to measure sentence level reading fluency and comprehension. The TOSREC requires fluent recognition of printed words, ability to process grade-level appropriate sentence structure, knowledge of grade-level-appropriate vocabulary, adequate working memory capacity to process realistic sentences, the ability to make appropriate inferences, and possession of relevant background knowledge. In this speeded test, a maximum of 60 sentences can be attempted within the 3-minute time limit. Children were instructed to read the sentences one by one, and evaluate whether they are true or false by circling the correct alternative. The number of correct responses (maximum 60 points) was used to measure achievement in this reading task. The simultaneous focus on rate and comprehension that is represented in the TOSREC is thought to more closely approximate what good readers do. For example, good readers do not read faster to improve their comprehension. Rather, they slow down and reread text if needed to understand (Kuhn et al., 2010). The TOSREC has an average correlation coefficient with several measures of reading comprehension and word-level reading that exceed 0.70 (Wagner et al., 2010). The Cronbach's alpha for this measure in the present study was 0.89 in Grade 1, 0.94 in Grade 2 and 0.96 in Grade 3.

Analysis strategy

Our first aim was to examine what kinds of profiles (i.e., latent subgroups) of teaching practices can be identified among Finnish Grade 1 teachers. Mixture modelling was used to identify various profiles that differ from other profiles but that are homogeneous within each profile. In this study, three criteria were used to evaluate the appropriate number of profiles: (a) the fit of the model, (b) the mean probabilities and number of teachers in the latent profiles, and (c) the interpretability of the identified profiles. The model fits were evaluated on 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 ($p < .05$) test results indicate a higher number of profiles. The highest log-likelihood value (log L) also indicates the best model fit. 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). These statistical analyses were performed with Mplus version 7.0 statistical package (Muthén & Muthén, 2018).

Our second aim was to examine how children's reading skills (i.e., word recognition and sentence level reading) develop from Grade 1 to Grade 3 after being taught by a teacher who employed a particular teaching style in Grade 1. For this purpose, we ran several repeated ANCOVAs, in which we controlled for previous word recognition (T0) and children's age and gender, to predict group differences in the development of reading fluency and comprehension from Grade 1 to Grade 3. The repeated ANCOVAs were conducted in two steps. First, word recognition and sentence level reading from T1 to T3 were used as repeated within-factor separately, teaching style T1 was used as a between-factor, and word recognition (T0) was used as a covariate. In the second step, the child's age and gender were added to the model as extra covariates. Pillai's Trace results by Multivariate Tests were used to report each F value.

Results

The descriptive statistics for word recognition and sentence level reading at each time point are reported in Table 1.

Preliminary analysis of teacher change

In the Finnish educational system, the same classroom teacher typically teaches almost all the subjects and teaches the same classroom across grades 1 and 2. Then the new teacher typically teaches the children across grades 3 and 6, but there are also some schools, in which the same teacher teaches the same classroom across grades 1 and 6. The current study aimed to identify groups of teaching practices (i.e., teaching styles) for Finnish first-grade teachers and to examine the association between first-grade teaching styles and children's reading development (across grades 1–3). However situations in which teachers were changed between grades 1 and 3 may partially preclude us from finding the solid links between first-grade teaching styles and reading development across grades 1 and 3. In other words, the new teachers who teach children after Grade 1 may also affect the reading development process as well. To account for this issue, we conducted preliminary analyses to examine whether the new teachers were significantly different from teachers who stayed with the same classroom with regards to teacher age, working experience, gender, educational level, and class size.

Out of 359 first grade students in current study, 78 (21.73%) had the same teacher throughout grades 1 to 3. One hundred seventy-four (48.47%) had the same teacher throughout grades 1 and 2 ($n = 21$ teachers), and 24 (6.69%) had the same teacher throughout grades 1 and 3 (n = 2 teachers). In case of thirty-three students (9.19%), their teacher changed at Grade 2 and this teacher taught the classroom also at Grade 3 ($n = 6$ teachers). We investigated whether the changed teachers (either at Grade 2 or Grade 3) differed from the previous teachers in terms of their main demographic characteristics (e.g., age and working experience). For those children who had the same teacher throughout grades 1 and 2 and changed their teacher at Grade 3, the changed teachers did not differ from the earlier teachers in terms of age ($t(52) = -1.77, p = .08$), work experience ($t(53) = 1.21, p = .23$), and educational level ($t(42) = -1.136, p = .26$). However, the changed teachers tended to have more male students ($t(54) = -2.74, p < .01$) and bigger class sizes ($t(54) = -2.10, p < .05$). For those children who changed their teacher at Grade 2 and kept this teacher at Grade 3, the changed teachers did not differ with earlier teachers in terms of age ($t(9) = 0.37, p = .72$), work experience ($t(9) = -1.38, p = .20$), gender ($t(9) = -1.38, p = .20$), class size ($t(12) = -0.38, p = .71$), and educational level.[1]

Latent profiles of teaching practices

Mixture modelling was conducted for models with different numbers of latent profiles (Table 2). The results showed that the BIC, ABIC, AIC and log-likelihood values decreased as the class number increased. However, none of the VLMR and LMR values were significant,

[1] All changed teachers and their prior counterparts in this category were female, therefore no *t*-test could be ran.

Table 1
Descriptives for word recognition and sentence-level reading.

	Overall M (SD)	*Teacher-directed style M (SD)*	*Mixed teaching style M (SD)*	*Child-centred style M (SD)*
N	359	58	256	45
Word recognition T0	8.62 (6.44)	8.81 (6.59)	8.24 (5.98)	10.53 (8.34)
N	342	55	243	44
Word recognition T1	19.22 (8.75)	17.45 (7.33)	19.32 (8.51)	20.86 (11.22)
Word recognition T2	25.39 (7.35)	24.69 (6.19)	25.35 (7.29)	26.45 (8.90)
Word recognition T3	36.08 (8.24)	34.13 (6.71)	36.54 (7.98)	36.00 (10.83)
Sentence reading T1	18.14 (7.5)	16.07 (5.47)	18.22 (7.22)	20.3 (10.29)
Sentence reading T2	30.68 (8.11)	29.07 (7.00)	30.79 (7.92)	32.09 (10.16)
Sentence reading T3	39.18 (8.22)	35.73 (7.22)	39.37 (8.03)	42.49 (9.00)

Note. T0 = Grade 1 fall, T1 = Grade 1 spring, T2 = Grade 2 spring, and T3 = Grade 3 spring. The same symbols are used in Table 3.

Table 2
Indices for mixture models with different numbers of latent classes.

Class	log L	BIC	ABIC	AIC	VLMR	LMR	Entropy	N
1	−77.44	175.67	156.96	166.87			1.00	32
2	−63.07	160.80	129.62	146.14	0.08	0.09	0.96	5/27
3	−52.46	153.44	109.79	132.91	0.39	0.42	0.95	5/7/20
4	−44.72	151.81	95.70	125.43	0.10	0.10	0.96	5/19/7/1
5	−35.96	148.16	79.58	115.917	0.09	0.10	0.98	4/1/7/1/19

Note. 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.

indicating that no model was better than the others. We decided to choose the three-class solution as the best solution for the following four reasons. First, the model with three latent profiles supports previous findings with a comparable sample (i.e., Tang, Kikas, et al., 2017). Second, the four-class and five-class solutions both contained a profile with only one member. Third, most of the three profiles had a high average value (> 0.91) for the probability of profile membership.

Our results showed that the largest profile for first-grade teachers was characterised by the use of the *mixed teaching style*. This profile comprised 63% (20) of teachers (with 256 students) with nearly equal means on both child-centred and teacher-directed practices (M_{cc} = 3.12, SD = 0.43; M_{td} = 2.48, SD = 0.22; M_{cd} = 1.29, SD = 0.31). The second profile, *child-centred style*, comprised 22% (7) of first-grade teachers (with 45 students) with the highest means on child-centred practices and low means on the other two teaching practices (M_{cc} = 3.78, SD = 0.25; M_{td} = 1.46, SD = 0.24; M_{cd} = 1.03, SD = 0.05). The third profile, *teacher-directed style*, comprised 15% (5) of first-grade teachers (with 58 students) with high means on teacher-directed practices and low means on the other teaching practices (M_{cc} = 1.83, SD = 0.55; M_{td} = 3.95, SD = 0.62; M_{cd} = 1.3, SD = 0.22). *Mixed teaching style* means that teachers use moderate levels of both child-centred and teacher-directed practices in their classroom. In other words, teachers who use mixed teaching style provide children with some amount of autonomy, as well as guide and instruct children based on child interests and initiatives, while also relying on the use of didactic and rote instruction practices. Teachers who adopt a *child-centred style* rely most often on child-centred practices that support children's autonomy and interests. On the contrary, teachers who adopt a *teacher-directed style* focus mostly on didactic practices and rote learning without considering children's interests and initiatives.

The teaching style profiles were also tested with respect to whether they differed in terms of teacher's age and gender, teaching experience, and class size. No differences were found. However, we found that teachers adopting the *child-centred style* were more likely to have less than a master-degree level (adjusted standardized residual = 2.9) than those who received master degree or above (adjusted standardized residual = −2.9). The *Mixed teaching style* was more represented in teachers who had a master degree or above (adjusted standardized residual = 2.8) than in those who had less than a master degree level (adjusted standardized residual = −2.8).

Teaching styles and children's reading skills

Repeated ANCOVAs, in which children's previous word recognition (T0), age and gender were included as covariates, were run to compare the effect of Grade 1 teaching styles (IV) on word recognition and sentence level reading from Grade 1 to Grade 3. 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 analyses. The mean level of children's word recognition and sentence level reading for each profile is reported in Table 1.

Repeated ANCOVAs were conducted in two steps (See Table 3). In the first step, *word recognition* from Grade 1 to Grade 3 (Time) was included as the repeated factor and teaching styles as the between factor. The results showed that children's *word recognition* grew steadily from Grade 1 to Grade 3 ($F(2, 337) = 261.60$, $p < .001$, Partial $\eta^2 = 0.61$). The Grade 1 teaching style had a significant main effect ($F(2, 338) = 5.11$, $p < .01$, Partial $\eta^2 = 0.03$). Its interaction with Time (T1-T3) was not significant ($F(4, 676) = 1.12$, $p = ns.$). After adding child's age and gender as extra covariates, the main effect of Grade 1 teaching style was statistically significant ($F(2, 335) = 4.76$, $p < .01$,

Table 3
Repeated ANCOVA results for word recognition and sentence-level reading.

	Teaching style T1 as IV and Word recognition T0 as covariate F	Adding child age and gender as additional covariates F	Post-hoc tests
Word recognition			
Time (T1-T3)	261.60***	251.55***	T3 > T2 > T1
Teaching style T1 (td, mix, cc)	5.11**	4.76**	mix > td
Time * Teaching style T1	1.12	1.28	
Sentence-level reading			
Time (T1-T3)	508.82***	494.47***	T3 > T2 > T1
Teaching style T1 (td, mix, cc)	8.91***	8.94***	mix = cc > td
Time * Teaching style T1	2.58*	2.58*	

Note. td = teacher-directed style; mix = mixed child-centred and teacher-directed styles; cc = child-centred style. The same symbols are used in Figs. 1 and 2.

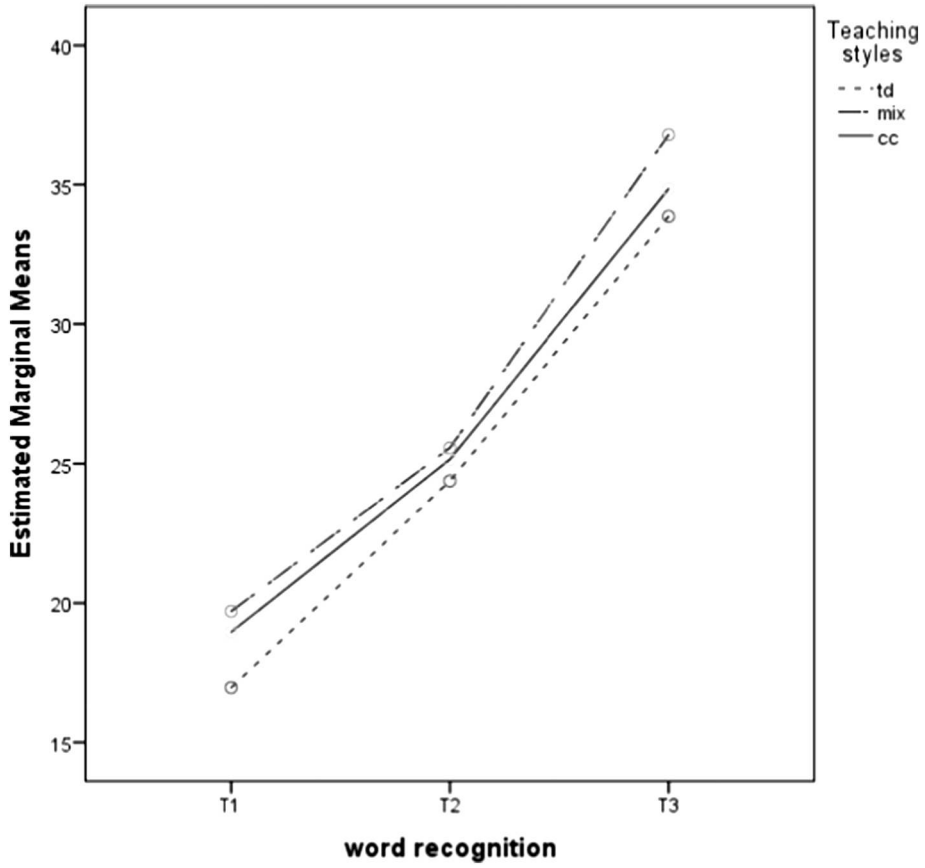

Fig. 1. Grade 1 teaching styles and development of word recognition from grade 1 to 3.

Partial $\eta^2 = 0.03$), whereas the Teaching style * Time interaction was not. Post-hoc analyses of teaching style showed that children whose teachers deployed the *mixed teaching style* at Grade 1 had consistently higher *word recognition* than those taught by teachers deploying the *teacher-directed style* ($p < .01$; see Fig. 1).

Analogous analyses for *sentence level reading* showed that children's *sentence level reading* increased from Grade 1 to Grade 3 (main effect for Time, $F(2, 336) = 508.82$, $p < .001$, Partial $\eta^2 = 0.75$). The main effect of grade 1 teaching style ($F(2, 337) = 8.91$, $p < .001$, Partial $\eta^2 = 0.05$) and its interaction with Time ($F(4, 674) = 2.58$, $p < .05$, Partial $\eta^2 = 0.02$) were also statistically significant, after controlling for word recognition at T0 as covariate. After adding child's age and gender as extra covariates, the main effects of grade 1 teaching style ($F(2, 334) = 8.94$, $p < .001$, Partial $\eta^2 = 0.05$) and interaction of teaching style and time ($F(4, 668) = 2.58$, $p < .05$, Partial $\eta^2 = 0.02$) remained statistically significant. Post-hoc analyses showed (see Table 3 and Fig. 2) that children whose grade 1 teachers used the *child-centred style (cc)* and the *mixed teaching style (mix)* performed better in *sentence level reading* than those whose grade 1 teachers deployed the *teacher-directed style (td)* ($p < .01$ for both the pairs cc-td and mix-td). Moreover, their *sentence level reading* also developed faster than those in the Grade 1 *teacher-directed style* classroom did when move from Grade 2 to Grade 3 ($F(1, 93) = 9.72$, $p < .01$; $F(1, 292) = 4.91$, $p < .05$; respectively for the pairs cc-td and mix-td).

Discussion

This study used a person-oriented approach to identify profiles of teaching practices among Finnish first-grade teachers, and to examine the extent to which first-grade teaching styles were related to children's reading skills during early school years. Three different teaching styles were identified in Grade 1. More than half (63%) of first-grade classroom teachers employed *a mixed teaching style*. The rest of the first-grade classroom teachers used either a *child-centred style* (22%) or a *teacher-directed style* (15%). The *child-dominated style* was not found. Moreover, two main results emerged from our examination between Grade 1 teaching styles and children's *word recognition* and *sentence level reading* from Grade 1 to 3. Firstly, children who were in Grade 1 *child-centred style* classrooms showed better performance in *sentence level reading* only, not in *word recognition*, as compared to children who were in Grade 1 *teacher-directed style* classrooms. Secondly, children who were in Grade 1 *mixed teaching style* classrooms had better performance and development in both *word recognition* and in *sentence level reading* as compared to children who were in Grade 1 *teacher-directed style* classrooms.

With regard to our first question, our results that the majority of teachers used the mixed teaching style and child-centred style corroborate past studies in Finland (e.g., Kiuru et al., 2015; Nurmi et al., 2013), and align to Finland's National Core Curriculum for Basic Education (2014). The Finnish curriculum emphasises the importance of teacher sensitivity to students' individual differences in competence and interests, respect for students' perspectives, and creation of a warm and supportive classroom climate, as well as foster collaboration and positive interactions in the classroom. The Finnish curriculum also places extra emphasis on the flexible use of teaching approaches which is described as “integrative instruction” (Finnish National Board of Education, 2014; pp. 69–74). In addition, in contrast to Kikas et al.'s findings (2016) from Estonian first-grade classrooms, we did not find a *child-dominated teaching style* potentially as a result of curriculum differences between the two countries in the early childhood years. In Estonia, children are taught decoding already in the pre-school year, whereas in Finland children receive systematic reading instruction starting Grade 1 (Soodla et al., 2015). Therefore it is plausible that Finnish first-grade teachers are less likely to use the child-dominated

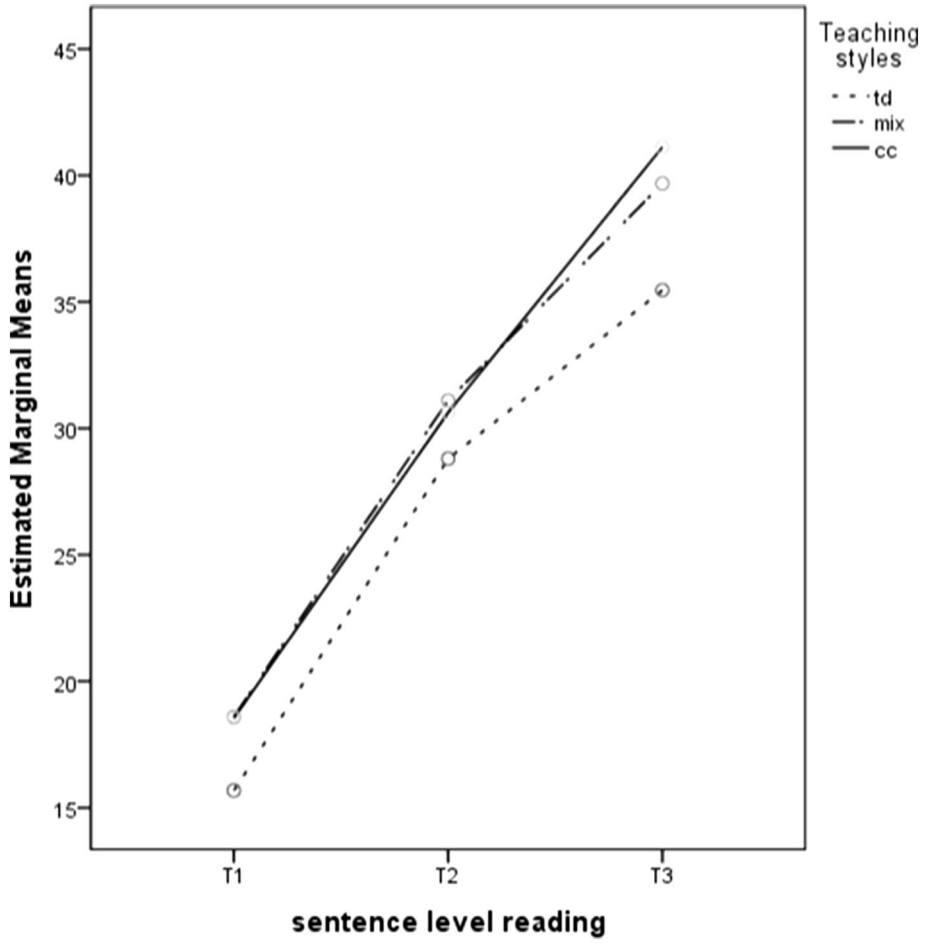

Fig. 2. Grade 1 teaching styles and development of sentence-level reading from grade 1 to 3.

teaching style given that their children need more instructional supports.

The findings on the relations between teaching styles and reading skills in the present study show significant and interesting patterns. On the one hand, children in Grade 1 *child-centred style* classrooms showed a faster development in higher-order reading skill (i.e., *sentence level reading*) as compared to their counterparts in *teacher-directed style* classrooms, but showed no differences in basic reading skill (i.e., *word recognition*). On the other hand, the *mixed teaching style* in Grade 1 (i.e., use of both child-centred practices and teacher-directed practices) proved to be more beneficial than the *teacher-directed style* for children's development of *both* sets of reading skills. Basic reading skills, measured through word recognition in this study, reflected children's ability to recognize/decode the graphemes and phonemes of a word, and to gain word-level lexical information. Therefore, it is not surprising that students in *teacher-directed style* classrooms, which are characterised by emphasising phonics instruction and drill practices, showed good mastery of basic reading skills (Stipek et al., 1995). It was also not surprising that children in these classrooms were not as not successful in higher-order reading as compared to children in *child-centred style* classrooms as in children in these classroom receive a broad array of literacy experiences and instructional practices that support higher order skills (e.g., Lerkkanen et al., 2016; Perry et al., 2007). It is important to note, however, that in this study higher-order reading skills were measured by sentence level reading fluency and comprehension (TOSREC) which might not fully tap the highest-order reading skills such as text-level comprehension skills. However, according to Wagner et al. (2010), the TOSREC provides a snapshot of an individual's ability to perform the end product of actually comprehending print, and it has been showed this measurement had high correlations with several measures of reading comprehension (Wagner et al., 2010).

What was striking is that the *mixed teaching style* had a greater effect on basic reading skills such that children in these classrooms showed superior word recognition performance as compared to children in the *teacher-directed style* classrooms. In other words, providing children both abundant interest-based literacy activities and enough phonics guidance and exercises leads them to greater gains in letter and word decoding, phoneme-grapheme connecting, and other basic skills than solely providing children with phonics instruction. Our findings further demonstrate the benefits for the child-centred style and mixed teaching style for higher-order reading skills as well (Lerkkanen et al., 2016; Snow & Matthews, 2016). This result corroborates those of a previous study in which we found that teachers who endorsed child-centred practices also placed a strong emphasis on advanced reading and writing skills, such as reading comprehension, in their curriculum goals (Tang, Pakarinen, et al., 2017). Therefore, it is unsurprising that children from child-centred style and mixed teaching style classrooms performed better in higher-order reading skills than children from teacher-directed style.

Taken together, our results support Snow and Matthews (2016)

suggestions regarding best reading practices in early childhood classrooms. Snow and Matthews (2016) categorise early reading skills as constrained skills (e.g., letter recognition, alphabet reciting, and phonemes) and unconstrained skills (e.g., vocabulary, grammar, storylines, topic-specific knowledge). They argue that whereas constrained skills can be taught effectively by structured instruction, unconstrained skills are gained through rich language and literacy experiences, such as book reading, story telling and role playing (Snow & Matthews, 2016). In short, our findings suggest that a *mixed teaching style* offers just that and therefore targets both constrained and unconstrained literacy skills. More importantly, our findings also demonstrates that providing effective instructions targeting both constrained and unconstrained skills leads to larger gains in constrained skills, than targeting only constrained skills through structured instruction only.

The debate on the most effective reading instruction (Connor et al., 2011; Connor, Morrison, & Katch, 2004; Foorman, 1995) has been underway for decades, with one side advocating code-oriented approach and the other side preferring whole language approach. Though this study did not focus on the specific instruction of reading skills, our findings suggest that providing a variety of teaching practices and holding balanced responsibilities of teachers and children are the most beneficial for children's reading skills development, in particular of the word- and sentence- level reading skills. Moreover, given this study's focus on the early primary school years, results have significant implications for the discussion on best teaching practices at the early stage of school. Some scholars (e.g., Whitebread, Coltman, Jameson, & Lander, 2009) suggest teachers should provide less informal teaching and emphasise more on students' freedom and interests, whereas others (e.g., Kirschner, Sweller, & Clark, 2006) suggest that higher amount of teaching and specific instruction foster the necessary foundational skills for the future learning. Results of the present study supported a balanced view of effective teaching practices and indicated that the flexible use of teaching practices might be the best way to support children's early reading skills development. In fact, both child-centred practices and teacher-directed practices have their benefits and can be used to complement each other. Effective teaching, as argued by Pressely et al. (2003) and Good et al. (2009), requires flexible use of a variety of methods depending on the instructional goal and needs of the students. Our study is among the few to provide empirical support for this claim. Therefore, our study has implications for both teachers and teacher educators (including pre- and in-service training) showing that it is best to encourage teachers to adopt a flexible repertoire of teaching practices suited to their learners' needs.

In addition, this study might shed light at some of the reasons behind Finland's high performance in international comparison assessments such as PISA (OECD, 2016). Over sixty percentages of Finnish Grade 1 teachers adopted the *mixed teaching style* in this study and we found that this teaching style promote both sets of reading skills. By combining child-centred and teacher-directed practices, the *mixed teaching style* takes into account children's initiatives and choices, while also relies on teacher-led practices that controlling activities and emphasise the importance of facts and basic skills (Kikas & Tang, 2019; Lerkkanen et al., 2016). This combination fosters autonomy support, while also providing a warm classroom climate and structure for learning, thus enhancing student engagement in learning activities (Jang, Reeve, & Deci, 2010). Previous comparative work with Estonian children has found although Finnish first-graders lag behind in reading skills when entering the primary school, they catch up Estonian children by the end of Grade 1 (Soodla et al., 2015), and surpass them at Grade 2 (Soodla, Torppa, Kikas, Lerkkanen, & Nurmi, 2018). The success of Finnish students has been largely attributed to the higher proportions of effective teaching practices in Finnish as compared to Estonian schools. (Tang, Kikas, et al., 2017).

Limitations and future directions

However, some limitations of the present study need to be considered. First, the sample of observed teachers was relatively small (32 teachers), resulting in decreased power to identify groups differing in their teaching styles. Future studies shall have a larger sample size to examine whether same teaching profiles hold still for Grade 1 Finnish teachers. Second, although we examined the relation between teaching styles and reading skills, teaching practices were observed not only in literacy lessons but also during lessons of other subjects. Therefore, conclusions specifically on teaching practices in literacy instruction cannot be made. However, as suggested by Stipek and Byler (2004), the ECCOM focuses on the general characteristics of teaching practices in the classroom rather than on subject matter. Third, in our study, teaching styles were measured only in Grade 1, whereas children's reading skills were measured annually from Grade 1 to Grade 3. Consequently, our study focused on the role of the teaching styles of first-grade teachers in the development of children's reading skills a few years after the teaching styles were measured. However, future studies might benefit from investigating teaching practices in later grades as well. Fourth, the measures used for reading skills in the present study are somehow limited. Only speeded word recognition and sentence level reading fluency and comprehension were used, and there were no, for example, oral reading fluency test or text-level reading comprehension tests. Although our sentence-level reading fluency and comprehension is measuring comprehension skills at the sentence level, it is better in further studies to use also text-level reading comprehension test (e.g., test with a passage and open questions) to avoid a shallow level of comprehension as an outcome.

Despite these limitations, the present study is one of the few to provide empirical evidence that didactic and constructivist practices complement each other and can be combined effectively (Good et al., 2009; Pressley et al., 2003; Stipek et al., 1995). Overall, our study shows that children taught by teachers deploying the *mixed teaching style* showed the fastest development of their reading skills (i.e., word- and sentence- level reading). Moreover, more than half the Finnish Grade 1 teachers were using this teaching style. Results thus highlight that flexibility in teaching practices might be critical role for children's early learning than it has been previously understood. These findings merit consideration by teachers in their practical work and by teacher educators, as well as others involved, in professional teacher development.

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Appendix A

Table A.1
Description of the teaching practices, subscales, and items used in the ECCOM.

Subscale and item	Teaching practices		
	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.
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, < 20% of the time*; 5 = *these practices predominate, 80%–100% of the time*). The scale has been validated in the Finnish context (Tang, Pakarinen, et al., 2017).

References

Block, C. C., Parris, S. R., Reed, K. L., Whiteley, C. S., & Cleveland, M. D. (2009). Instructional approaches that significantly increase reading comprehension. *Journal of Educational Psychology, 101*(2), 262–281. https://doi.org/10.1037/a0014319.

Carlisle, J., Kelcey, B., Berebitsky, D., & Phelps, G. (2011). Embracing the complexity of instruction: A study of the effects of Teachers' instruction on Students' Reading comprehension. *Scientific Studies of Reading, 15*(5), 409–439. https://doi.org/10.1080/10888438.2010.497521.

Celeux, G., & Soromenho, G. (1996). An entropy criterion for assessing the number of clusters in a mixture model. *Journal of Classification, 13*(2), 195–212. https://doi.org/10.1007/BF01246098.

Chien, N. C., Howes, C., Burchinal, M., Pianta, R. C., Ritchie, S., Bryant, D. M., ... Barbarin, O. A. (2010). Children's classroom engagement and school readiness gains in prekindergarten. *Child Development, 81*(5), 1534–1549. https://doi.org/10.1111/j.1467-8624.2010.01490.x.

Connor, C. M., Morrison, F. J., Fishman, B., Giuliani, S., Luck, M., Underwood, P. S., ... Schatschneider, C. (2011). Testing the impact of child characteristics x instruction interactions on third Graders' Reading comprehension by differentiating literacy instruction. *Reading Research Quarterly, 46*(3), 189–221. https://doi.org/10.1598/RRQ.46.3.1.

Connor, C. M., Morrison, F. J., & Katch, L. E. (2004). Beyond the Reading wars: Exploring the effect of child-instruction interactions on growth in early Reading. *Scientific Studies of Reading, 8*(4), 305–336. https://doi.org/10.1207/s1532799xssr0804_1.

Entwisle, D. R., & Alexander, K. L. (1998). Facilitating the transition to first grade: The nature of transition and research on factors affecting it. *The Elementary School Journal, 98*(4), 351–364. https://doi.org/10.2307/1002192.

Finnish National Board of Education (2014). National core curriculum for basic education 2014. Retrieved from http://www.ebooks.com/2615808/national-core-curriculum-for-basic-education-2014/finnish-national-board-of-education/.

Foorman, B. R. (1995). Research on "the great debate": Code-oriented versus whole language approaches to reading instruction. *School Psychology Review, 24*(3), 376–392.

Good, T. L., Wiley, C. R. H., & Florez, I. R. (2009). Effective teaching: An emerging synthesis. In L. Saha, & A. G. Dworkin (Eds.). *International handbook of research on teachers and teaching SE - 51 (Vol. 21, pp. 803–816)*https://doi.org/10.1007/978-0-387-73317-3_51 Springer US.

Hallgren, K. A. (2012). Computing inter-rater reliability for observational data: An overview and tutorial. *Tutorial in Quantitative Methods for Psychology, 8*(1), 23–34.

Hamre, B. K., & Pianta, R. C. (2001). Early teacher-child relationships and the trajectory of children's school outcomes through eighth grade. *Child Development, 72*(2), 625–638. https://doi.org/10.1111/1467-8624.00301.

Hoover, W. A., & Gough, P. B. (1990). The simple view of reading. *Reading and Writing, 2*(2), 127–160. https://doi.org/10.1007/BF00401799.

Jang, H., Reeve, J., & Deci, E. L. (2010). Engaging students in learning activities: It is not autonomy support or structure but autonomy support and structure. *Journal of Educational Psychology, 102*(3), 588–600. https://doi.org/10.1037/a0019682.

Kendeou, P., Papadopoulos, T. C., & Kotzapoulou, M. (2013). Evidence for the early emergence of the simple view of reading in a transparent orthography. *Reading and Writing*. https://doi.org/10.1007/s11145-012-9361-z.

Kendeou, P., Savage, R., & Broek, P. (2009). Revisiting the simple view of reading. *British Journal of Educational Psychology, 79*(2), 353–370. https://doi.org/10.1348/978185408X369020.

Kikas, E., Peets, K., & Hodges, E. V. E. (2014). Collective student characteristics alter the effects of teaching practices on academic outcomes. *Journal of Applied Developmental Psychology, 35*(4), 273–283. https://doi.org/10.1016/j.appdev.2014.04.004.

Kikas, E., Silinskas, G., Jõgi, A.-L., & Soodla, P. (2016). Effects of teacher's individualized support on children's reading skills and interest in classrooms with different teaching styles. *Learning and Individual Differences, 49*, 270–277. https://doi.org/10.1016/j.lindif.2016.05.015.

Kikas, E., & Tang, X. (2019). Child-perceived teacher emotional support, its relations with

teaching practices, and task persistence. *European Journal of Psychology of Education, 34*(2), 359–374. https://doi.org/10.1007/s10212-018-0392-y.

Kirschner, P. A., Sweller, J., & Clark, R. E. (2006). Why minimal guidance during instruction does not work: An analysis of the failure of constructivist, discovery, problem-based, experiential, and inquiry-based teaching. *Educational Psychologist, 41*(2), 75–86. https://doi.org/10.1207/s15326985ep4102_1.

Kiuru, N., Nurmi, J.-E., Leskinen, E., Torppa, M., Poikkeus, A.-M., Lerkkanen, M.-K., & Niemi, P. (2015). Elementary school teachers adapt their instructional support according to students' academic skills: A variable and person-oriented approach. *International Journal of Behavioral Development, 39*(5), 391–401. https://doi.org/10.1177/0165025415575764.

Lerkkanen, M.-K., Kiuru, N., Pakarinen, E., Poikkeus, A.-M., Rasku-Puttonen, H., Siekkinen, M., & Nurmi, J.-E. (2016). Child-centered versus teacher-directed teaching practices: Associations with the development of academic skills in the first grade at school. *Early Childhood Research Quarterly, 36*, 145–156. https://doi.org/10.1016/j.ecresq.2015.12.023.

Lerkkanen, M.-K., Kiuru, N., Pakarinen, E., Viljaranta, J., Poikkeus, A., Rasku-Puttonen, H., ... Nurmi, J.-E. (2012). The role of teaching practices in the development of children's interest in reading and mathematics in kindergarten. *Contemporary Educational Psychology, 37*(4), 266–279. https://doi.org/10.1016/j.cedpsych.2011.03.004.

Lindeman, J. (1998). ALLU - ala-asteen lukutesti [Reading test for primary school]. *Turku.* Finland: University of Turku.

LoCasale-Crouch, J., Konold, T., Pianta, R., Howes, C., Burchinal, M., Bryant, D., ... Barbarin, O. (2007). Observed classroom quality profiles in state-funded pre-kindergarten programs and associations with teacher, program, and classroom characteristics. *Early Childhood Research Quarterly, 22*(1), 3–17. https://doi.org/10.1016/j.ecresq.2006.05.001.

Marcon, R. A. (1999). Differential impact of preschool models on development and early learning of inner-city children: A three-cohort study. *Developmental Psychology, 35*(2), 358–375. https://doi.org/10.1037/0012-1649.35.2.358.

Muthén, L. K., & Muthén, B. O. (2018). Mplus users guide and Mplus version 8.2. Retrieved January 10, 2019, from http://www.statmodel.com/index.shtml.

Nurmi, J.-E., Kiuru, N., Lerkkanen, M.-K., Niemi, P., Poikkeus, A.-M., Ahonen, T., ... Lyyra, A.-L. (2013). Teachers adapt their instruction in reading according to individual children's literacy skills. *Learning and Individual Differences, 23*, 72–79. https://doi.org/10.1016/j.lindif.2012.07.012.

OECD (2016). *PISA 2015 Results-EXCELLENCE AND EQUITY IN EDUCATION (Volume I).* OECD Publishinghttps://doi.org/10.1787/9789264266490-en.

Pakarinen, E., Kiuru, N., Lerkkanen, M.-K., Poikkeus, A.-M., Ahonen, T., & Nurmi, J.-E. (2011). Instructional support predicts children's task avoidance in kindergarten. *Early Childhood Research Quarterly, 26*(3), 376–386. https://doi.org/10.1016/j.ecresq.2010.11.003.

Parrila, R., Kirby, J. R., & McQuarrie, L. (2004). Articulation rate, naming speed, verbal short-term memory, and phonological awareness: Longitudinal predictors of early Reading development? *Scientific Studies of Reading, 8*(1), 3–26. https://doi.org/10.1207/s1532799xssr0801_2.

Perry, K. E., Donohue, K. M., & Weinstein, R. S. (2007). Teaching practices and the promotion of achievement and adjustment in first grade. *Journal of School Psychology, 45*(3), 269–292. https://doi.org/10.1016/j.jsp.2007.02.005.

Piaget, J. (1985). *The equilibration of cognitive structures: The central problem of intellectual development.* Chicago, IL: University of Chicago Press.

Pressley, M., Roehrig, A. D., Raphael, L., Dolezal, S., Bohn, C., Mohan, L., ... Hogan, K. (2003). Teaching processes in elementary and secondary education. *Handbook of psychology*John Wiley & Sons, Inc.https://doi.org/10.1002/0471264385.wei0708.

Rasku-Puttonen, H., Pakarinen, E., Trossmann, K., Lerkkanen, M.-K., Kikas, E., & Poikkeus, A.-M. (2011). Classroom practices in Finnish and Estonian preschools: Subgroups of observed teaching practices. In M. Veisson, E. Hujala, P. K. Smith, M. Waniganayake, & E. Kikas (Eds.). *Global perspectives in early childhood education: Diversity, challenges and possibilities* (pp. 313–331). Frankfurt am Main: Peter Lang.

Silver, R. B., Measelle, J. R., Armstrong, J. M., & Essex, M. J. (2005). Trajectories of classroom externalizing behavior: Contributions of child characteristics, family characteristics, and the teacher–child relationship during the school transition. *Journal of School Psychology, 43*(1), 39–60. https://doi.org/10.1016/j.jsp.2004.11.003.

Snow, C. E., & Matthews, T. J. (2016). Reading and language in the early grades. *The Future of Children.* https://doi.org/10.1353/foc.2016.0012.

Soodla, P., Lerkkanen, M.-K., Niemi, P., Kikas, E., Silinskas, G., & Nurmi, J.-E. (2015). Does early reading instruction promote the rate of acquisition? A comparison of two transparent orthographies. *Learning and Instruction, 38*, 14–23. https://doi.org/10.1016/j.learninstruc.2015.02.002.

Soodla, P., Torppa, M., Kikas, E., Lerkkanen, M.-K., & Nurmi, J.-E. (2018). Reading comprehension from grade 1 to 6 in two shallow orthographies: Comparison of Estonian and Finnish students. *Compare: A Journal of Comparative and International Education,* 1–19. https://doi.org/10.1080/03057925.2018.1445963.

Stipek, D., & Byler, P. (2004). The early childhood classroom observation measure. *Early Childhood Research Quarterly, 19*(3), 375–397. https://doi.org/10.1016/j.ecresq.2004.07.007.

Stipek, D., & Byler, P. (2005). The early childhood classroom observation measure. *Unpublished coding manual, school of education.* Stanford University.

Stipek, D., Feiler, R., Byler, P., Ryan, R., Milburn, S., & Salmon, J. M. (1998). Good beginnings: What difference does the program make in preparing young children for school? *Journal of Applied Developmental Psychology, 19*(1), 41–66. https://doi.org/10.1016/S0193-3973(99)80027-6.

Stipek, D., Feiler, R., Daniels, D., & Milburn, S. (1995). Effects of different instructional approaches on young children's achievement and motivation. *Child Development, 66*(1), 209–223. https://doi.org/10.2307/1131201.

Tang, X., Kikas, E., Pakarinen, E., Lerkkanen, M.-K., Muotka, J., & Nurmi, J.-E. (2017). Profiles of teaching practices and reading skills at the first and third grade in Finland and Estonia. *Teaching and Teacher Education, 64*, 150–161. https://doi.org/10.1016/j.tate.2017.01.020.

Tang, X., Pakarinen, E., Lerkkanen, M.-K., Kikas, E., Muotka, J., & Nurmi, J.-E. (2017). Validating the early childhood classroom observation measure in first and third grade classrooms. *Scandinavian Journal of Educational Research, 61*(3), 275–294. https://doi.org/10.1080/00313831.2015.1120237.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes.* Cambridge, MA: Harvard University Press.

Wagner, R. K., Torgesen, J. K., Rashotte, N. A., & Pearson, C. A. (2010). *TOSREC: Test of sentence Reading efficiency and comprehension.* Austin, TX: Pro-Ed.

Whitebread, D., Coltman, P., Jameson, H., & Lander, R. (Eds.). (2009). Play, cognition and self-regulation: What exactly are children learning when they learn through play? *Educational and Child Psychology, 26*(2), 40–52. https://doi.org/Article.

Yen, C.-J., Konold, T. R., & McDermott, P. A. (2004). Does learning behavior augment cognitive ability as an indicator of academic achievement? *Journal of School Psychology, 42*(2), 157–169. https://doi.org/10.1016/j.jsp.2003.12.001.