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2022-02

Tang , X , Kikas , E , Pakarinen , E , Laursen , B & Lerkkanen , M-K 2022 , ' Longitudinal associations between third-grade teaching styles and sixth-grade reading skills : a 3-year follow-up study ' , Journal of Research in Reading , vol. 45 , no. 1 , pp. 157-169 . <https://doi.org/10.1111/1467-9817.12385>

<http://hdl.handle.net/10138/345526>

<https://doi.org/10.1111/1467-9817.12385>

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Longitudinal associations between third-grade teaching styles and sixth-grade reading skills: a 3-year follow-up study

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Background: Most previous studies of teaching styles and reading skills have been cross-sectional. Longitudinal research is needed to clarify the direction of effects. The present longitudinal study examined the degree to which differences in teaching styles in the third grade predict the sixth-grade reading performance. The consistency of the findings was addressed by comparing results across students in two countries (Finland and Estonia).

Methods: A total of 1,057 students (50.9% boys) were followed from the third to sixth grade. Teaching styles of third-grade teachers ($N = 70$) were examined as predictors of the development of reading (i.e., third-grade to sixth-grade reading fluency and comprehension).

Results: Five patterns of third-grade teaching practices were found across two countries: *child-centred style*, *teacher-directed style*, *child-dominated style*, *extreme child-centred style*, and *mixed child-centred and teacher-directed style (mixed teaching style)*. The mixed teaching style and the child-centred style in the third grade were related to the greatest increases in reading fluency from the third to sixth grade, over and above the contribution of age, gender and maternal education.

Conclusions: The findings underscore the importance of the flexible use of child-centred and teacher-directed practices, which are both linked to the development of reading fluency during late primary school years.

Keywords: teaching styles, reading development, early teaching effects, elementary students, reading comprehension

Highlights

What is already known about this topic

- A person-oriented approach is an effective method to identify groups of teaching practices, known as teaching styles.
- Teaching styles have been differentially linked to reading skills, but the associations have been limited to cross-sectional data.
- Finnish teachers apply effective teaching styles more often than Estonian teachers.

What this paper adds

- This paper adds to previous studies by examining longitudinal associations between teaching styles and reading skills.
- The study established the consistency of teaching styles between Finland and Estonia.
- The study found that mixed teaching style is beneficial for reading fluency development.

Implications for theory, policy or practice

- The combinations of child-centred practices and teacher-directed practices are the most effective teaching styles for reading development.
- The beneficial effect is consistent across Finland and Estonia.

Early teaching practices exert a powerful influence over children's later academic achievement (Hamre & Pianta, 2005; Stipek et al., 1998). Both classroom management practices and positive teacher-child relationships in early primary school have been tied to long-term academic success (Hamre & Pianta, 2001; Stipek & Byler, 2004). Most empirical studies of teaching adopt a variable-oriented approach, exploring the independent contribution of different teaching practices to child outcomes. Few studies have applied person-oriented methods to determine teacher behaviours that tend to cluster together to form teaching styles (e.g., Hu et al., 2016; Kikas et al., 2016). The present investigation extends findings from a previous person-oriented study (Tang et al., 2017a) that linked specific constellations of teaching practices (i.e., teaching styles) to concurrent reading abilities. In the present study, we examined the role of early teaching styles in reading development from the third to sixth grade. We also tested our hypotheses in two countries (Finland and Estonia) to examine the effects in a cross-national context.

Teaching practices, teaching styles and reading performance

Much is known about the role of teaching practices in reading skills development (e.g., Connor et al., 2014; Pressley et al., 2001). Teaching practices are the behaviours that teachers employ in their daily interactions with children. Three broad perspectives define teaching practices. Child-centred practices, rooted in constructivist theories of learning and teaching, value children's interests, provide individual supports and demonstrate warmth and affection (e.g., Vygotsky, 1978; for an overview, see Driscoll, 2005; Pressley et al., 2003). Teacher-directed (i.e., didactic) practices, based on behaviourism, emphasise basic skills acquisition and teachers' authority in classroom activities (Driscoll, 2005; Pressley et al., 2003). Child-dominated practices, with roots in maturation theory and a more extreme version of constructivism, overstress children's autonomy and de-emphasise direct instruction (e.g., free play and discovery-based learning; Stipek & Byler, 2004).

Although these conceptual distinctions have improved our understanding of the link between teaching and reading skills (Lerikkanen et al., 2016; Stipek et al., 1998), teachers in real classrooms do not strictly adhere to these prescriptions (Good et al., 2009; Pressley et al., 2003). In authentic situations, teachers may utilise teaching practices in a more nuanced manner. In a previous publication (Tang et al., 2017a), we documented variability in teaching practices. With the help of person-oriented analyses (Larsen & Hoff, 2006), we identified five different teaching styles (defined as the manifestations of theory-defined teaching practices) in third-grade classrooms: *child-centred style*, *teacher-directed style*, *child-dominated style*, *mixed teaching style* and *extreme child-centred style*. The first three teaching styles correspond with three theory-defined teaching practices introduced earlier, but the latter two represent practices that illustrate the diversity of real classroom experiences. *Mixed teaching style* occurred when child-centred practices and teacher-directed practices were equally presented. *Extreme child-centred style* represented an extremely high level of child-centred practices. The results further indicated that the *child-centred style* and the *mixed teaching style* were most effective in terms of reading performance, because they provide direct/explicit reading instruction while supporting children's autonomy and interests. *Teacher-directed style* contributed to reading fluency as it offered direct instruction. *Extreme child-centred style* was associated with reading comprehension but not with reading fluency due to its support for the child's interests. *Child-dominated style* was the least effective, which is perhaps not surprising given that minimal instruction and guidance were provided.

This previous study was limited because it only examined cross-sectional associations between teaching styles and reading performance (Tang et al., 2017a). Longitudinal studies are needed to shed light on the predictive role of teaching styles in the development of reading skills. In one longitudinal study (Tang et al., 2019), we tried to fill this gap by examining the role of first-grade teaching styles in the development of reading skills from the first to third grade. The results indicated that the mixed teaching style is most beneficial for reading skill development. Nevertheless, conclusions were limited by a focus on students and teachers in early primary school years from a single setting. The role of teaching styles on the reading development during late primary school years is still largely unknown. The late primary school years are a period of consolidation; achievement during these years is important for the transition to secondary school (Virtanen et al., 2020). These years are also noteworthy for the instructional changes that occur (see the succeeding text).

In sum, the present study was designed to further our understanding of the long-term impact of teaching styles on reading development during late primary school years. Building on our previous research (Tang et al., 2017a), we examined the role of third-grade teaching styles on reading development from the third to sixth grade. Moreover, we extended previous findings by examining the consistency of teaching styles and their outcomes in two countries: Finland and Estonia.

Literacy instruction in Finland and Estonia during primary school years

Both Finland and Estonia show high performance in international comparison tests (e.g., PISA; OECD, 2019) and are similar in many respects: both are small northern European Union nations, with well-educated workforces and similar language roots (Kikas & Lerkkanen, 2011). Children in both countries start school at the age of 7. Schools in both countries adhere to a prescribed national curriculum.

However, there is a difference in the timing of formal literacy instruction, which starts in kindergarten in Estonia but in the first grade in Finland (Soodla et al., 2015). There are also differences in literacy instruction after the third grade. In Finland, the same teacher is responsible for all academic subjects across Grades 1–6; this teacher often is responsible for the same group of students for all 6 years. Literacy learning at Grades 1–3 emphasises reading accuracy, fluency, basic reading comprehension and spelling skills; at Grades 4–6, the emphasis shifts to independent reading, complex text comprehension and text production. From Grades 1 and 2 to Grades 3–6, literacy lessons decrease from 7 to 4–5 h/week. In Estonia, Grades 4–6 constitute the second stage of basic school. As in Finland, the same teacher is responsible for all main subjects in Grades 1–3. From Grade 4 onward, Estonian-language teachers are responsible for language-literacy lessons. Language-literature lessons are integrated in Grades 1–3 (19 lessons per week); in Grades 4–6, Estonian language (11 lessons per week) and literature (4 lessons per week) are taught separately. Thus, less attention is given to fluency than to text comprehension. Students in Estonia take a national-level language test at the close of the sixth grade, for which teachers prepare students intensively.

Despite the change of curriculum foci and teaching practices during the late primary school years, early teaching practices are thought to affect later reading development by laying the foundation of reading skills (Snow & Matthews, 2016; Soodla et al., 2015), reading habits (Torppa et al., 2020) and motivation (Kikas & Tang, 2019; Lerkkanen et al., 2016).

The present study

The present study will address three research questions. First, are the same five teaching styles present in Finland and Estonia? Our previous study (Tang et al., 2017a) reported five teaching styles among Finnish and Estonian third-grade teachers, yet they were identified using a combined sample. We expected to see same teaching styles within each country given similarities in their educational systems. Although there are differences in literacy instruction between two countries, in general, there are more similarities than differences (Kikas & Lerkkanen, 2011). In addition, teaching styles and their underlying teaching practices are broader than the literacy instruction; they represent more general pedagogical approaches across subject domains.

Second, are third-grade teaching styles associated with changes in student reading skills from the third to sixth grade? On the basis of previous findings (Block et al., 2009; Tang et al., 2019; Tang et al., 2017a), we hypothesised that the child-centred style and the mixed teaching style would be more strongly associated with reading fluency and reading comprehension than the child-dominated style. We also hypothesised that the teacher-directed style would be more strongly associated with reading fluency (Stipek et al., 1995) than the child-dominated style.

Third, are similar longitudinal associations between teaching styles and reading development found in both two countries? On the basis of previous research (Kikas & Lerkkanen, 2011; Tang et al., 2017a), we expected the same pattern of associations in Finland and Estonia.

Method

Participants

The sample included 70 third-grade teachers (33 in Finland and 37 in Estonia) and their students ($N = 1,057$; $N_{\text{Finland}} = 456$ and $N_{\text{Estonia}} = 601$). Most of the teachers were female (Finland = 72% and Estonia = 100%) and had at least an MA degree (Finland = 97% and Estonia = 100%). The modal length of teaching experience was 11 to 15 years in Finland and more than 15 years in Estonia. Most children were between the age of 9 and 10 years at the outset (Finland = 9.15 years, $SD = 0.3$; Estonia = 9.53 years, $SD = 0.52$). Boys comprised 48.7% of the Finnish students and 52.6% of the Estonian students.

Procedure. Data were collected in classes during regular school hours by trained research assistants. The third-grade data were collected in the spring of 2010 (Finland and Estonia) and 2011 (three classes in Estonia) academic years; the sixth-grade data were collected in the spring term 3 years later. Teaching practices were observed during the third-grade data collection period. Detailed information on the teaching observation, coding process and inter-rater reliabilities is described in an earlier publication (Tang et al., 2017b).

Measures

Classroom observations. Early Childhood Classroom Observation Measure 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. Each practice was rated on three subscales: management (four items; e.g., children are allowed to take responsibility to the degree that they are able), climate (four items; e.g., teacher encourages children to engage in conversation and elaborate on their thoughts) and instruction (six items; e.g., tasks and lessons are designed to teach identifiable concepts and develop understanding). The rating scale was based on the percentage of time that each practice was demonstrated during the observation period: 1 = practice is rarely seen (0–20% of the time) to 5 = practice predominates (80–100% of the time). The measure has been validated in Finnish and Estonian educational contexts (Lerkkanen et al., 2012; Tang et al., 2017b). The present study utilised a summary score of 14 items to assess each teaching practice.

Reading fluency. A word-level reading fluency test was administered (Lindeman, 1998). In this speed test, a maximum of 80 items could be attempted within a 2-minute time limit. For each item, children selected one of four phonologically similar responses that matched the picture presented. Scores represent the number of correct answers (maximum = 80). Test-retest reliability was adequate ($>.60$).

Reading comprehension. A reading comprehension test (Lindeman, 1998) assessed skills in gleaned factual knowledge, concepts and inferences from text. After silently reading the text, children were presented with 12 multiple-choice questions about the content. Scores represent the number of correct answers (maximum = 12). This normed test included different text and multiple-choice questions for each grade. Internal reliability was acceptable across countries and grades (Cronbach's alpha: Finland = .66 and Estonia = .70–.77). All reading skills test scores were standardised within country.

Missing data

Of 1,057 students participating in the third grade, 722 (68.3%) also participated in the sixth grade. Little's missing completely at random test indicated that data were not missing completely at random ($\chi^2 = 55.274$, $df = 19$, $p < .001$). There were no differences as a function of age, country, gender or maternal educational, but students who participated at both grades had better reading fluency ($t = 3.09$, Cohen's $d = .20$, $p < .01$) and reading comprehension ($t = 2.62$, Cohen's $d = .17$, $p < .01$) than students who participated in the third grade only. To maximise statistical power and avoid bias arising from listwise deletion, multiple imputation was applied used to the missing values (Enders, 2013). Five data sets were generated, each with 50 iterations (R package *mice*; van Buuren & Groothuis-Oudshoorn, 2011).

Analysis strategy

To determine whether teaching-style profiles replicated across countries, identical profile analyses were conducted on the data from Finland and Estonia. Following guidelines by Morin et al., (2016), we conducted latent profile analyses to estimate the number of profiles for each country and then contrasted profiles across countries. The first step was to establish configural similarity by determining whether the same number of profiles can be identified across two countries. The second step involved comparisons of structural similarity, constraining the within-profile means to be equal across countries. Dispersion similarity was then estimated by additionally constraining the within-profile variation to be equal across two countries. Finally, distributional similarity was examined by constraining the size (class proportion) of profiles to be equal across countries. Models were compared with Bayesian information criterion, consistent Akaike's information criterion and sample size-adjusted Bayesian information criterion, with lower values indicating better model fit. Other model comparison indicators, such as bootstrapped likelihood ratio test and entropy, were also considered (see the supporting information for the evaluation and selection of models). We chose the default model specification on variances and covariances in latent profile analyses (i.e., equal variances and covariances fixed to 0). The analyses were conducted with MPLUS V8.3 (Muthén & Muthén, 2019).

To test the hypothesis that third-grade teaching styles predicted changes in reading skills from the third to sixth grade, we conducted analyses of covariance (ANCOVAs) with teaching styles and country as independent variables, and sixth-grade reading fluency and comprehension as dependent variables. Age, gender, maternal education, and third-grade reading fluency and comprehension were included as covariates. ANCOVAs were conducted through R package *mitml* (Grund et al., 2019) and *multcomp* (Hothorn et al., 2008). Because ANCOVAs from multiple imputed data sets can only be obtained by using the parameters and covariance matrices of a regression analysis (van Ginkel & Kroonenberg, 2014), the interpretation of results differs from that of a standard ANCOVA because pooled *F* tests must be used. All the supporting information can be accessed from <https://osf.io/zmjv5/>.

Table 1. Associations between third-grade teaching styles and changes in reading skills from the third to sixth grade: pooled analysis of covariance estimates.

	Grade 6 reading fluency		Grade 6 reading comprehension	
	Estimate	Std. error	Estimate	Std. error
Intercept	.81	0.57	-.41	0.49
Grade 3 teaching style (ref. mixed style)				
Teacher-directed	.06	0.19	-.23	0.24
Extreme child-centred	-.38*	0.18	.01	0.23
Child-centred	.09	0.09	.04	0.12
Child-dominated	-.02	0.29	.26	0.28
Country ^a	.26**	0.10	.11	0.11
Age	-.09	0.08	.06	0.07
Gender ^b	-.18*	0.07	-.24***	0.06
Maternal education ^c				
Secondary	-.12	0.14	-.01	0.11
More than secondary	-.07	0.12	.18	0.12
Grade 3 reading fluency	.57***	0.03	.17***	0.04
Grade 3 reading comprehension	.07	0.04	.27***	0.04
Teaching Style × Country ^d				
Teacher-directed ^d	-.16	0.23	.10	0.25
Extreme child-centred ^d	-.06	0.21	-.07	0.26
Child-centred ^d	-.28	0.16	-.14	0.16
Child-dominated ^d	-.26	0.28	-.23	0.35

^aFinland as the reference group; thus, positive estimate means Estonia is greater than Finland.

^bGirl as the reference group.

^cLess than secondary as the reference group.

^dEstonia and mixed teaching style as the reference group.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Results

Identification of teaching styles in Finland and Estonia

Latent profile analysis confirmed that five profiles represented the best solution in each country (Table S1). A *mixed teaching style*, *extreme child-centred teaching style*, *child-centred teaching style*, *teacher-directed teaching style* and *child-dominated teaching style* were identified in Finland and Estonia. Multiple-group latent profile analysis revealed dispersion similarity (i.e., invariant means and variance), indicating that five teaching styles were equivalent across countries (Table S1).

Teaching styles and changes in reading performance from the third to sixth grade

The role of third-grade teaching styles in reading development from the third to sixth grade was tested using pooled ANCOVAs (see Table 1 for findings using the mixed teaching style as the reference group; see Table 2 for findings using other reference groups). Comparisons with the *mixed teaching style* (Table 1) indicate that the *extreme child-centred teaching style* was a less effective practice for the development of reading fluency (estimate = $-.38$, $p < .05$). The *child-centred teaching style* was more effective than the *extreme child-centred teaching style* in terms of reading fluency (estimate = $.47$, $p < .05$; Table 2). The *extreme child-centred teaching style* was marginally less effective than the *teacher-directed style* in reading fluency (estimate = $-.44$, $p = .089$).

There was a main effect of country on reading fluency (Table 1). Estonian students scored higher on reading fluency than their Finnish peers (estimate = $.26$, $p < .01$). Boys scored lower on reading fluency than girls (estimate = $-.18$, $p < .05$). There were no main effects for child age or maternal education. Finally, there were no two-way interactions between country and teaching styles on reading fluency. There were neither main effects nor interactions for any study variable on reading comprehension (Tables 1 and 2).

Table 2. Pooled analyses of covariance of other teaching styles as reference group.

	Reading fluency		Reading comprehension	
	Estimate	Std. error	Estimate	Std. error
Extreme child-centred vs teacher-directed	-.44	0.26	.24	0.33
Child-centred vs teacher-directed	.03	0.20	.28	0.22
Child-dominated vs teacher-directed	-.08	0.34	.49	0.34
Child-centred vs extreme child-centred	.47*	0.19	.04	0.24
Child-dominated vs extreme child-centred	.35	0.34	.25	0.31
Child-dominated vs child-centred	-.12	0.27	.21	0.27

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Discussion

Following some students from the third to sixth grade, we found that third-grade teaching styles were associated with the development of reading fluency. Specifically, we found that the mixed, child-centred and (marginally significantly) teacher-directed teaching styles were more effective than the extreme child-centred style in promoting reading fluency. Reading fluency, the ability to decode words and to connect graphemes and phonemes, can be effectively enhanced with the help of direct instruction, such as explicit teaching and phonics and words practices (Pressley et al., 2003; Stipek et al., 1995). Both the mixed teaching style and the teacher-directed style contain direct instruction, whereas the extreme child-centred style de-emphasises drill practices. Moreover, students demonstrated better reading fluency development in child-centred style classrooms, where students' interests were considered, a variety of activities were offered and individual accountability was assured. Previous research suggests that students in such classrooms are more likely to build foundational reading skills, form good reading habits and have high motivations, thus leading to the development of reading fluency (Kikas & Tang, 2019; Lerkkanen et al., 2016; Snow & Matthews, 2016; Torppa et al., 2020).

The findings also suggest that the *extreme child-centred teaching style* should be minimised. Children receiving this form of instruction in the third grade demonstrated the poorest development of reading fluency over time. The extreme child-centred style overemphasises child-centred practices and underemphasises teacher-directed and child-dominated practices. We can only speculate as to the reason why this style is disadvantageous. An overemphasis on child-centred practices may result in teachers paying too much attention to some students at the expense of others (Kirschner et al., 2006; Sandilos et al., 2017). Clearly, there is a trade-off between focusing on individual students and focusing on the group. What remains puzzling is why the child-dominated style, characterised by minimal guidance and encouragement of free exploration, did not differ from other teaching styles in the prediction of reading skills. That is, this style was neither superior nor inferior to other teaching styles. In our previous study (Tang et al., 2017a), the child-dominated style was the least effective in terms of concurrent reading skills. The present findings imply that the child-dominated style may not have a long-term adverse impact on reading skills development, perhaps because students become more autonomous when they move to late primary school years. One prior study also showed that child-dominated practices may be supportive in classrooms with high skills and persistence for early primary schoolers (Kikas et al., 2014). It is possible that their interest in reading could compensate the loss of direct instruction for their reading skills. Nevertheless, more research on the child-dominated style is needed to help us understand this finding.

Contrary to hypotheses and to previous concurrent findings (Tang et al., 2017a), there were no effects of teaching styles on reading comprehension. Our earlier study found that the mixed teaching style, child-centred style and extreme child-centred style were associated with stronger concurrent reading comprehension than other teaching styles. Findings from the present study indicated that those effects were not persistent later. This may partly be because reading comprehension ($r_{3rd-6th} = .45$ in this study) is not as stable as reading fluency ($r_{3rd-6th} = .66$). In other words, there are other factors (e.g., reading habits and home learning environment; Torppa et al., 2020) that could affect the development of reading comprehension. The effect of those factors on the reading comprehension may be stronger than that of prior teaching styles. Again, given that person-oriented studies

of teaching practices are still scarce and longitudinal studies even scarcer, there is a clear need for additional research.

Our findings revealed a similar set of teaching styles in Finland and Estonia. Similar effects on reading skills development were shown in both countries. Although schools in Estonia provide literacy instruction 1 year earlier than Finnish schools, Finnish students catch up to their Estonian counterparts by the end of the first grade (Soodla et al., 2015). Because the two countries have similarities in terms of language origin, teacher education and educational system (Kikas & Lerkkanen, 2011), it is not surprising to find that the role of early teaching styles in the reading development was similar in both countries.

Overall, taken together with our earlier research (Tang et al., 2019; Tang et al., 2017a), our findings suggested that the *mixed teaching style* is one of the most effective practices for the promotion of reading fluency in primary schools. By offering a structured instruction that is based on students' individual needs, rich language exposure and multiple literacy experiences (Snow & Matthews, 2016), this type of teaching style displayed the strongest effect on reading skills development. Our findings echo previous suggestions that effective teaching requires flexible use of a variety of teaching practices depending on the instructional goal and individual needs of the students (Good et al., 2009; Pressley et al., 2003). In addition, our results indicate that this effect is consistent across two countries – Finland and Estonia. Future studies are welcomed to examine whether beneficial effects of the *mixed teaching style* can be generalised to other contexts.

Acknowledgements

The authors thank the earlier contributions of Joonas Muotka and Professor Jari-Erik Nurmi to this work (JEN deceased on 9 October 2017). This study was supported by grants from the Academy of Finland (No. 268 586 for 2013–2017 and No. 277 299 for 2015–2017) and Tallinn University (Tallinna Ülikool), Estonia (120_TF3818).

Data availability statement

The data that support the findings of this study are available from the corresponding author, X. T., upon reasonable request.

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Received 2 February 2021; revised version received 22 December 2021.

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