JYU DISSERTATIONS 511

Jenni Ruotsalainen

Literacy Instruction and Reading Performance in First Grade Classrooms

UNIVERSITY OF JYVÄSKYLÄ
FACULTY OF EDUCATION AND PSYCHOLOGY

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ABSTRACT

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The aim of the present dissertation was to examine the associations between observed literacy instruction and students' reading performance at the classroom level during the first school year. The data focusing on the first grade autumn and spring were drawn from two longitudinal studies conducted in Finland and one conducted in Estonia. The three sub-studies used data from audio or video recorded literacy lessons (sub-study 1: n_{FIN} = 12, n_{EST} = 21; sub-study 2: n = 35; sub-study 3: n = 30), and assessments of reading performance (word reading skills, and reading comprehension; sub-study 1: n_{FIN} = 154, n_{EST} = 415; sub-study 2: n = 616; sub-study 3: n = 537). Literacy instruction activities were coded for instructional attention management (i.e., who is responsible for directing students' attention to the task: the teacher during whole group work vs. students during independent work) and content of literacy activities utilising an adapted version of the Individualizing Student Instruction (ISI) observation system. The data were analysed using multilevel modelling. The results showed, first, that the emphases in the contents of the activities shifted during the first grade. Second, students' word reading skills at the classroom level were associated with the allocation of lesson time to different literacy instruction activities in both the autumn and spring terms. Third, different literacy instruction activities were found to be associated with average word reading skills and reading comprehension in classrooms. Overall, the findings contribute to the understanding of classroom-level associations between literacy instruction and literacy learning in first grade. The findings highlight the need to consider the effects of the classroom-level skills of students on teachers' practices when supporting students' learning to read.

Keywords: literacy instruction, classroom observations, reading performance, reading accuracy, reading fluency, reading comprehension, first grade

TIIVISTELMÄ (ABSTRACT IN FINNISH)

Ruotsalainen, Jenni
Lukutaidon opetus ja lukutaito ensimmäisellä luokalla
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Väitöstutkimuksessa tarkasteltiin lukemaan opettamisen ja luokan lukutaidon tason välisiä yhteyksiä ensimmäisen luokan aikana. Osatutkimusten aineistot olivat osa laajoja pitkittäistutkimuksia, joista kaksi toteutettiin Suomessa ja yksi Virossa. Jokaista osatutkimusta varten nauhoitettiin (ääni- tai videotallenne) äidinkielen oppitunteja (osatutkimus 1: n_{FIN} = 12, n_{EST} = 21; osatutkimus 2: n = 35; osatutkimus 3: n = 30) ja kerättiin testitietoa oppilaiden (osatutkimus 1: n_{FIN} = 154, n_{EST} = 415; osatutkimus 2: n = 616; osatutkimus 3: n = 537) lukutarkkuudesta, lukusujuvuudesta ja luetun ymmärtämisestä. Oppituntien analysoinnissa käytettiin tutkimuksen myötä Suomen ja Viron konteksteihin sovitettua, alun perin opetuksen yksilöllisen vaikuttavuuden arviointiin kehitettyä kansainvälistä Individualizing Student Instruction (ISI) havainnointimenetelmää. Oppituntien koodauksessa huomioitiin opetuksen sisältö sekä se kuka ensisijaisesti oli vastuussa huomion suuntaamisesta tehtävään (opettaja tai oppilas) ja työskentelyn toteutustapa (koko ryhmä tai itsenäinen työskentely pienryhmässä tai yksilötehtävät). Tilastollisissa analyyseissä käytettiin monitasomallinnusta. Tulokset osoittivat, että lukemaan opettamisen sisältöjen painopiste siirtyi ensimmäisellä luokalla tarkan lukutaidon harjoittelusta tekstien lukemiseen ja ymmärtämiseen lukuvuoden aikana. Luokan lukutaidon keskimääräisen tason havaittiin olevan yhteydessä toteutuksen sisältöjen ja työskentelytapojen jakautumiseen oppitunneilla syksyllä ja keväällä. Lisäksi tulokset osoittivat yhteyksiä toteutuksen eri sisältöjen ja työskentelytapojen sekä luokkatason lukemisen sujuvuuden ja ymmärtämisen välillä. Kaiken kaikkiaan tulokset lisäävät ymmärrystä lukemaan opettamisen ja oppimisen vastavuoroisesta suhteesta. Luokan taitotaso tulisi ottaa huomioon opetuksen suunnittelussa ja toteutuksessa pohdittaessa sitä, miten lasten lukutaidon kehitystä voidaan parhaiten tukea koulun aloitusvaiheessa.

Avainsanat: lukemaan opettaminen, luokkahuoneen havainnointi, lukutaito, lukutarkkuus, lukusujuvuus, luetun ymmärtäminen, ensimmäinen luokka

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Laukaa, April 2022
Jenni Ruotsalainen

LIST OF PUBLICATIONS

This doctoral thesis is based on the following publications, which are referred to as sub-studies 1, 2 and 3 in the text.

Article 1 Ruotsalainen, J., Soodla, P., Räikkönen, E., Poikkeus, A.-M., Kikas, E., & Lerkkanen, M.-K. (2022). Literacy instruction activities and their associations with first graders' reading performance in two transparent orthographies. *Compare: A Journal of Comparative and International Education*, *52*(1), 92–109. https://doi.org/10.1080/03057925.2020.1742093

Article 2 Ruotsalainen, J., Pakarinen, E., Poikkeus, A.-M., & Lerkkanen, M.-K. (2022). Literacy instruction in first grade: Classroom-level associations between reading skills and literacy instruction activities. *Journal of Research in Reading*, *45*(1), 83–99. https://doi.org/10.1111/1467-9817.12384

Article 3 Ruotsalainen, J., Pakarinen, E., Poikkeus, A.-M., & Lerkkanen, M.-K. (2021). Associations between students' reading performance and literacy instruction in first grade: A cross-lagged study. [Manuscript in review].

The author of this dissertation is the first author of all three research articles. She was responsible for the methodological adaptation of the Individualizing Student Instruction (ISI) observation system to Finnish and Estonian contexts. She was responsible for coding the audio- and video-recorded literacy lessons of the Finnish samples, searching and reviewing the literature and writing the manuscripts. She conducted the statistical analyses with consultation from statistical experts (included as co-authors). The co-authors had advisory roles in the design of the studies and interpretation of the results, and they provided comments for all three manuscripts. The data used in the three publications had been collected as part of longitudinal studies in Finland, the First Steps study and the Teacher and Student Stress and Interaction in Classroom (TESSI) study, and in Estonia, the Reading study.

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ORIGINAL PAPERS

1 INTRODUCTION

A longstanding interest has focused on how to best support young students' emerging reading skills development (Bowers, 2020; Connor et al., 2004; Fletcher et al., 2020). Students' reading skills at school entry have been shown to predict their later reading development across time (Duncan et al., 2007; Korpipää et al., 2020; Verhoeven & van Leeuwe, 2008). However, despite the overall stability in students' skills, greater progress in reading skills has been found in lower rather than higher grades (Verhoeven & van Leeuwe, 2008) as well as differences in developmental patterns in reading (for a review, see Pfost et al., 2012). Rapid changes in students' word reading skills right after the beginning of formal reading instruction and the acknowledgement of the importance of early reading skills to later academic performance have directed attention to reading instruction during this crucial early period, which also constitutes the main topic of this dissertation.

To gain insight into instructional practices taking place in authentic classroom settings, observational methods have increasingly been used (Hoffman et al., 2011). Research on the associations between literacy instruction and students' reading skills development has, however, often centred on a single content of instruction during interventions (Baker et al., 2020), or instruction for specific groups, such as second language learners (Baker et al., 2006), children living in poverty (Nelson et al., 2014) or children struggling in reading (Foorman et al., 1998; Simmons et al., 1995). Examples of more comprehensive designs considering students' skills and a breadth of literacy instruction activities include those by Connor et al. (2004, 2013) and Kelcey and Carlisle (2012), but they, too, focused on selected subgroups such as the students living in poverty and/or students with lower than average reading achievement. The sample characteristics of classrooms and students in prior literature may, thus, have influenced the conclusions of effective instruction and hampered their wider generalisation. The sub-studies described in this dissertation contribute to the scant literature on observations of the concrete practices of authentic classrooms at the initial stage of reading instruction. The design of the present research has addressed some of the prior limitations by including a detailed analysis of

instructional activities (e.g. allocation of lesson time to different literacy learning contents) with a structured international coding scheme, based on the Individualizing Student Instruction (ISI) observation system by Connor, Morrison et al., (2009), and examining the associations between instruction and students' reading skills at the classroom level. The coding scheme was adapted (Poikkeus et al., 2013) to the contexts of two languages (Finnish and Estonian), both with shallow orthographies, thus broadening the understanding of the associations between instruction and students' skills in language and educational contexts other than that of the United States (US).

The effects of the students' skills on teachers' instruction are sometimes acknowledged in research reports as potential contributing factors (e.g. Connor et al., 2004), but they are seldom included in the study design (as an exception, see Carlisle et al., 2011), or their effect has been examined as instructional adaptations as a response to student inputs during learning activities (for a review, see Parsons et al., 2018). This dissertation is based on the assumption that students' reading skills at the classroom level may set conditions for choice of activities and, thus, be associated with how teachers implement their instruction. If the teachers are to take the current skills of students in the classroom into account, the instruction is likely to be rather different in a classroom with predominantly beginning readers than in a classroom with a high proportion of precocious, fluent readers.

The aim of this dissertation is to examine literacy instruction activities and their associations with students' reading performance at the classroom level in first grade. More specifically, the first objective was to examine teacher's allocation of time to different literacy instruction activities in literacy lessons. The proportion of different types of literacy content during the recorded lessons was the focus of analyses in sub-study 1, whereas in sub-studies 2 and 3, literacy instruction activities were analysed using combination categories of instructional management (i.e. who is responsible for directing students' attention to the task; Connor & Morrison, 2016; Connor, Morrison et al., 2009) and content of literacy activity. Second, the associations between students' word reading skills and literacy instruction activities were examined in first grade autumn data (sub-study 2) and in first grade spring data (sub-study 3). Third, the associations between literacy instruction activities (in the autumn, sub-study 3; in the spring, sub-study 1) and students' word reading skills and reading comprehension in the spring were investigated. Sub-study 1 involved a cross-country comparison of literacy instruction in Finland and Estonia. The students enter school at the age of seven in both countries, and the orthographies of Finnish and Estonian languages are similar. However, some differences exist in national pre-primary and primary school curricula regarding the onset of formal reading instruction. Finnish pre-primary education practices provide versatile support for the development of children's phonological awareness and letter knowledge, but explicit reading and spelling instruction (e.g., matching graphemes to phonemes and blending them to decode words or syllables) begins at entry to the first grade (Lerkkanen, 2007). In Estonia, instruction of use of grapheme–phoneme

correspondence to support children's learning to read and spell is provided gradually already in pre-primary education before school entry (Estonian Government, 2008). These features provided interesting premises for a cross-country comparison.

In addition, the dissertation contributes to the methodological development and adaptation of systematic observation instrumentation focusing on early literacy instruction in the Finnish and Estonian language contexts. Acquisition of reading accuracy is typically a very rapid process in these language contexts due to their highly regular grapheme–phoneme correspondence (Seymour et al., 2003; Soodla et al., 2015), and, thus, the first grade of school provides a unique developmental period of literacy learning. The ISI observation system, originally developed in the US, was adapted with respect to language-specific features (Poikkeus et al., 2013) and is used here to analyse the literacy instruction activities at the classroom level. The sub-studies expanded the previous studies utilising the ISI (e.g. Connor et al., 2011, 2013; Connor, Piasta et al., 2009) by examining the associations between literacy instruction and students' reading skills in language contexts that differ significantly from the English language contexts, and by examining classroom-level associations between students' word reading skills and literacy instruction.

2 THEORETICAL BACKGROUND

2.1 Emerging literacy skills

Among first graders, a wide variety of literacy skills have been identified. The orthographies represented in this dissertation, Finnish and Estonian, are shallow with consistent grapheme–phoneme correspondence (Dasinger, 1997). These features have been associated with students' more rapid reading acquisition compared with the reading acquisition of students learning to read in languages with deeper orthographies consisting of more inconsistent grapheme–phoneme correspondences (Seymour et al., 2003). For example, Finnish students typically learn to read accurately during the first semester and become relatively fluent by the end of the first grade (Lerkkanen et al., 2004). Some of the first graders can be described as emerging readers possessing a range of prerequisite skills such as letter knowledge, phonological awareness, understanding of grapheme–phoneme correspondence and the ability to recode some letters to sounds, whereas some students can already be rather proficient readers. The onset of formal instruction has been shown to decrease the differences between students' word reading skills in shallow orthographies, as the skill development at school is more rapid among beginning readers than among students who were already reading at school entry (Foster et al., 2007; Lerkkanen et al., 2004; Soodla et al., 2015).

Learning to read is an important skill in order for reading to be used for learning in later stages. Some theories, such as Ehri's (2005) theory depicting four phases of learning to read, focus specifically on the very early development of word reading skills. Mere word level reading does not, however, sufficiently capture the broad foundational skills of reading even considering the development of young students. Thus, many theories have sought to take into consideration and examined both the development of word reading and comprehension skills. The complex nature of reading skills is reflected in the literature in diverse frameworks and theories of the development of reading skills (Stafura & Perfetti, 2017). These include for example the construction–

integration (C–I) model (Kintsch, 1988) and the reading systems framework (Perfetti & Stafura, 2014) that seek to outline the key antecedents and processes affecting word reading and comprehension skills development and depict how they interact across the development.

The starting point adopted in this dissertation involves taking into account young children's need for parallel and adaptive early reading skill support in the form of both code-focused practices (such as phonological awareness, reading accuracy and fluency, and spelling) and meaning-focused practices (such as support for vocabulary development and listening and reading comprehension) in early literacy classrooms. This notion of interwoven and interactive development in the key areas of reading skill domains aligns with the widely utilized propositions of the Simple View of Reading (SVR) model by Gough and Tunmer (1986). The SVR indicates that reading comprehension is a product of both word reading skills (accuracy and fluency) and linguistic comprehension, rather than a sum of these skills. Individuals with good linguistic comprehension but poor decoding skills, or individuals manifesting good reading fluency but difficulties in grasping meanings from text would not be considered competent readers. As an example, Gough and Tunmer (1986) referred to the former in describing an average 5-year-old with none or only some skills for decoding but good comprehension skills relative to age. This depiction could be expanded to refer to many first graders as well. The SVR is widely used especially in studies addressing early reading skill development in different language contexts, including shallow orthographies such as Finnish (e.g. Florit et al., 2020; Hjetland et al., 2019; Kendeou et al., 2009; Lepola et al., 2016; Torppa et al., 2016, 2019; Verhoeven & van Leeuwe, 2008). Furthermore, several additions have also been suggested to expand the model's scope and coverage of relevant skills areas such as reading fluency and the role of vocabulary growth in development of reading comprehension (e.g. Joshi & Aaron, 2000; Kirby & Savage, 2008). The basic reading skills comprising efficient word reading and comprehension skills outlined in the SVR (Gough & Tunmer, 1986) form the basis for the more advanced skills required in modern society. For example, word reading and comprehension skills have been shown to predict online research and comprehension skills in later grades (Kanniainen et al., 2019).

Studies applying the SVR model in study contexts of different alphabetic orthographies have shown that different antecedents predict word reading skills and linguistic comprehension. Phonological awareness, letter knowledge and naming speed as well as the child's reading ability during the assessment predict word reading skills (accuracy and fluency), whereas vocabulary and listening comprehension have been linked to comprehension skills (e.g. Hjetland et al., 2019; Muter et al., 2004; Torppa et al., 2016, 2019; Verhoeven & van Leeuwe, 2008). However, even though word reading skills and linguistic comprehension are seen as different components, their development is interdependent, especially in the early phases of reading skills development. For example, in a sample of Finnish 4- and 6-year-old children, Lepola et al. (2016) documented correlations between oral comprehension skills and reading precursors (letter knowledge and

phonological awareness), whereas Kendeou et al. (2009) showed that vocabulary loaded on the decoding factor rather than the comprehension skills factor in the samples of English-speaking 4- and 6-year-olds. In addition, the meta-analysis by Florit and Cain (2011) showed that the predictive value of word reading skills and linguistic comprehension on reading comprehension differed based on the depth of the orthography: word reading skills explained more of the variance in reading comprehension in English, representing a deep orthography, whereas linguistic comprehension explained more of the variance in reading comprehension in shallow orthographies already in early grades. However, also in shallow orthographies, during the early grades, reading fluency explains more of the variation in reading comprehension than in later grades when reading has become more automatised and other skills, such as rapid naming or vocabulary, have increased their relative explanatory power (Torppa et al., 2016).

Critique have been raised, however, suggesting that SVR model is too simple. Even though Gough and Tunmer (1986) indicate that both accurate and fluent decoding (i.e. word reading skills) is required for reading proficiency, the decoding component has typically been measured either as accuracy or fluency, which has likely resulted in differences in the explained variation in students' reading comprehension (Florit & Cain, 2011). Both Joshi and Aaron (2000) and Kirby and Savage (2008) have argued that reading fluency, in particular, needs to be addressed more explicitly in prediction of reading comprehension. Accordingly, in recent studies conducted especially in contexts of shallow orthographies, measures of reading fluency rather than accuracy have been employed (e.g. Torppa et al., 2016). It can be argued that the SVR provides only a relatively robust framework for defining the minimum level for efficient reading skills and identification of students who face difficulties in reading, but it does not provide a more elaborated theory on how these skills develop in comparison to frameworks such as the C–I model (Kintsch, 1988) or reading systems framework (Perfetti & Stafura, 2014). Furthermore, SVR does not address how the development of reading comprehension is affected by learned reading strategies or ability to interpret and integrate information from various sources of information (Kirby & Savage, 2008).

Despite the critique pointing out some of the caveats of SVR, Kirby and Savage, however, acknowledge that the SVR serves to provide as a brief explanation of the relationships between word reading skills, linguistic comprehension, and reading comprehension, as well as reminder of the variation among students in both of the foundational skills. The focus of the dissertation is on the associations between literacy instruction and students' reading skills (word reading and reading comprehension) at classroom level during the first grade. Thus, the proposition of key components of reading illustrated in SVR provide a useful framework for the purposes of the dissertation.

2.2 Reciprocal nature of learning and instruction

The development of reading skills is dependent on a literacy-rich environment. Much of the learning occurs in informal interactions with the environment, but there is wide evidence of the importance of explicit instruction on reading skills development (Baker et al., 2020; Fletcher et al., 2020; Foorman et al., 1998; Kelcey & Carlisle, 2012; Kuhn & Stahl, 2003; Nelson et al., 2014; Pressley et al., 2001; Simmons et al., 1995). However, it is widely acknowledged that instruction is not mere transmission of information, but children's reading skills (Carlisle et al., 2011) as well as self-regulation (Day et al., 2015), for example, have an effect on the instruction. Yet, despite the acknowledgement of students' effect on instruction, the discourse of effective instruction often centres on the one-way associations between instruction and learning despite the undeniable complexity of classroom context and its potential effects on instruction.

The reciprocal relationship between an individual and environment is stressed in both the bio-ecological model (Bronfenbrenner & Morris, 2006) and in the transactional model (Sameroff, 2009) of development. Even though both of these models have been developed in order to understand the processes between developing children and their primary caregivers, their notions are also highly applicable when considering the processes seen in classroom contexts (Connor, Morrison et al., 2009; Jaeger, 2014; Morrison & Connor, 2009).

The more recent version of Bronfenbrenner's bio-ecological model of development (Bronfenbrenner & Morris, 2006) delineates the dynamic, interactive relationships among the four principal components of the model, the process, person, context and time, while emphasising the role of proximal processes as the main driver of development. Proximal processes typically take place in interaction with other people on a regular basis over extended periods of time, but they can also occur with elements of the environment. Bronfenbrenner and Morris (2006) further stated that in order to be effective, proximal processes need to change in complexity as the demands for skills in acquiring new knowledge and performing complex tasks become higher. All these elements apply to those found in the school context as well: a group of students interact on a regular basis with each other and with the teacher(s) but also with the learning materials over extended periods of time. As more time elapses and students' skills develop, the teacher supports the students in tackling increasingly more difficult tasks and materials.

In the transactional model, Sameroff (2009) draws attention to the different meanings of the terms *interaction* and *transaction*. Sameroff noted that the term interaction is used to refer to encounters between persons without changes in knowledge (e.g. routine greetings while meeting), whereas in transactions between individuals or an individual and the context, over time, something is changed (e.g. the course of a child's development is altered). With respect to learning, the developing child's actions and knowledge may change in the transactions with the environment, such as with instruction (Morrison & Connor,

2009), but the child's responses and interests also evoke responses in the environment (e.g. Jaeger, 2014; Nurmi et al., 2013; Sameroff, 2009).

In the educational context, responses to student inputs can be seen in instructional adaptations from fine-tuned micro-level adaptations to prepared lesson plans taking students' skills into account (Corno, 2008; Hardy et al., 2019; Parsons et al., 2018). Micro-level adaptations include in situ adaptations during instruction; for example, the teacher provides more examples in order to help the student to understand what is to be learned while possibly altering the lesson plan (Vaughn, 2019). More long-term adaptations can be seen in teacher reports of providing more individual support for students struggling in their learning (e.g. Kikas et al., 2015; Kiuru et al., 2015) or in changed emphases in instruction across the school year (e.g. Pressley et al., 2001) and grades (Morrison & Connor, 2009). Different adaptations are also likely to occur simultaneously in the classroom settings: the teachers may make their lesson plans considering the needs of their students and make adjustments based on student responses during instruction (Hardy et al., 2019).

2.3 Literacy instruction

Instruction has a gatekeeper role in securing sufficient basic reading skills for every student. Kirby and Savage (2008) noted that even though the SVR model (Gough & Tunmer, 1986) was not developed to consider instruction, it does outline two teachable skills, word reading skills and comprehension, to be explicitly addressed in instruction (Baker et al., 2020; Phillips et al., 2008). Moreover, Connor, Phillips et al. (2014) argued that text-specific skills, including decoding and linguistic skills, together with cognitive and regulatory skills, develop over time and are considered to reciprocally affect each other.

The literature has further documented that different antecedents have predictive value for reading comprehension in different phases of reading skill development (e.g. Hjetland et al., 2019; Torppa et al., 2016; Verhoeven & van Leeuwe, 2008). In line with this, the effectiveness of literacy instruction has also been associated with how well the instruction corresponds to the student's literacy learning needs over time (e.g. Connor et al., 2004, 2013).

2.3.1 Instruction supporting word- and text-level reading accuracy and fluency

Instruction supporting students' word reading skills span from instruction of the prerequisite skills, such as phonological awareness and letter knowledge, to instruction of accurate reading and spelling of words to instruction of fluent reading of texts. Phonological awareness activities support the children to first distinguish words from the spoken language and, eventually, sounds from the words (Lerkkanen, 2007; Phillips et al., 2008). There is considerable evidence of the importance of phonics instruction, mapping letters to corresponding sounds,

for word reading skills along with instruction supporting students' comprehension skills (e.g. Connor et al., 2004; Foorman et al., 1998).

Compared with deep orthography such as English, learning to read is a relatively simple task in shallow orthographies such as Finnish and Estonian that show nearly perfect consistency in grapheme–phoneme correspondences (Aro, 2017; Seymour et al., 2003). However, Finnish and Estonian have complex morphological systems, and words tend to be long due to the agglutinating and rich derivational systems, though even more so in the Finnish context (Aro, 2017; Dasinger, 1997). For example, in Finnish reading materials, even the syllabicated children's books aimed at beginning readers include words such as 'hyppäämään' ([go] to jump), 'luokaltamme' (from our class), or 'piirustuksetkaan' ([not] even the drawings) in which inflections and derivational affixation have to some extent also altered the stem (hypätä/luokka/piirustus). The systematic use of grapheme–phoneme correspondence in literacy instruction proceeds from introducing letter names and shapes and the sounds that correspond them to phonological recoding and spelling of syllables and, later on, to multisyllabic words (Aro, 2017; Lerkkanen, 2007). Early instructional material typically includes vocabulary limited to familiar words using the grapheme–phoneme correspondences learned so far (e.g. saa [(it) get(s)], suu [a mouth]; for both Finnish and Estonian) to provide experience of success (Lerkkanen, 2007). Due to consistency of grapheme–phoneme correspondences, decoding and spelling are taught simultaneously in Finnish and Estonian.

After accurate reading has been achieved, reading must automatise so that attention can be directed to the meaning of the texts. Across languages, naming speed in particular has been shown to predict reading fluency (Landerl et al., 2019; Torppa et al., 2013). Reading fluency can be supported from the level of grapheme–phoneme correspondence to that of text level, but research on reading fluency instruction has largely focused on text-level activities, the main context of reading, as summarised by Kuhn and Stahl (2003) and Rasinski et al. (2011). Many of the ways that have been introduced to support reading fluency development build on repeated reading of texts to allow more practice and possibilities to also direct the attention to the meaning of the text rather than just decoding of the words. However, there is not as compelling evidence of the effectiveness of different practices supporting reading fluency as research evidence considering instruction supporting reading accuracy. One of the reasons might be that the definitions of fluency often expand to also cover comprehension (Rasinski et al., 2011). Skilled readers are not merely fluent readers but monitor comprehension while reading and utilise different strategies in reading, including the use of grapheme–phoneme correspondence when facing difficult or new words. However, as reading fluency plays a critical role in reading proficiency among Finnish and Estonian students (Torppa et al., 2019), it is supported in early literacy instruction. The majority of Finnish students reach accuracy in reading words during the first semester (Lerkkanen et al., 2004), after which, typically during the spring of first grade, the instruction shifts to support students' reading fluency (Lerkkanen, 2007). In Estonia, instructional shift to

stronger emphasis in reading fluency may take place earlier during the first grade as Estonian students are ahead of Finnish students in their reading skills at school entry (Soodla et al., 2015). This difference is at least partly likely to be linked to how literacy instruction is implemented in accordance with national curricula. In the Estonian pre-primary education, learning of all letters and some initial spelling and reading is set as a goal for literacy learning during the year preceding the first grade (Estonian Government, 2008). In Finland, children's phonological awareness is supported, and they are encouraged to recognise and produce letters and different kind of texts in pre-primary education (Finnish National Agency for Education, 2016a), but goals of the skills the children should reach before school entry are not set. Instead, reading and spelling instruction begins only at first grade in Finland (Finnish National Agency for Education, 2016b).

2.3.2 Instruction supporting reading comprehension

In line with the SVR model, support for the development of students' comprehension skills is critical from early on in instruction. Connor and Morrison (2016) described these activities as any instructional activity that aims at supporting students' understanding of decoded texts in their prior work, and they referred also to elements of spoken language (e.g. Connor et al., 2011). The latter comprehension activities, such as vocabulary enrichment and listening comprehension, are important, especially when the students are not yet able to read efficiently by themselves (Dickinson & Porche, 2011).

Typical instruction supporting comprehension skills of young students employs narrative rather than expository texts (Gersten et al., 2001) and occurs during read aloud instruction, as it can be embedded with many components supporting comprehension and knowledge building (Baker et al., 2020; Wiseman, 2011). Efficient read aloud instruction includes elements before, during and after reading that both engage the students in reading activities and teach them strategies for reading (Baker et al., 2020; Garner & Bochna, 2004; Gersten et al., 2001; Wiseman, 2011). There can be overlap in the activities in different phases of reading. For example, before reading, the students can be engaged with the upcoming text by previewing the format of the text and predicting what is to be read based on the title, illustrations or the background knowledge the students might have of the topic. Strategies used during reading include discussions and explanations of new vocabulary and questions monitoring comprehension as well as linking the text to students' earlier experiences. Finally, after reading, students may be helped to understand the information they have learned by retrieving facts from the text, retelling, organising, summarising and making inferences within and between texts and their own prior knowledge. An important aspect of this type of instruction is that it also models the strategies the students ought to use when reading texts independently and attaching meaning to them (Rojas-Drummond et al., 2014; Wiseman, 2011). For example, Garner and Bochna (2004) found in their intervention study that instruction in narrative text structure on first graders' listening comprehension resulted in better reading

comprehension when compared with the control group. Moreover, selecting texts that are easy enough for the students increases their reading rate and comprehension of the texts, especially among students with weaker word reading skills (Armstrong, 1983; O'Connor et al., 2002).

2.3.3 Mode of literacy instruction

Instruction in a classroom can be provided for the whole group, small group(s) or individual students. Connor et al. (2006, 2011) have shown in their intervention studies that instruction to support word reading skills is more efficient when targeted to small groups or individual students than when provided to the whole class. Small-group instruction with differentiated contents has been recommended by other researchers as well (e.g. Juel & Minden-Cupp, 2000; Phillips et al., 2008; Pressley et al., 2001) to respond to the different learning needs of the students, and flexible groupings are also a standard pedagogical strategy among Finnish teachers (Lerkkanen, 2007). For comprehension skills, Connor and Morrison (2016) claimed that both small-group and whole-class instruction are effective. A possible reason for this may be that whole-class instruction and independent work serve different purposes. Whole-class instruction engages students in joint discussions and provides them with opportunities to learn from each other (Connor et al., 2020), whereas independent work may engage students with increasingly complex materials that potentially provide rich vocabulary and background knowledge (Cunningham & Stanovich, 1998; Hirsch, 2003).

The question of whole-class instruction versus instruction directed at small groups or individual students as a format for effective instruction is not, however, straightforward but is likely to be linked with the support the teacher provides for the students. The study by Connor et al. (2011) also included the dimension of management, focusing on whether the attention to the task was managed by the teacher and the student or the student(s) independently. Connor et al. (2011) did not find differences in the extent to which teachers in the control or treatment group provided time for independent practicing of word reading skills in small-group or individual work contexts, but with the extent to which the students were practicing together with the teacher regardless of the format. It is widely acknowledged that students require support when they are learning new skills or facing difficulties in learning, whereas strong support from the teacher might be experienced as intrusive if the student is capable of working independently (Corno, 2008; van de Pol et al., 2010). The possibility to work independently when the student has necessary prerequisite skills supports autonomy and ownership of one's learning (Gersten et al., 2001; Pressley et al., 2001; van de Pol et al., 2010) and provides more time for practicing at their own pace.

2.3.4 Adapting instruction based on students' skills

Students' initial skills have been shown to be associated with what type of instruction they benefit from but also with the changes that take place in teachers'

instruction across the school year (e.g. Connor et al., 2004, 2011, 2013; Juel & Minden-Cupp, 2000; Pressley et al., 2001). Connor et al. (2004) showed that students with high vocabulary and decoding skills at the beginning of first grade benefitted from opportunities to independently practice their reading and writing throughout the school year, whereas students with low initial vocabulary and decoding skills benefited from steady increases in the amount of this type of practicing.

In a classroom context, where students have varying skills, the teacher needs to organise the instruction to balance between instruction that is considered beneficial for all students, such as class discussions, and instruction that responds to individual learning needs (Corno, 2008). What is beneficial for all or most students may depend on the classroom composition. In a class of beginning readers, word reading instruction is beneficial for many students, whereas in a classroom where the majority of the students have surpassed the reading acquisition phase, the use of small-group and individual work to a greater extent may be more efficient.

2.4 Education in Finland and Estonia

Finnish and Estonian educational systems share many similarities (for more information, see Kikas & Lerkkanen, 2011; Soodla et al., 2015, 2019). In both countries, the students enter school at the age of seven and attend nine years of compulsory comprehensive school. During the first grade, students receive seven 45-minute literacy lessons weekly. The national core curricula in Finland (Finnish National Agency for Education, 2016b) and Estonia (Estonian Government, 2011/2014) outline the broad guidelines for instruction, but, in both countries, the teachers enjoy high professional autonomy in implementing their instruction. As both Finnish and Estonian have shallow (i.e. highly transparent) orthographies, word reading instruction is based on the systematic use of grapheme–phoneme correspondence (Soodla et al., 2015).

The main difference between Finnish and Estonian early literacy education, and the driver for the design of the present sub-study 1, is the different timing of the onset of systematic use of grapheme-phoneme correspondence in order to teach reading and spelling. In Finland, children's language skills are supported in pre-primary education through playful language and literacy activities and practicing of uppercase letters, for example, but the instruction of the systematic use of grapheme–phoneme correspondence in order to learn to decode and spell words only begins in first grade (Lerkkanen, 2007). However, approximately one-third of Finnish children are able to read at school entry (Soodla et al., 2015), and less than 30% of children at school entry do not yet have full mastery in grapheme–phoneme correspondence (Ukkola & Metsämuuronen, 2019). In comparison, in Estonia, even though playful activities to support children's language and pre-reading skills are emphasised in the pre-primary education, the curriculum defines expected learning outcomes that include naming all the

letters and being able to spell one- and two-syllable words and recognise some words after pre-primary education (Estonian Government, 2008). Consequently, Estonian students are ahead of their Finnish peers in their word reading skills at school entry. Reading skill development is, however, rapid among Finnish first graders, and the students in these two countries perform at the same level at the end of first grade (Soodla et al., 2015).

Even though the early primary school years' curricula in Finland and Estonia share many similarities, such as emphasis on support for language skills development as a broader construct, the differences in timing of onset of formal reading instruction is likely to have some effects on the first grade teachers' practices in these two countries. In Finland, first grade reading instruction typically focuses on reading and spelling accuracy during the first semester, after which instruction gradually shifts to practicing fluent reading as students' reach higher automaticity in decoding (Lerkkanen, 2007). In Estonia, the focus with respect to word reading skills shifts towards fluency already during the first semester (Soodla et al., 2015).

Literacy instruction in Finnish and Estonian classrooms and its associations with students' reading performance were compared in sub-study 1 in the dissertation. The comparison was based, on the one hand, on the similarities in orthographies (Dasinger, 1997) and, on the other hand, on differences in the onset of formal reading instruction and emphases in national curricula (Estonian Government, 2008; Finnish National Agency for Education, 2016b) in these two countries. Similar orthographies of the Finnish and Estonian languages enabled us to focus more on teachers' allocation of lesson time to different content areas in first grade and examine whether these have associations with students' skills.

2.5 Observing literacy instruction

Different methodologies have been used to capture the variation in literacy instruction. These include questionnaires (Sonnenschein et al., 2010), observations of more generic features of interaction in the classroom (Hamre et al., 2013; Stipek & Byler, 2004), qualitative analyses of observed literacy practices (e.g. Juel & Minden-Cupp, 2000; Pressley et al., 2001) and the application of systematic observation systems for analysing literacy instruction (e.g. Connor, Morrison et al., 2009; Grossman et al., 2013; Kelcey & Carlisle, 2012). Observational methods have the potential to reveal more of the actual instructional practices in classroom than questionnaires, as teachers have been reported to sometimes use different practices than what they emphasise in questionnaires (Stipek & Byler, 1997) or report in video-stimulated recall interviews (Uibu et al., 2021). Camburn et al., (2017) found that teachers tend to overrate some aspects of their instruction in questionnaires, whereas recent findings using observations in classrooms have, in contrast, demonstrated a broader and more versatile range of practices than what teachers report (Uibu et al., 2021).

The complex nature of learning and instruction has resulted in many different observational frameworks and models in the effort to answer questions pertaining to high-quality or effective instruction. For example, features of observed teacher–student interaction operationalised as emotional support, classroom management and instructional support (e.g. Teaching Through Interaction framework; Hamre et al., 2013) and teaching practices (Early Childhood Classroom Observation Measure [ECCOM]; Stipek & Byler, 2004) have been demonstrated to be associated with students' reading skills development (e.g. Hamre & Pianta, 2005; Lerkkanen et al., 2016; Pakarinen et al., 2017; Tang et al., 2017). Yet, even though they provide valuable information on the features that are important for student learning, they do not address the concrete practices of literacy instruction.

In observations of classroom literacy instruction, the focus has typically been either on a specific content of instruction, for example, the fidelity of instruction of target content in intervention studies (e.g. Baker et al., 2020) or comprehensive observations of literacy instruction listing features differentiating literacy lessons of more and less effective teachers (Pressley et al., 2001) or rating the quality of literacy instruction on pre-specified dimensions (e.g. Platform for Language Arts Teaching Observation [PLATO]; Grossman et al., 2013). Both of these approaches have some limitations. The observations of specific content help in identifying the best practices to support the selected target skill (e.g. Baker et al., 2020). However, they typically have a narrow focus and do not address how the instruction of a specific content complements other instructional contents. A question seldom examined concerns, for instance, the teacher's pedagogically driven process of balancing instruction to decide whether there are some contents for which a lesser amount of lesson time could be allocated to provide sufficient time for practices of the focal target content. In turn, the problem of comprehensive observations of literacy instruction seeking to capture all relevant aspects is that they may lead to lengthy lists of different features of instruction (e.g. Pressley et al., 2001), which may hamper applicability both for research and practice. Additionally, all the potential features considered as high-quality literacy instruction are not necessarily observable during a time-limited observation cycle, which may limit interpretations when codings are averaged across several dimensions (Grossman et al., 2013; Quinn & Paulick, 2021).

The ISI classroom observation system (Connor, Morrison et al., 2009) was selected for coding the observational data in the sub-studies described in this dissertation. The rationale for the selection was, first, that the ISI was developed especially for the observations of kindergarten (e.g. Al Otaiba et al., 2011) and elementary school literacy instruction (e.g. Connor et al., 2013) and, thus, it was seen suitable for analyses of literacy instruction in the early grades. Second, the ISI provides specific information of a variety of literacy instruction activities that are likely to support the development of different skills (i.e. word reading skills vs. linguistic comprehension) rather than assessment of overall quality of instruction (cf. e.g. PLATO; Grossman et al., 2013). The theoretical background behind the ISI (Connor & Morrison, 2016; Connor, Morrison et al., 2009) draws

from the bio-ecological and transactional models of development, as well as the SVR model. A major feature of the ISI is the notion of child x instruction interactions in affecting which type of instruction is more beneficial for individual students when their prior skills are taken into account (Connor, Morrison et al., 2009).

With the ISI framework, Morrison and Connor (2009) determined, the analysis of literacy instruction activities can be organised along five key dimensions: 1) content, 2) management, 3) explicit versus implicit, 4) student-level versus classroom-level and 5) change in instruction across time. Of these dimensions, content was examined and reported in each of the three sub-studies described here and management in two sub-studies, respectively, and they, thus, constituted the central focus of interest. The dimension of *management* centres on who – the teacher or the students themselves – is responsible for focusing the student's attention on the task or whether attention is managed together between the teacher and the student (Connor, Morrison et al., 2009, Connor et al., 2010, Morrison & Connor, 2009). Teacher/child-managed (i.e. joint management between the teacher and the student[s]), and child-managed focus of attention have been the management types most often addressed in previous studies (e.g. Connor et al., 2011, 2013). The dimension of *content* is divided along the SVR model propositions (Gough & Tunmer, 1986) into code-focused and meaning-focused activities (Connor & Morrison, 2016). Code-focused activities refer to contents that support the development of students' decoding and spelling skills, whereas meaning-focused activities support students' linguistic comprehension and reading comprehension skills (Connor & Morrison, 2016).

The original ISI observations (e.g. Connor et al., 2013) are conducted at the level of individual focal students and, instead of ratings of dimensions that are typical for many other instruments (cf. e.g. PLATO; Grossman et al., 2013), the durations of different activities are calculated (Connor, Morrison et al., 2009). Connor, Morrison et al. (2009, 2011) suggested that the amount of time students spend in specific activities (illustrated as combinations of management and content) is associated with gains in students' reading skills development when students' prior skills are taken into account. The results of the early studies of Connor et al. (2004) and the results from the intervention studies (e.g. Connor et al., 2011) indicated that students with poor pre-skills at school entry benefitted more from a higher amount of teacher/child-managed instruction both with respect to code-focused and meaning-focused contents, while students with stronger skills benefited more from a greater extent of child-managed meaning-focused activities. In the interventions (e.g. Connor et al., 2011, 2013; Connor, Piasta et al., 2009), the teachers have received individualised recommendations for different students of the amounts to be spent in different combinations of management and content. Connor et al. (2011) found that student gains in reading skills development are linked to the accuracy of teachers implementing the recommended amounts of different literacy instruction activities. They also noted that even though the deviations from the recommendations may be just minutes per day, they can amount to hours across the school year.

In the present dissertation, the key interest is in the implementation of different types of literacy content and managing of attention in instruction and their associations to students' reading skills at the classroom level across first grade. The adapted coding system of literacy instruction (Poikkeus et al., 2013) using the ISI in the three sub-studies aligned with the dimensions of management and content but differed in three significant ways from the studies conducted by Connor and colleagues. First, the observations were conducted at the classroom level and, thus, the observations reflected the teachers' allocation of different instructional activities during the lessons rather than instruction received by individual focal students. Second, as the observations were conducted at the classroom level, the dimension of context was integrated with the dimension of management: Teacher/child-managed activities were observed during whole-group instruction, whereas child-managed activities were observed during independent individual, pair and small-group work. Third, the associations between students' skills and instruction were explicitly addressed.

3 THE AIMS OF THE THESIS

The overall aim of the dissertation is to examine the associations between observed literacy instruction and students' reading performance at the classroom level during the first school year. Students' word reading skills vary greatly at school entry, but they develop rapidly during the first grade (Soodla et al., 2015). If teachers adapt their instruction based on their students' reading skills, differences between classrooms as well as between autumn and spring semesters should be found in allocation of time to different types of instructional activities. Furthermore, as different literacy instruction activities are considered to support different skills (Connor & Morrison, 2016), an emphasis on a certain literacy instruction activity type ought to support the development of that respective skill among students in the classroom. The specific questions addressed here are the following:

1. How is instructional time during the literacy lessons allocated among different types of literacy instruction activities in the autumn (sub-studies 2 and 3) and spring (sub-studies 1 and 3) of first grade?
2. To what extent are students' word reading skills at the classroom level associated with different types of literacy instruction activities in the autumn (sub-study 2) and spring (sub-study 3) of first grade?
3. To what extent are different types of literacy instruction activities associated with students' reading performance (word reading skills and reading comprehension) at the classroom level in the spring of first grade (sub-studies 1 and 3)?

The dissertation also contributes to the methodological development of observational methods in authentic classroom situations in other languages and educational contexts outside the US. To achieve this, the ISI classroom observation system (Connor, Morrison et al., 2009), developed in the US, was adapted to the Finnish and Estonian language contexts (Poikkeus et al., 2013) and utilised in observations at the classroom level rather than at the level of an individual focal student (cf. Connor, Morrison et al., 2009). By changing the scope

from observing selected focal students to observing teachers' instruction at the whole-class level, the dissertation aims to provide detailed information on the association between the average skills of students in classrooms and teachers' implementation of different literacy activities.

4 METHOD

4.1 Participants and procedure

Data for the sub-studies were drawn from longitudinal studies carried out in Finland and, in sub-study 1, Estonia. In sub-study 1, the Finnish data were drawn from the longitudinal First Steps study (Lerkkanen et al., 2006) in which approximately 2,000 children and their teachers and parents were followed from kindergarten until the end of comprehensive school (i.e. ninth grade). The Estonian data came from the Reading Study (Soodla et al., 2015), in which 433 students from two cohorts were followed from first to second grade from 2011–2013. The data for sub-studies 2 and 3 were drawn from the Teacher and Student Stress and Interaction in Classroom (TESSI) study (Lerkkanen & Pakarinen, 2016) in which 870 children and their teachers and parents were followed from kindergarten until the fourth grade. In the sub-studies, the sampling criteria were as follows: 1) the classroom had participated in classroom observations, and recording (audio or video) of a literacy lesson was obtained, and 2) there were only first graders in the classroom (i.e. multi-grade classes were excluded from the analysis).

In sub-study 1, the Finnish sample consisted of 12 first grade teachers and 154 students in their classrooms from 10 schools participating in the study during the academic year 2007–2008. The Estonian sample was drawn from two cohorts during academic years 2011–2012 and 2012-2013 comprising a total of 21 first grade teachers and 415 students in their classrooms from seven schools. Sub-study 2 consisted of 35 teachers and 616 students from 21 schools participating in the autumn of first grade in 2017. In sub-study 3, the same classrooms as in sub-study 2 were followed to spring term: data consisted of 30 teachers and 537 students from 20 schools who participated both in the autumn and in the spring during academic year 2017–2018. In addition, in each sub-study, teachers reported on their educational background and work experience, and parents reported on their educational background. An overview of the samples, measures and statistical measures of the sub-studies is presented in Table 1.

TABLE 1 Overview of samples, measures and statistical methods used in the sub-studies

Sub-studies	Sample and data	Variables	Statistical methods
Sub-study 1: Literacy instruction activities and their associations with first graders' reading performance in two transparent orthographies.	Audio-recorded literacy lessons of 12 teachers from Finland and 21 teachers from Estonia in first grade spring. 154 students in Finland and 415 students in Estonia assessed on their reading fluency in first grade autumn and spring, and on their reading comprehension in first grade spring.	Observed literacy instruction activities (coded with ISI) Group (Country) Reading fluency/ word recognition fluency Reading comprehension Parental educational level	Chi-square test of independence Mann–Whitney *U* test Random coefficient multilevel regression model Intraclass correlations (ICC)
Sub-study 2: Literacy instruction in first grade: Classroom-level associations between reading skills and literacy instruction activities.	Video recorded literacy lessons of 35 Finnish teachers in first grade autumn. 616 students assessed on their word reading skills in first grade autumn.	Observed literacy instruction activities (coded with ISI) Teacher's work experience Number of students present during the video recordings Word reading accuracy Word reading fluency Student gender	Multilevel path analyses ICCs
Sub-study 3: Associations between students' reading performance and literacy instruction in first grade: A cross-lagged study.	Video recorded literacy lessons of 30 Finnish teachers in first grade autumn and spring. 537 students assessed on their word reading skills in first grade autumn and spring, and on their reading comprehension in first grade spring.	Observed literacy instruction activities (coded with ISI) Teacher's work experience Word reading accuracy Word reading fluency Reading comprehension Student gender Parental educational level	Multilevel cross-lagged models ICCs

4.2 Measures

4.2.1 Reading performance

In every sub-study, students' reading performance was assessed by trained testers either individually or in a group-administered test situation. Autumn assessments were included in every sub-study, while spring assessments were included in sub-studies 1 and 3.

Reading accuracy. Reading accuracy was assessed individually by utilising a reading accuracy test (Lerkkanen et al., 2006) that included 20 words of increasing difficulty. The student earned a point from each correct answer (maximum of 20 points). The test was discontinued if the student could not read or gave an incorrect answer to three consecutive test items. The same reading accuracy test was used both in the autumn and in the spring. Standardised test scores were used in sub-studies 2 and 3. For the analyses, a sum score of reading accuracy and reading fluency measure of word list reading was calculated. Information of the reliability of the composite measure is provided below.

Reading fluency: word recognition. Reading fluency was assessed with a group-administered word recognition test in sub-study 1. The word recognition test belongs to the Finnish nationally normed reading test battery (Lindeman, 1998). A translated version of the word recognition test (Soodla et al., 2015) was used in the Estonian sample. In the word recognition test, the student's task was to silently read four phonologically similar words and draw a line from the word to the matching picture located to the right-hand side of the words. The student earned one point from each correctly matched word–picture pair within a 2-minute time limit (maximum of 80). Parallel versions of the word recognition test were used to assess students' reading fluency in the autumn and in the spring. In the Finnish data, the Cronbach's alpha for the measure was .93 in the autumn and .95 in the spring. Test-retest reliability was .67. In the Estonian data, the Cronbach's alpha was .98 in both time points, and test–retest reliability .78. Students' reading fluency at school entry has been found to provide a stronger predictive measure of later reading fluency among Estonian students than among Finnish students (Torppa et al., 2019). Reading skill development has been found to be rapid among the Finnish students who do not read at school entry (Lerkkanen et al., 2011), which is likely to explain the difference in Finnish and Estonian test–retest results.

Reading fluency: word list reading. An individually administered word list reading test (Häyrinen et al., 1999) was used in sub-studies 2 and 3. The student's task was to read as accurately and fluently as many words as possible during a 45-second time period. The student earned one point from each correctly read word (maximum of 90). The same reading fluency test was used in the autumn and in the spring. For the analyses, the students' results were standardised, and a mean score with equal weight was formed of reading accuracy and reading fluency to indicate students' word reading skills in the autumn and in the spring. In sub-study 2, the Cronbach's alpha for the composite

word reading skill measure was .85 in the autumn. In sub-study 3, the Cronbach's alphas were .82 in the autumn and .62 in the spring. Test-retest reliability for the mean score was .70. Similarly to the word recognition measure, different growth rates of students in word reading skill development (Lerkkanen et al., 2011) as well as the ceiling of the reading accuracy measure in the spring are likely to explain the lower reliability of the measure in the spring. However, both measures were decided to include in the analyses including autumn data. Reading accuracy measure without any time-limit was considered as an important indicator of students' early word reading skills especially in the autumn and differences between classrooms in reading accuracy were found to explain 7% (p = .015) of the variance.

Reading comprehension. Reading comprehension was assessed in the spring of first grade using a group-administered reading comprehension test from the nationally normed reading test battery (Lindeman, 1998) in sub-studies 1 and 3. The Estonian translation of the test (Soodla et al., 2015) was used in sub-study 1. The student's task was to read a page-long expository text and answer 12 questions. Even though narrative rather than expository texts are typically used in first grade instruction, the piloting conducted before the data collection indicated that an expository text (rather than the narrative text available in the test battery) provided better differentiation (i.e., more variation) among students' skills in reading comprehension. Eleven of the questions were multiple-choice questions, and, in one question, the students were asked to arrange seven statements in the correct sequence based on the text. One point was assigned for each correct answer (maximum of 12 points). Raw scores were used in the analyses in sub-study 1. Standardised test scores were used in the analyses in sub-study 3, as the word reading skill measure was also standardised. Cronbach's alphas were .78 in the Finnish data and .88 in the Estonian data in sub-study 1, and .83 in sub-study 3.

4.2.2 Observational codings of literacy instruction using the Individualizing Student Instruction observation system

Literacy lessons were audio or video recorded in the autumn (sub-studies 2 and 3) and spring (sub-studies 1 and 3) of first grade. In sub-study 1, the literacy lessons were audio recorded, and in sub-studies 2 and 3, video recordings of literacy lessons were obtained. The recordings of lessons took place at the teachers' convenience during normal school hours.

Adaptation of coding and coding procedure. The ISI classroom observation system (Connor et al., 2010; Connor & Morrison, 2016; Connor, Morrison et al., 2009) was used to code the literacy instruction during the lessons. The ISI coding scheme (Connor et al., 2010) consists of three dimensions: 1) *context*, 2) *instructional management*, and 3) *content.* The original coding scheme focuses on instruction received by individual focal students in the lesson. The coding scheme was adapted to the Finnish and Estonian contexts and to observations at the classroom level (Poikkeus et al., 2013) before commencing sub-study 1. In addition, a few additions to the coding scheme were made before

commencing sub-study 2 due to the differences in the instruction in the autumn compared with the instruction in the spring.

In sub-study 1, initial codings were made from transcripts, and durations of the activities were checked from the audio recordings. In sub-studies 2 and 3, the codings were made from video recordings. The minimum duration of literacy instruction activity that could be reliably coded was set as 15 seconds in the original ISI (Connor et al., 2010; Connor, Morrison et al. 2009), with the exception of codings of teacher management of attention (e.g. read aloud without discussion, teacher-managed [TM]) for which the minimum duration was set as 45 seconds. During the adaptation process, it was determined that using the 15-second criterion obscured relevant activities both in the Finnish and Estonian samples. Thus, a 10-second criterion was set for the majority of sub-codes, but a 45-second criterion was applied for coding of teacher management of attention (Poikkeus et al., 2013).

Lesson length differed both between and within teachers, and thus, the analyses were conducted based on the percentages of different activities (contents or combination categories) that describe the extent to which certain types of activities were observed during the lesson. The percentages were calculated by dividing the duration of the activity by the instructional time during the lesson. As both audio and video recordings were typically running before the beginning of the lesson, the instructional time was defined as the time from the teacher beginning the lesson (e.g. by requesting the students' attention) to the teacher ending the lesson. In addition, in sub-study 1, dummy codes for different content areas were created (0 = not observed during the lesson; 1 = observed during the lesson).

Context. The dimension of context refers to whom the instruction is directed: to the whole group of students, small group(s) or individual students (Connor et al., 2010; Connor, Morrison et al., 2009). Time spent in the different categories of context was coded from the data but not reported or analysed as separate variables in the sub-studies 1, 2 and 3. Information gathered from the audio recordings in sub-study 1 regarding context was not considered reliable enough even though intercoder reliability between the two coders was high (88.3%). In sub-studies 2 and 3, coding of context was integrated with the management codes.

Instructional management. Instructional management focuses on who is responsible for directing students' attention to the task at hand (Connor et al., 2010; Connor, Morrison et al., 2009). Originally, this dimension included the following three categories: 1) *teacher-managed* (TM; the teacher is responsible for directing the students' attention), 2) *teacher–child-managed* (TCM; the teacher and the students together direct students' attention), and 3) *child-managed* (CM; the students themselves are responsible for directing their attention). In the process of coding for sub-studies 2 and 3, an additional combined management category of CM/TCM was formed. This code accounts for situations in the data when the majority of the students were working independently or in pairs, but the teacher was circulating in the classroom providing instructional support for individual

student(s) at the time. Similarly, for the dimension of context, audio recordings in sub-study 1 were considered limited for reliable coding of management despite the high (96.4%) intercoder reliability. Management was included in analyses of sub-studies 2 and 3, which were based on video recordings. As the codings were made at the classroom level, the dimension of management also contained information of context: TM and TCM were observed in whole-group situations, while CM and CM/TCM were observed during individual and small-group work.

Content. The dimension of content included 12 literacy content areas (e.g. phonological awareness, grapheme–phoneme correspondence, decoding, fluency, oral language, listening and reading comprehension, text reading and listening, and writing) as well as non-instructional activities such as transitions and general instructions (Connor et al., 2010, as cited in sub-study 1). Initial codings included subcategories for each content, for example, initial phoneme or rhyming for phonological awareness, and teacher read texts or silent sustained reading for text reading activities. The contents were further categorised as code-focused (CF) or meaning-focused (MF) activities in line with the SVR model (Gough & Tunmer, 1986; Connor & Morrison, 2016).

Some language-specific modifications (exclusions or additions) were made to the subcategories of content (Poikkeus et al., 2013). For example, while rhyming is widely used in the Finnish and Estonian contexts as well to foster phonological sensitivity (Silvén et al., 2007), activities focusing on onset and rime (a sub-code in the original manual; Connor et al., 2010) are not effective methods for decoding instruction in the Finnish and Estonian context. Hence, the subcategory of onset and rime under *phonological awareness* was omitted from the adapted manual. Because practices at the level of syllables (e.g. AI, UI, SAU) are typically utilised in Finnish literacy instruction before decoding and spelling of multisyllabic words (Lerkkanen, 2007), additional sub-codes for the reading and spelling of syllables were included in the adapted manual (Poikkeus et al., 2013). In addition, some examples specific to the Finnish and Estonian languages of the sub-codes were added to the manual. For example, an additional sub-code of phoneme duration was added to the manual (Poikkeus et al., 2013) to account for phoneme durations of 'short' and 'long' in both Finnish and Estonian and the Estonian phoneme duration of 'over long'.

Combination categories of management and content. Following the previous studies utilising the ISI (e.g. Connor et al., 2013; Connor, Piasta et al., 2009), combination categories of management and content were used in the analyses in sub-studies 2 and 3. Initially, eight different combination categories emerged from the codings: TM-CF, TM-MF, TCM-CF, TCM-MF, CM-CF, CM-MF, CM/TCM-CF and CM/TCM-MF. The codings of data indicated that the majority of the instructional activities fell into the categories of TCM-CF, TCM-MF, CM/TCM-CF and CM/TCM-MF in terms of both their prevalence in the lessons and duration of the activities.

The remaining combination categories were typically observed during the same activity continuum. For example, TM-MF and TCM-MF were often

observed together in a sequence during read-aloud sessions. During independent work, the teachers actively circulated in the classroom and provided support and instruction to the students (CM/TCM-CF or CM/TCM-MF), but there were short moments during which the teachers were not with any of the students (e.g. gathering materials; CM-CF or CM-MF). Thus, for the analyses, initial combination categories were further combined into four combination categories: TCM-CF, TCM-MF, CM-CF and CM-MF (Figure 1). Even though CM/TCM activities were more prevalent than CM activities, CM was selected to the reporting of the results as it depicted the management of most of the students and aligned with previous literature (e.g. Connor et al., 2013; Connor, Morrison et al., 2009).

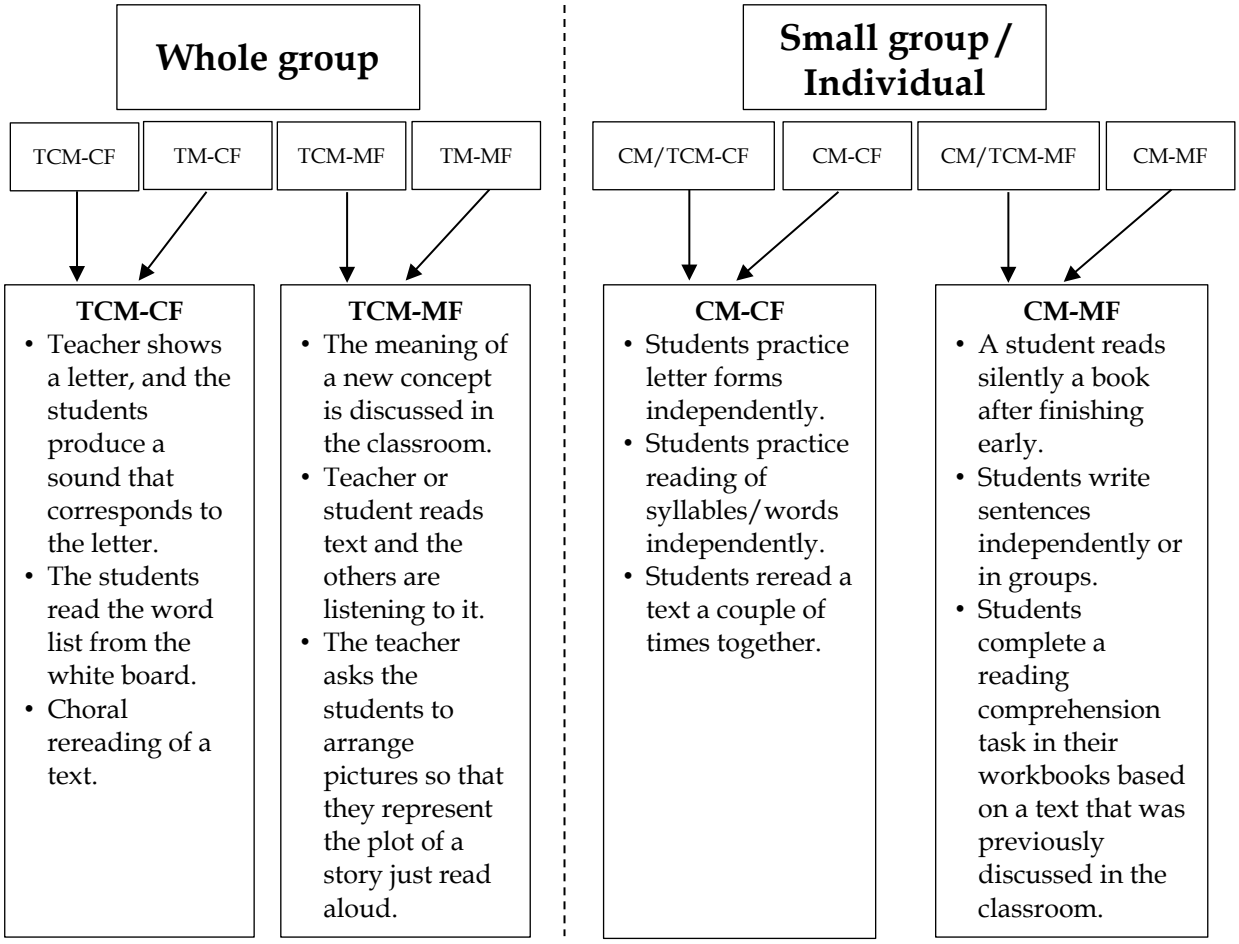

FIGURE 1 Combination categories of management and content and examples of activities.

Note. TCM = teacher/child-managed, CM = child-managed, CM/TCM = child-managed and teacher/child-managed activities observed simultaneously, CF = code-focused, MF = meaning-focused.

Individualised work. An additional code/dimension of individualised work was created in adapting the ISI to classroom-level observations (Poikkeus

et al., 2013). Individualised work was coded when there were at least two different *contents* occurring at the same time, for example, a) reading and writing either isolated words (CF) or short sentences (MF), or b) engagement in activities that support accurate and fluent word reading (CF) or reading comprehension (MF). Individualised work was observed in each sample but reported only in sub-study 1.

Intercoder reliability. Part of the lessons in each sub-study were double coded. In sub-study 1, four Finnish and four Estonian lessons were cross-translated by an Estonian who spoke Finnish fluently. First, agreement of the codings of one Finnish and one Estonian lesson were examined, and some clarifications were made to the adapted manual (Poikkeus et al., 2013). Second, intercoder reliability was calculated as percentages of agreement for the remaining three Finnish and three Estonian lessons in each dimension: 88.3% for context, 96.4% for management and 88.8% for content. In sub-studies 2 and 3, 20% of the lessons (7 of the autumn sample in sub-study 2, 6 of the autumn sample and 6 of the spring sample in sub-study 3) were double coded. ICCs showed high intercoder reliability between the coders, ranging from .97 to .99 (95% CI = .90, .99).

4.2.3 Other measures

The other measures consisted of background information of the teachers (education and work experience), students (gender and age), and the parents (education). In every sub-study, questionnaires were used to obtain information about parents' educational level as well as teachers' educational level and work experience. In addition, in sub-study 2, the number of students participating in the observed literacy lesson was recorded and included in the analyses.

4.3 Analyses

4.3.1 Descriptive comparative analyses

Comparisons of instructional contents. In sub-study 1, the prevalence and number of different literacy instruction activities related to content and individualisation of instruction in the Finnish and Estonian samples were examined and compared. First, chi-square tests of independence were run for the associations between country and different content areas (dummy coded as observed vs. not observed in the lessons) to investigate whether the countries differed in the prevalence of different content areas. Second, differences in the durations of different content areas between Estonian and Finnish classrooms were examined for those activities that were observed in almost all (i.e. over 90% of the classrooms) or in all classrooms. The analyses were run with non-parametric Mann–Whitney U tests because of the small number of literacy

lessons and deviations from the normal distribution regarding the literacy contents.

Intraclass correlations. ICCs (Heck, 2001; Muthén, 1991) were calculated to determine the proportion of variance that was attributable to classrooms in students' skills in sub-studies 1, 2 and 3, and in parents' educational level in sub-study 3.

4.3.2 Multilevel modelling

The main analyses in each sub-study were conducted by utilising multilevel modelling techniques (Muthén & Muthén, 1998–2015). Of interest were the associations between literacy instruction activities and students' reading performance at the classroom level. Further information on the analyses at the classroom level is provided below. In addition, the associations of students' reading performance in the autumn and spring (sub-studies 1 and 3), gender (sub-studies 2 and 3) and parental education (sub-studies 1 and 3) at the level of individual students were included in the analyses. In each sub-study, the parameters of the models were estimated using maximum likelihood estimation (MLR) with non-normality robust standard errors and the full information maximum likelihood (FIML) procedure to account for missing data (Enders, 2010).

Sub-study 1. Two random coefficient multilevel regression models were constructed to examine the associations between the content of literacy instruction activities (CF or MF) and students' reading performance (word reading fluency and reading comprehension) in first grade spring in Estonia and Finland and whether the associations differed in these two countries. In addition to the associations between literacy instruction activities and students' reading performance in the spring, the impact of entry-level reading fluency in first grade autumn on the associations was examined.

Sub-study 2. Multilevel path analyses were conducted to examine classroom-level associations between students' word reading skills and the extent of TCM-CF, TCM-MF, and CM-CF/MF in observed literacy lessons in first grade autumn. The number of students present during the video-recorded lessons, teachers' work experience, and students' gender were controlled for.

Sub-study 3. The classroom-level associations between students' reading performance (word reading skills and reading comprehension) and literacy instruction activities in the autumn and spring of first grade were investigated by utilising a cross-lagged design. Four multilevel models were constructed to examine the associations between students' reading performance and literacy instruction activity combinations of TCM-CF, TCM-MF, CM-CF, and CM-MF. In each model, teachers' work experience, mothers' educational level, and students' gender were controlled for.

5 OVERVIEW OF THE ORIGINAL STUDIES

5.1 Sub-study 1: Literacy instruction activities and their associations with first graders' reading performance in two transparent orthographies

The aims of sub-study 1 were, first, to compare literacy instruction activities with respect to *content* of instruction in Finnish and Estonian first grade classrooms and second, to determine how these activities were associated with the students' reading fluency and reading comprehension in these countries. In Finland, 12 classrooms with 154 students participated in the study, and in Estonia, 21 classrooms with a total of 415 students, respectively. In each classroom, one literacy lesson was recorded in the first grade spring, and students' reading performance was assessed in the autumn and spring of first grade. The content of the literacy instruction activities was coded following the guidelines of ISI observation system (Connor et al., 2010; Connor, Morrison et al., 2009). In addition, information on whether the teacher individualised the contents was coded. In the analyses, the prevalence and the extent of different content areas as well as broader content categories of code-focused (CF) and meaning-focused (MF) and individualisation of instruction were first compared between Estonia and Finland. Second, the associations of CF and MF activities with students' reading fluency and comprehension were analysed.

The results showed, first, that there were more similarities than differences in the literacy instruction activities in the observed lessons of Finnish and Estonian teachers' classrooms. It should, however, be noted that only one recording was available for each teacher which limits any generalisations. The only content areas where differences emerged, were *listening and reading comprehension* and *print vocabulary*, which were observed more in the Estonian classrooms. Individualising of the literacy instruction activities, however, was observed only in the Finnish classrooms (n = 5).

Second, in analysing the associations between literacy instruction activities and students' average reading skills in classrooms, interactions were noted

between the amount of CF and MF activities and the country with students' skills. The amount of CF or MF activities was not associated with students' reading fluency or reading comprehension in Estonia. However, in Finland, a higher amount of CF instruction was associated both with a higher level of reading fluency in the classroom and higher reading comprehension among the students who had the lowest reading fluency in the autumn.

The results suggested, first, that the teachers adapted their instruction based on specific features of their educational system. Estonian children already receive formal reading instruction in pre-primary education, which is likely to explain that Estonian students had already been provided a higher extent of listening and reading comprehension tasks in first grade spring than Finnish students. With these data, it is difficult to fully explain why only Finnish teachers individualised the literacy contents in their instruction. It can be hypothesised, however, that the greater variation in Finnish students' entry-level skills and teachers' beliefs or experiences of best pedagogical practices for responding to this diversity might be reasons why individualising the teaching of literacy contents was more common among Finnish teachers. Second, literacy instruction activities were associated with only Finnish students' reading performance. At the classroom level, emphasis on practicing CF skills, such as reading fluency, was associated with a higher reading fluency level in the Finnish classrooms when controlling for the reading fluency level in the autumn. In addition, support for CF skills (especially reading fluency) seemed to be beneficial for the Finnish beginning readers who were performing with the lowest in reading fluency in the autumn of first grade. It should be noted, however, that, on average, the majority of time was spent on MF activities both in Estonia and in Finland.

5.2 Sub-study 2: Literacy instruction in first grade: Classroom-level associations between reading skills and literacy instruction activities

The aim of sub-study 2 was to investigate whether average word reading skills in classrooms were associated with the allocation of instructional time to different literacy instruction activities during the literacy lessons in first grade autumn. The word reading skills (accuracy and fluency) of 616 students were assessed, and literacy lessons in 35 classrooms were video recorded in the autumn of first grade. Literacy lessons were coded using the ISI observation system (Connor et al., 2010; Connor, Morrison et al., 2009). Based on the initial codings, three combination categories of management (teacher/child-managed [TCM] vs. child-managed [CM]) and content (code-focused [CF] vs. meaning-focused [MF]) were formed: TCM-CF, TCM-MF and CM-CF/MF. CM-CF and CM-MF combination categories were merged to the combination category of CM-CF/MF because CM-MF activities were observed rarely and typically simultaneously with CM-CF activities. As the codings were made at the

classroom level, codes of both TCM-CF and TCM-MF were used when instruction was directed to the whole group, and the code of CM-CF/MF was used when the majority of the students were engaged in independent individual, pair or small-group work.

The results showed that, on average, more lesson time was allocated to CF rather than MF activities. Furthermore, lower average word reading skills in classrooms (i.e. more non-readers in the classroom) were associated with a higher proportion of TCM-CF activities, whereas higher average word reading skills in classrooms (i.e. more students able to read in the classroom) were associated with a higher proportion of CM-CF/MF activities during the lesson. In addition, teachers' work experience was associated with the extent of TCM-CF and TCM-MF activities: more experienced teachers tended to include TCM-CF activities to a greater extent, whereas less experienced teachers implemented more TCM-MF activities.

The results suggest that during the initial stages of formal reading instruction, teachers' instructional adaptation to students' skill would rather be seen in the extent of whole-group versus independent work than in the content of the instruction. In addition, the time spent on independent work may provide affordances for the teacher to individualise the contents of the instruction and the amount of support provided to individual students to meet the varying learning needs of the students.

5.3 Sub-study 3: Associations between students' reading performance and literacy instruction in first grade: A cross-lagged study

The aim of the sub-study 3 was to examine the associations between literacy instruction activities and reading performance at classroom level across first grade. Literacy lessons were video recorded in 30 classrooms in the autumn and in the spring and coded with respect to management and content of the literacy instruction activities utilising the ISI observation system (Connor et al., 2010; Connor, Morrison et al., 2009). Word reading skills (accuracy and fluency) of 537 students were assessed in the autumn and spring, and reading comprehension was assessed in the spring.

Four separate multilevel models were run to analyse the cross-lagged associations between students' reading performance and TCM-CF, TCM-MF, CM-CF and CM-MF activities at the classroom level. Average word reading skills in classrooms in the autumn were negatively associated with the proportion of TCM-CF and CM-CF activities in the spring and positively with the extent of CM-MF activities in the spring. None of the literacy instruction activities in the autumn were associated with students' word reading skills in the spring. However, the proportion of TCM-MF activities in autumn was positively associated with students' reading comprehension at the classroom level in spring,

whereas a negative association was found between CM-CF activities in autumn and average reading comprehension in classrooms. In each model, the students' growth in word reading skills was greater in classrooms in which the mothers' education level was lower.

None of the different types of literacy instruction activities in the autumn were associated with students' additional growth in word reading skills at the classroom level. It may be speculated that lower average word reading skills in classrooms in the autumn signal to the teachers the need to devote a higher proportion of lesson time to activities that support students' reading accuracy and fluency still in the spring. However, if the students in the classrooms already had a high level of word reading skills in the autumn, the teacher could allocate more time to independent practicing of reading and writing in the spring. On the other hand, students' reading comprehension can be supported via activities engaging students with texts and discussions on concepts already in the autumn when many of the students are learning to read.

6 GENERAL DISCUSSION

The search for best literacy instruction practices to support students' emerging reading skills has occupied researchers and educators' minds over decades. The studies on the underachievement of students living in poverty (Nelson et al., 2014) or facing learning difficulties (Foorman et al., 1998; Simmons et al., 1995) have provided valuable information about effective instruction, but they leave the question open as to whether the students' skills also affect the instruction and understanding in the field of effective instruction. In addition, many of the studies have been conducted in educational systems where the teachers' work is not as autonomous as in Finland and Estonia, which constituted the educational contexts of the present dissertation.

The overall purpose of the dissertation was to examine teachers' allocation of lesson time to different literacy instruction activities in the autumn and spring of first grade and the association between instructional activities and average reading performance (word reading skills and reading comprehension) in classrooms. In analysing the literacy instruction activities, this dissertation has contributed to the methodological development of observational methods by adapting the ISI systematic observation system (Connor, Morrison et al., 2009) for application to Finnish and Estonian language contexts (Poikkeus et al., 2013). The results showed both differences in teachers' allocation of lesson time to different literacy activities in the autumn and spring of first grade and changes in the overall emphasis of contents between autumn and spring. These changes were reflected in students' reading skill development at the classroom level during the first grade. In addition, some associations between different types of literacy instruction activities and students' reading performance were found. Overall, the results add to our understanding of the reciprocal relationship between students' progress in learning to read and teacher's implementation of literacy instruction.

6.1 Literacy instruction activities across first grade

The first aim of the dissertation was to examine how teachers allocated their lesson time to different literacy instruction activities. In each sub-study, variation was observed in teachers' allocation of lesson time to different literacy instruction activities both in the autumn and spring terms of first grade (cf. e.g. Connor et al., 2011). On average, instructional management was divided rather similarly in both autumn and spring, with approximately 40% of the activities managed jointly by the teacher and the students (TCM, whole-group instruction) and 30% spent in CM independent activities (sub-studies 2 and 3). Approximately 25% of the lesson time was allocated to activities other than literacy instruction, such as planning and organising, routines and transitions. These activities were typically managed jointly by the teacher and the students. Although individual and small-group work were often used in Finnish first grade classrooms, the majority of lesson time was spent on whole-group activities. This finding contrasts with the predominant use of small-group and individual activities in the US context (e.g. Connor et al., 2011; Juel & Minden-Cupp, 2000). Finnish teachers' allocation of the majority of the lesson time to whole-group activities may be linked to the specific needs of the age group and teachers' purpose to form a learners' community, in addition to academic goals, but also to the lack of availability of assisting staff in the classroom. For example, in their case study, Juel and Minden-Cupp (2000) reported that in each classroom, there was a teacher's assistant who supervised students in their activities when the teacher was giving instruction to other students. Even though there are teacher assistants in Finnish schools, they are not typically present during every lesson.

Across the sub-studies, some shifts were observed in the provision of the different literacy contents. CF activities were more prominent in the autumn, accounting for approximately half of the instructional time, whereas, on average, only 20% was spent in CF activities in the spring. The opposite pattern was true for MF activities, which constituted 20% of the instructional time in the autumn and 50% in the spring, which was expected as these main categories were seen to be generally mutually exclusive except when the teacher individualised the contents. Subcategory coding of the lessons provided some information about differences within the combination categories. For example, in the autumn, TCM-CF could be manifested as teacher-led practicing of reading syllables utilising systematic use of grapheme–phoneme correspondence, whereas in the spring whole-group choral rereading of a text together with the teacher was often observed. TCM-MF activities, in turn, could include teacher reading stories in the autumn, whereas in the spring it was often the students who were reading dialogues and short texts under teacher supervision. Thus, during the first grade, there seemed to be a shift from practicing accuracy to practicing fluency, a shift from grapheme–phoneme- and syllable-level to text-level practices and a shift towards a more active student role during the instruction, which reflected the students' reading skill development during first grade (Lerkkanen et al., 2004)

and recommendations of the national core curriculum (Finnish National Agency for Education, 2016b; see also Lerkkanen, 2007).

A specific novel focus of the dissertation was examining classroom-level associations between different types of literacy instruction activities and students' reading performance. Approximately half of the Finnish teachers were observed to individualise the contents of their instruction in each sub-study (reported specifically in sub-study 1). Individualisation of literacy contents typically took place during independent work, as the teacher instructed some of the students to practice accurate reading of syllables or words while some of the students were instructed to read sentence- or text-level materials. Thus, the analyses provided confirmation of the individualisation of instruction expected in the Finnish curriculum (Finnish National Agency for Education, 2016b), but further studies are needed on this topic.

Of interest are, for instance, whether individualisation is linked to variation in skills among the students in the classroom and whether there are systematic changes in individualisation across the first grade. It could be hypothesised, on the one hand, that a larger rather than smaller variation in students' skills would stimulate more individualising practices to meet each student's educational needs. Differences may be found among classrooms in the extent of individualising instruction but also between autumn and spring if differences in students' skills decrease or increase during the first grade (cf. Pfost et al., 2012). On the other hand, an increase in teachers' knowledge of their students' skills could result in a higher extent of individualising practices (Gatlin-Nash et al., 2021) at the end of the school year. In line with the division of intended and implemented adaptations by Hardy et al. (2019), it would be relevant to examine the extent to which individualisation is manifested as pre-planned activities based on students' skills or as adaptations to students' needs observed during the lesson (see also Vaughn, 2019).

Literacy instruction activities in the observed lessons of Finnish and Estonian classrooms in first grade spring (sub-study 1) were found to be more similar than different, but some differences were also noted. In both countries, MF activities were more prominent than CF activities. However, within the content categories, the Estonian teachers allocated more time to listening and reading comprehension activities and print vocabulary activities than Finnish teachers, whereas only Finnish teachers were found to individualise their instruction. The differences might be due to the greater variation in reading skills among Finnish school beginners (Soodla et al., 2015), differences in curricular emphases for literacy instruction in pre-primary education and primary grades (Estonian Government, 2008, 2011/2014; Finnish National Agency for Education, 2016a, 2016b), and the variations in teachers' expectations of students' skills (Gatlin-Nash et al., 2021) and teachers' education (Kikas & Lerkkanen, 2011).

6.2 Associations between students' word reading skills at school entry and literacy instruction activities

The second aim of the dissertation was to investigate classroom-level associations between students' entry phase word reading skills and the observed literacy instruction activities in their classroom. Sub-studies 2 and 3 examined the extent to which students' word reading skills at school entry were associated with literacy instruction activities across the first grade. It should be noted, however, that the sub-studies were correlational, and thus, caution is warranted in interpreting the associations between word reading skills and literacy instruction activities.

Overall, changes in the instructional contents seemed to reflect the changes in students' reading status: emphasis in the instruction shifted from accurate reading and spelling of words in the autumn to text-level activities in the spring (cf. Connor et al., 2011; Pressley et al., 2001). Furthermore, average word reading skills in classrooms were found to be associated with the allocation of different activities in the autumn (sub-study 2) and spring (sub-study 3) of first grade. In the autumn, the associations between word reading skills and literacy instruction were seen as the extent of whole-group versus independent work during the lesson rather than with the content of the instruction. In contrast, in the spring, associations were also seen between word reading skills in the autumn and the contents of the instruction in the spring. Both in the autumn and spring, TCM-CF activities were observed to a greater extent if there were more beginning readers in the classrooms at school entry. In the spring, teachers of these classrooms allocated more time to CM-CF activities compared with classrooms in which there were more students who were able to read already at school entry. A higher average in word reading skills in classrooms was associated with a higher extent of independent work in the autumn (CM-CF/MF; sub-study 2) and with independent practicing at the sentence- and text-level in the spring (CM-MF; sub-study 3). Teachers' allocation of time to different literacy activities was, thus, in line with the recommendations of Connor et al. (2009, 2011, 2013) of effective instruction based on students' skills.

As learning to read is an essential skill to be learned during early grades, the teachers allocated more time for practicing accuracy and fluency in the autumn and, maybe more importantly, also in the spring if there were more beginning readers in the classroom in the autumn. Since many students in these classrooms were still learning to read in the autumn term, whole-group instruction can be seen as an appropriate use of lesson time to provide the same instruction to all students (cf. Connor et al., 2011). Whole-group instruction may also be practical at the beginning of the school year, as many of the independent tasks were new to the students, or students were not yet able to read the instructions by themselves. In the spring, literacy instruction activities supporting students' word reading skills often included practicing fluent reading of texts in the whole group, with a pair or individually. Reading fluency

development is critical for reading progress early on in shallow orthographies (e.g. Torppa et al., 2016, 2019), and this is likely to be reflected in the teachers' allocation of lesson time for repeated reading of texts in order for the reading to be more fluent and to provide the students with possibilities to hear the texts more than once before proceeding to comprehension tasks.

Higher average word reading skills in classrooms were associated with a higher extent of independent work in the classroom, which is likely to be linked to students' learning needs as well as to the fact that these students' might already possess the ability to read the short instructions from the workbooks and worksheets. Prior research has, however, also found associations between students' academic skills and self-regulation (e.g. Connor et al., 2016; Day et al., 2015; Duncan et al., 2007) and task orientation (Lepola et al., 2016), which facilitate independent work among young students. Supporting students' autonomy and independent use of their skills is an important part of instruction (van de Pol et al., 2010) and is also emphasised in the Finnish national core curriculum (Finnish National Agency for Education, 2016b). Allocating time for independent work may support students' autonomy (Pressley et al., 2001; van de Pol et al., 2010), but it can also allow teachers to provide more individual support for students who are struggling with reading (Kiuru et al., 2015; Nurmi et al., 2013).

6.3 Associations between literacy instruction activities and students' reading performance at the end of first grade

The third aim of the dissertation was to examine the associations between literacy instruction activities and students' reading performance. This aim is linked with earlier studies examining instruction that supports students' reading skills development (e.g. Connor et al., 2004; Kelcey & Carlisle, 2012). The results regarding the associations between literacy instruction activities and students' word reading skills and reading comprehension (i.e. performance at the end of first grade) were mixed. In sub-study 3, none of the different literacy instruction activities in the autumn were found to be associated with students' word reading skills in the spring. In addition, associations were not found between the content of the instruction in the spring and the classroom's concurrent average in reading fluency among Estonian students in sub-study 1. In sub-study 1, however, CF activities were positively associated with concurrent reading fluency in classrooms in the spring in the Finnish sample when controlling for reading fluency in the autumn. These findings are, for the most part, in line with findings by Connor et al. (2004), who did not find classroom-level associations but individual-level associations between instruction and students' reading gains. It should be noted, though, that in the study of Connor et al. (2004), only one to six students per classroom were selected for the study, and the results, thus, did not represent the full variation among students' skills in these classrooms.

Some of the differences in the results among Finnish and Estonian samples are likely to be due to teachers adapting their instruction to students' skills. The earlier onset of systemic use of grapheme-phone correspondence in supporting pre-primary students reading and spelling skills in Estonia results in better word reading skills of the students at school entry (Soodla et al., 2015). Even though word reading skills improved during the first grade among both Estonian and Finnish school beginners, the development was more rapid among Finnish students (cf. Soodla et al., 2015). In addition, Torppa et al. (2019) have shown reading fluency at school entry to be a stronger predictor of reading skills development and reading difficulties among Estonian students than among Finnish students. In their study, Connor et al. (2011) found that the intervention was somewhat more beneficial for students with low rather than high initial skills, but the intervention had lower power for the skill development of students with learning difficulties. Thus, it might be that a higher extent of CF activities in the spring did not provide strong additional support for the word reading skills of the Estonian students who were well on their way to becoming fluent readers, whereas the extent of CF activities was not sufficient to combat the difficulties of students struggling with reading.

The results from sub-study 3 provided support for the conclusions of Connor and Morrison (2016) on the benefits of whole-class MF activities for the progress of students' comprehension skills. The extent of activities supporting students' vocabulary development and comprehension in the autumn were positively associated with average reading comprehension in classrooms in the spring, whereas a negative association was found between the extent of independent practicing of CF contents in the autumn and reading comprehension in the spring. However, in sub-study 1, among the Finnish lowest performing students, reading comprehension in the spring was higher when attending classrooms in which CF activities were implemented to a greater extent in the spring. This finding stresses the importance of addressing the diverse learning needs of the students in the classroom (Connor et al., 2004, 2011, 2013; Kirby & Savage, 2008).

The result of the positive association between TCM-MF activities in the autumn and reading comprehension in the spring is in line with the propositions of the SVR model (Gough & Tunmer, 1986) and notions of the importance of activities fostering the development of comprehension skills before the students are able to read by themselves (Dickinson & Porche, 2011). The finding of a negative association between CM-CF activities and average reading comprehension in classrooms may suggest that a preponderance of CF activities is problematic if it takes time from MF practicing, especially among students who have already mastered the basics of decoding (cf. e.g. Connor et al., 2013). In addition, Schwanenflugel et al. (2009) showed that a strong emphasis on practicing fluency was associated with students' off-task behaviour in first grade, although it was positively associated with students' reading comprehension in second grade.

6.4 Applicability of the Individualizing Student Instruction observation system in classroom-level observations

The ISI observation system (Connor, Morrison et al., 2009) was utilised in the sub-studies discussed in this dissertation. However, in these studies, the perspective was changed from the instruction that the individual students received to the instruction the teachers provided to their students during the lessons. The overall structure of the ISI, including even the broader categories of the content (CF vs. MF), is rather universal. Nevertheless, as a subject-specific observation method, language and education contexts in particular need to be taken into account in the adaptation process. English, as the language context of the original ISI (Connor, Morrison et al., 2009) and the language contexts of the Finnish and Estonian adapted version (Poikkeus et al., 2013), represents the opposite end in the continuum of orthographic depth, which has effects on the rate of students' reading acquisition (Seymour et al., 2003). The differences in languages and instruction supporting reading acquisition resulted in revisions considering the sub-codes under CF contents (phonological awareness, decoding, spelling). In addition, adaptation to classroom-level observations resulted in additional codes to mark the activities during which the teachers provided management support to individual students at a time or individualised the contents.

The results of the sub-studies support the conclusion that the ISI is applicable in the Finnish and Estonian contexts and in classroom-level observations. Observational methods are time-consuming, but it can be claimed that classroom-level coding of the activities is less time-consuming than individual-level codings. As the codings were made based on the durations of prespecified activities, coding was also rather simple and very reliable. Information that can be obtained with the ISI is different from the information that can be obtained with observational methods assessing instruction on a scale (e.g. Teaching Through Interaction framework; Hamre et al., 2013; PLATO; Grossman et al., 2013) and can be seen as a complementary observational method. However, the ISI lacks information on more general features of the classroom environment, such as the emotional support that has been shown to be associated with students' reading skills (Hamre & Pianta, 2005; Pakarinen et al., 2017). Nevertheless, the ISI provides detailed information on what the instruction comprises and how this might be linked to students' reading skills development. The division of the contents into the broad categories of CF and MF activities in line with the SVR (Connor & Morrison, 2016; Gough & Tunmer, 1986) is practical, especially when assessing literacy instruction in early education and in primary grades when much of the focus is on reading acquisition. This information is crucial when outlining guidelines and recommendations for instruction. The use of sub-codes under content areas also enables detailed analyses of instruction in the future.

6.5 Theoretical and practical implications

The dissertation has implications for both research and practice. The dissertation is among the few that have examined the associations between students' skills and instruction at the classroom level (Carlisle et al., 2011). The results discussed here suggest that even though the differences in students' skills among classrooms are small, they have the potential to affect the instruction. However, a wider range in classroom demographics is warranted in future studies to be able to draw further conclusions about these associations and the ways in which teachers adapt their instruction to individual students' needs.

The results of the sub-studies provided support for earlier studies (Dickinson & Porche, 2011) concerning the importance of TCM-MF activities in terms of students' reading comprehension. However, the results did not provide evidence that the extent of any of the literacy instruction activities was more beneficial for students' word reading skill development at the classroom level, which is in line with the earlier findings of Connor et al. (2004), who only found individual-level associations. Nonetheless, it was found that all types of literacy instruction activities were observed both in the autumn and in the spring of first grade, but the overall emphasis in instruction shifted across the school year. In addition, differences in emphasis were found based on the average reading skills in the classrooms. The results align with the findings from studies examining effective instruction (Juel & Minden-Cupp, 2000; Pressley et al., 2001) and the results and recommendations of Connor et al. (2004, 2013) of individualising instruction based on individual students' skills: beginning readers and students struggling with reading benefit from relatively strong emphasis on CF activities, but more independent text-level reading activities are warranted to allow more practice as soon as possible.

Teachers need information about both the skills that should be supported in classroom instruction and the knowledge of their students' individual skills and interests (Connor, Morrison et al., 2009; Piasta et al., 2009). Explicit instruction of word reading skills ought to be continued at the classroom level to support the consolidation of word reading skills, especially when the number of beginning readers is high in the classroom. However, this does not mean devoting the lesson time solely to CF activities, but rather making sure that they are regularly applied together with MF activities. For example, beginning readers may not be able to focus on the meaning of the text when the attention is on decoding words. Thus, providing more time for reading and rereading a text may provide them with more opportunities to form an understanding of the text. However, if there are many precocious readers in the classroom, this type of instruction may not provide further support for their reading skills development. Thus, individualising content is needed for addressing students' different skills effectively (Connor et al., 2011).

The Finnish educational system relies on teachers' autonomy in implementing their instruction as long as they follow the guidelines stated in the

national core curriculum (Finnish National Agency for Education, 2016b). The present findings suggest that teachers adapt instruction according to the average needs of their students with shifting emphases in the content and modes of instruction. The teachers' ability to identify their students' skills and adapt their instruction based on this information, however, needs to be supported via professional development. Finnish teachers have a research-based master's-level qualification in education, but their ability to assess reading skills and need for intensified support (Virinkoski et al., 2018) and participation rate in professional development programmes in literacy (Leino et al., 2017) are relatively low. Professional development programmes have the potential for increasing teachers' competence in rating their students' skills, which has been linked to better adapted instruction and, hence, better learning outcomes (Gatlin-Nash et al., 2021).

6.6 Ethical considerations

This dissertation aligns with the ethical guidelines for responsibly conducted research by the Finnish National Board on Research Integrity (TENK, 2009, 2019). Three general ethical principles were met in the research: 1) respecting the autonomy of research participants, 2) avoiding harm, and 3) ensuring privacy and data protection (TENK, 2009). All data for the sub-studies were drawn from large longitudinal studies. The studies conducted in Finland had received statements of approval from the Committee of Ethics of the University of Jyväskylä before being commenced: in June 2006 for the First Steps study and in August 2017 for the TESSI study. Similar ethical principles were followed in the Estonian Reading study (Soodla et al., 2015).

Participation in the studies was voluntary, and the participants could withdraw their consent to participate in the study at any time. Written consent was collected from the students' guardians for their child's participation, and from participating teachers and parents for their own participation. Before commencing the study, the participants were provided with information about the content and aims of the study and the ways personal data would be processed as well as the practical implementation of the research (see TENK, 2019). Specific attention was paid to ensure sensitive treatment, acknowledging that the students were under 15 years of age during the data collection. Data were anonymised through the allocation of codes. Children whose parents did not wish their child to be seen in the footage (video recordings in the classroom lessons) were provided seats from which they were able to participate without being seen on camera or their images were blurred afterwards. Data were stored and treated in accordance with the guidelines of the University of Jyväskylä and the University of Tallinn. The participants' privacy has been carefully protected in research publications and the dissertation.

6.7 Limitations and future directions

There are some limitations regarding the sub-studies that ought to be taken into consideration. First and foremost, the sample size in each sub-study was small both in terms of the number of classrooms participating in the study and the number of lessons observed. Observations of a single lesson per measurement point have also been used in previous studies (e.g. Connor et al., 2004, 2013), but extending the observations to several time points or covering a week's literacy lessons, for example, would be beneficial for allowing more reliable estimates of the time spent in literacy activities in total as well as the allocation of different activities and individualising practices. For example, more comprehensive observations together with a larger sample size would increase the generalisability of the results, but also enable analysis of combinations of different literacy instruction activities and their associations with students' reading performance via person-oriented methods (e.g. Tang et al., 2017).

Second, the observations focused only on the extent of certain content-based activities, which may have left out other important aspects of the instruction. Piasta et al. (2009), for example, have shown that more time spent in decoding instruction is more effective only if the teacher has better knowledge of the language structure and of concepts of literacy acquisition and instruction. In addition, Connor, Spencer et al. (2014) have shown that information on specific literacy activities and on the quality of the classroom learning environment jointly predict students' skills. Third, a longer follow-up would provide valuable information on the reciprocal relations between literacy learning and teaching. The results from the sub-studies provided support for teachers adapting their instruction based on the word reading skill level of their students instead of highlighting any specific literacy instruction activity as a potential predictor of word reading skill development. According to the results of Schwanenflugel et al. (2009), it is possible that the associations between instruction and students' skills development may be seen more strongly at later grades. Fourth, the associations between students' linguistic comprehension and instruction were not examined. In the study by Connor et al. (2004) that preceded the development of the ISI observation measure, students' reading gains were examined in relation to both students' vocabulary and decoding level.

The present dissertation adds to our understanding of the classroom level associations between reading skills and literacy instruction. In the future, it would be crucial to also examine the associations at the level of individual students, as suggested by Connor, Morrison et al. (2009), to gain information on whether the findings in the US context can be generalised to other language and educational contexts. Another important aspect for future studies concerns the combination of observations of both classroom- and individual-level processes, which may have different functions. In the search for effective instruction, future studies would benefit from examining the interdependence or independence of these processes and their associations with student learning.

7 CONCLUSIONS

The present dissertation contributes to the research on the associations between early literacy learning and instruction as well as to the systematic observational methods assessing the instruction. Earlier studies have mainly focused on examining which instruction would best support students' skill development. Key findings noted here were the associations between students' skills and instruction at classroom-level across the first grade, and, in addition, the confirmation of earlier studies of the benefits of activities supporting students' comprehension skills.

Gradual changes in the contents of instruction as well as in the autonomy provided for the students ought to follow students' skill development. Acknowledging students' skills at the classroom level could enable teachers to plan their lessons optimally to support the learning needs of their students in instruction that is to be provided for every student in the classroom and when the contents and support for learning should be individualised. Based on the results of the sub-studies, it can be concluded that Finnish teachers adapt their literacy instruction according to the word reading skills of their students across the first grade. The study results indicate the need for future researchers to examine reciprocity between learning and instruction in different language and educational contexts.

YHTEENVETO

Väitöstutkimuksessa tarkasteltiin lukutaidon opetuksen ja luokan lukutaidon välisiä yhteyksiä perusopetuksen ensimmäisellä luokalla. Tutkimuksen tavoitteena oli selvittää, miten opetus jakautui oppitunneilla toteutuksen sisältöjen ja työskentelytapojen osalta ensimmäisen luokan aikana sekä miten nämä olivat yhteydessä oppilaiden lukutaitoon. Lukutaitoa tarkasteltiin lukemisen tarkkuuden, sujuvuuden ja luetun ymmärtämisen näkökulmista lukutaidon yksinkertaisen mallin (Simple View of Reading; Gough & Tunmer, 1986; Lerkkanen & Torppa, 2019) pohjalta. Mallia on hyödynnetty myös varhaisen lukemaan opettamisen tutkimuksissa, sillä mallista voidaan johtaa oletus siitä, että myös lukemaan opettamisen tulee kohdentua niin tarkan ja sujuvan lukutaidon harjoitteluun kuin kielellisen ymmärtämisen taitojen tukemiseen. Vaikka oppilaiden väliset erot tarkassa ja sujuvassa lukutaidossa ovat suuria ensimmäisen luokan alussa, erot lukutaitoisten ja aloittelevien lukijoiden välillä kapenevat nopeasti kouluvuoden aikana (Soodla ym., 2015). Luetun ymmärtämisen taustalla ovat vahvasti kielelliset taidot, mutta myös lukusujuvuus on vahvasti yhteydessä luetun ymmärtämiseen ensimmäisellä luokalla (Torppa ym. 2016).

Aiemmat tutkimukset ovat osoittaneet, että oppilaiden taidot ovat yhteydessä siihen, millaisesta opetuksesta he hyötyvät eniten (esim. Connor ym. 2004). Sujuvasti lukeva oppilas ei esimerkiksi enää hyödy lukemisen tarkkuuden harjoittelusta siinä missä aloittelevalle lukijalle tarkan lukutaidon oppiminen on välttämätöntä. Sen sijaan kummankin oppilaan voidaan nähdä hyötyvän kielellistä ymmärtämistä tukevasta opetuksesta, joka pitkällä tähtäimellä rakentaa luetun ymmärtämisen taitoa. Connor ym. (2004, 2013) ovat osoittaneet, että aloittelevat tai heikot lukijat hyötyvät opettajan tukemasta lukemisen harjoittelusta ja asteittaisesta itsenäisen harjoittelun lisäämisestä. Sen sijaan lukutaitoisten oppilaiden lukutaidon kehitystä tukee säännöllinen itsenäinen harjoittelu muun opetuksen ohessa. Valtaosa aiemmista tutkimuksista on keskittynyt tarkastelemaan opetuksen ja oppimisen välisiä yhteyksiä englanninkielisessä ympäristössä, joten on tärkeää tarkastella, ovatko tulokset toistettavissa myös muissa kieli- ja koulutusympäristöissä, tässä tutkimuksessa Suomessa ja Virossa. Kielen säännönmukaisen ortografian ansiosta suomalaiset ja virolaiset lapset oppivat lukemaan verrattain nopeasti ja painopiste opetuksessa siirtyy tarkan sanatasoisen lukutaidon opettelusta tekstitasoisen sujuvan ja ymmärtävän lukemisen harjoitteluun jo ensimmäisen luokan aikana oppilaiden lukutaidon kehittyessä.

Vähäiselle huomiolle niin kansallisessa kuin kansainvälisessä tutkimuksessa on jäänyt se, miten luokan oppilaiden taitotaso on yhteydessä opetukseen ja opettajan valitsemiin harjoitteisiin. Perusopetuksen opetussuunnitelman perusteet (Opetushallitus, 2014) velvoittavat opettajia ottamaan oppilaiden taidot huomioon opetusta suunniteltaessa. Suomessa opettajat voivat suunnitella ja toteuttaa opetusta verrattain itsenäisesti parhaaksi katsomallaan tavalla. Väitöstutkimuksen keskeisenä tavoitteena olikin tarkastella, onko luokan lukutaidon taso yhteydessä siihen, missä määrin lukutaidon eri osa-alueita tukevaa opetusta ja

harjoitteita oppitunneilla havaittiin niin syksyllä kuin keväällä. Lukutaidon tasolla tarkoitetaan ensimmäisen luokan syksyllä käytännössä sitä, kuinka paljon luokassa on aloittelevia lukijoita suhteessa lukutaitoisiin oppilaisiin.

Väitöstutkimus koostuu kolmesta vertaisarvioidusta osatutkimuksesta. Osatutkimusten aineistoissa hyödynnettiin suomalaisten Alkuportaat ja Opettajien ja oppilaiden stressi ja vuorovaikutus luokassa (TESSI) hankkeiden sekä virolaisen Reading study -hankkeen pitkittäisaineistoja oppilaiden lukutaidosta ja äidinkielen oppituntien ääni- ja videotallenteista. Oppituntien video-/ääninauhojen analysoinnissa hyödynnettiin Suomen ja Viron konteksteihin sovellettua, opetuksen yksilöllistämiseen kehitettyä havainnointimenetelmää (Individualizing Student Instruction [ISI] observation system; Connor ym., 2009). Menetelmässä lukutaidon opetusta tarkasteltiin sisällön osalta sekä sen suhteen, suuntasiko opettaja vai oppilas vai molemmat yhdessä huomiota tehtäviin. Opetuksen sisällöt koodattiin kestoina (kauanko kyseiseen sisältöön kohdentuva toiminta jatkui) ja luokiteltiin kahdentoista sisältöalueen suhteen (esimerkiksi lukutarkkuus, kuullun ja luetun ymmärtäminen), joista muodostuivat laajemmat foneemipohjaiset tarkkaa ja sujuvaa lukemista tukevat (code-focused) ja merkityspohjaiset ymmärtämistä tukevat (meaning-focused) sisältökategoriat. Huomion suuntaaminen tehtäviin (instructional management) katsottiin ensisijaisesti olevan joko opettajalla koko ryhmän opetustilanteissa tai oppilailla itsellään itsenäisen työskentelyn aikana. Kahdessa osatutkimuksessa hyödynnettiin huomion suuntaamisen ja sisällön yhdistelmäkategorioita (esimerkiksi ”oppilaiden oma huomion suuntaaminen merkityspohjaisessa työskentelyssä”).

Ensimmäisessä osatutkimuksessa tarkasteltiin opetuksen sisältöjen jakautumista tarkkaa ja sujuvaa lukemista sekä toisaalta kielellistä ymmärtämistä tukevan opetuksen kesken ja näiden yhteyttä luokan oppilaiden lukutaitoon ensimmäisen luokan keväällä Suomessa ja Virossa. Tutkimukseen osallistui Alkuportaat-pitkittäistutkimuksesta 12 opettajaa ja 154 oppilasta ja Reading study -pitkittäistutkimuksesta 21 opettajaa ja 415 oppilasta. Oppituntien sisältöjen jakautumista sekä opetuksen yksilöllistämistä maiden välillä verrattiin ristiintaulukoinnin sekä parametrittoman järjestyssummatestin avulla. Sisältökategorioiden yhteyttä oppilaiden lukutaitoon ja mahdollisia maiden välisiä eroja yhteyksissä analysoitiin monitasomallinnuksella. Tulosten mukaan eroja löytyi pikemminkin eri oppituntien välillä kuin maiden välillä. Sekä Suomessa että Virossa noin puolet oppitunnista sisälsi merkityspohjaisia sisältöjä ja noin viidennes foneemipohjaisia sisältöjä. Virossa opettajat kuitenkin käyttivät suuremman osan oppitunnista kuullun ja luetun ymmärtämisen harjoitteluun, kun taas vain suomalaisten opettajien oppitunneilla havaittiin opetuksen sisällön eriyttämistä. Opetuksen ja maan välillä havaittiin yhdysvaikutus: suomalaisessa aineistossa suurempi osuus foneemipohjaisia sisältöjä oli yhteydessä parempaan lukusujuvuuden tasoon. Lisäksi suurempi osuus foneemipohjaisia sisältöjä ensimmäisen luokan keväällä oli yhteydessä parempaan luetun ymmärtämiseen alkavilla lukijoilla.

Toisessa osatutkimuksessa tarkasteltiin luokan keskimääräisen sanalukutaidon yhteyttä lukemaan opettamiseen ensimmäisen luokan syksyllä. Aineistona käytettiin TESSI-tutkimuksen 616 oppilaan lukutarkkuuden ja -sujuvuuden testituloksia ja 35 luokan videoituja äidinkielen oppitunteja. Huomion suuntaamisen (opettaja/oppilas) ja sisällön (foneemipohjainen/merkityspohjainen) luokittelun pohjalta muodostettiin kolme yhdistelmäkategoriaa: 1) opettajan suuntaama huomio, foneemipohjainen opetus, 2) opettajan suuntaama huomio, merkityspohjainen opetus, ja 3) oppilaiden suuntaama huomio, itsenäinen työskentely (sisältäen sekä foneemipohjaisen että merkityspohjaisen harjoittelun). Monitasomallinnuksen tulokset osoittivat, että heikompi keskimääräinen sanalukutaidon taso oli yhteydessä suurempaan osuuteen opettajan suuntaamaan huomioon foneemipohjaiseen harjoitteluun oppitunnilla. Korkeampi sanalukutaidon taso oli puolestaan yhteydessä itsenäisen työskentelyn suurempaan osuuteen oppitunnilla.

Kolmas osatutkimus oli jatkoa toiselle osatutkimukselle. Tässä lukutaidon ja lukemaan opettamisen välisiä yhteyksiä ensimmäisen luokan aikana syksystä kevääseen tarkasteltiin 30 luokassa (n = 537 oppilasta). Opetuksen luokittelun osalta myös itsenäinen työskentely erotettiin foneemipohjaiseen ja merkityspohjaiseen harjoitteluun, minkä myötä yhdistelmäkategorioita tässä tutkimuksessa oli neljä. Tulosten mukaan syksyllä havainnoidut opetuksen yhdistelmäkategoriat eivät olleet yhteydessä luokan sanalukutaitojen tasoon keväällä, mutta opettajan suuntaama huomio (ts. koko ryhmän opetus) merkityspohjaisessa harjoittelussa oli myönteisesti yhteydessä luokan luetun ymmärtämisen tasoon keväällä. Syksyn sanalukutaidon taso oli yhteydessä opetusajan jakautumiseen keväällä: heikompi sanalukutaidon taso oli yhteydessä foneemipohjaiseen opetukseen niin koko ryhmän opetuksessa kuin itsenäisessä työskentelyssä, kun taas korkeampi sanalukutaidon taso oli yhteydessä itsenäiseen merkityspohjaiseen työskentelyyn keväällä.

Väitöstutkimuksen tulokset antoivat arvokasta tietoa oppilaiden taitotason ja opetuksen vastavuoroisesta suhteesta. Tutkimuksen aineistot olivat kuitenkin verrattain pieniä. Tulevaisuudessa olisikin tärkeä tarkastella taitojen ja opetuksen keskinäisiä suhteita suuremmilla otoksilla ja pidemmälle aikavälille ulottuvissa tutkimuksissa. Erityisen tärkeää olisi selvittää, miten eri luokka-asteilla luokan taitotaso on yhteydessä opetukseen ja toisaalta onko opetuksen mukauttaminen yhteydessä oppilaiden lukutaidon kehitykseen pidemmällä aikavälillä. Samalla olisi tärkeä selvittää, millaisista sisällöistä ja työskentelytavoista hyötyvät erityisesti ne oppilaat, joiden taitotaso eroaa luokan keskiarvosta ja jotka hyötyisivät eriyttämisen ja yksilöllistämisen erilaisista tavoista. Tutkimuksen tulosten perusteella voidaan todeta, että suomalaiset opettajat soveltavat lukemaan opettamisen käytäntöjä ja harjoitteita oppilaiden taitotason mukaan.

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ORIGINAL PAPERS

I

LITERACY INSTRUCTION ACTIVITIES AND THEIR ASSOCIATIONS WITH FIRST GRADERS' READING PERFORMANCE IN TWO TRANSPARENT ORTHOGRAPHIES

by

Jenni Ruotsalainen, Piret Soodla, Eija Räikkönen, Anna-Maija Poikkeus, Eve Kikas, & Marja-Kristiina Lerkkanen, 2022

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Literacy instruction activities and their associations with first graders' reading performance in two transparent orthographies

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ABSTRACT

The aim of the study was to analyse literacy instruction activities and their associations with the reading performance of first graders in Estonia and Finland, two countries that share similar orthographies and educational systems but differ in the onset of formal reading instruction. The contents of 33 Literacy lessons in first grade spring were analysed and students' (N_{EST} = 415, N_{FIN} = 154) reading performance was assessed in first grade autumn and spring. The results showed that there were more similarities than differences between the countries in literacy instruction activities, but some country-specific interaction effects were found between students' reading performance and contents of the instruction. Especially the slopes of reading performance development among Finnish beginning readers differed from the other readers in both countries with respect to the content of literacy instruction. The results highlight the importance of responsiveness to students' needs in early school years literacy instruction.

KEYWORDS

Reading fluency; reading comprehension; literacy instruction; first grade; transparent orthography

Introduction

Reading proficiency requires the development of both decoding and comprehension skills (Gough and Tunmer 1986) as well as instructional practices that address both of these areas (Connor, Morrison, and Katch 2004). Estonia and Finland provide an interesting comparative context as they both have languages with transparent orthographies, and in both countries, students enter school at the age of seven. However, the onset of formal reading instruction takes place in kindergarten in Estonia but in first grade in Finland. Earlier findings (Soodla et al. 2015) have shown that in spite of the later onset of instruction, Finnish students on average reach the same level of reading fluency and reading comprehension as their Estonian peers by the end of first grade. In addition, small but significant

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differences emerge in reading comprehension in second grade in favour of Finnish students (Soodla et al. 2019).

Instruction in first grade has been shown to have a greater impact on students' reading skills than instruction in other grade levels (Connor et al. 2013). The characteristics of first grade instruction may help to explain why the earlier onset of reading instruction does not seem to give long-term advantages to Estonian students over Finnish students. The need for balanced instructional practices that support both the development of students' foundation-level code-focused (CF) skills of decoding and reading fluency and the broad advancement of meaning-focused (MF) comprehension skills has been widely acknowledged (e.g. Connor, Morrison, and Katch 2004; Kendeou et al. 2009). Yet, analyses of the effects of specific instructional practices at these differentiated levels from classroom observations are rare. Previous research has predominantly focused on the effects of different types of literacy programmes or interventions (e.g. González-Valenzuala and Martín-Ruiz 2017), students at-risk for reading difficulties (Swanson 2008), and the overall quality of teaching style (e.g., Tang et al. 2017).

The present study employs a cross-country comparison to examine instructional activities used in first grade Literacy lessons in Estonia and in Finland, and their associations with students' reading performance at the first grade. In the classroom observations and analysis of literacy instruction activities, the *Individualising Student Instruction* (ISI) observation system (Connor et al. 2009) was adapted for the first time in Estonia and Finland to examine the CF and MF content of instruction.

Emerging literacy skills

A central aim of entry-level formal schooling is setting a strong foundation for students' literacy skills. Thus, it is important to be aware of the most effective teaching practices in the classroom. The widely used theoretical account on reading, The Simple View of Reading (SVR; Gough and Tunmer 1986), which is a widely used theoretical account on reading, suggests that reading comprehension is a composition of efficient decoding skills and linguistic comprehension of which development are affected by somewhat different cognitive antecedents (Torppa et al. 2016). Linguistic comprehension and vocabulary develop through informal and formal exposure to interactions throughout one's life, whereas acquiring the ability to decode words is a more rapid process where students must master a constrained amount of letter-sound combinations and the alphabetic principle (Paris 2005). Typically, in transparent orthographies the acquisition of decoding skill takes place soon after reading instruction has begun and students advance to a rather fluent reading level after the first year of school (Lerkkanen et al. 2004). Although vocabulary and linguistic comprehension have been shown to be stronger long-term predictors of reading comprehension than decoding or reading fluency, the significance of fluency is evident during the first school years (e.g,. Torppa et al. 2016).

Literacy instruction in first grade

At the entry-level stage of formal reading instruction, students present a wide spectrum of skill profiles, which challenges the classroom teacher to adapt his or her instruction to correspond to the students' various skill levels (Connor, Morrison, and Katch 2004). The

sensitivity of the teacher to take a student's skills into account and tailor the instruction has been shown to contribute to the development of students' reading skills (Connor et al. 2013). A heavier emphasis on activities that support the development of CF skills, for example, through letter knowledge, phonological awareness, and decoding tasks, is commonly needed in the beginning of the first school year, whereas the focus may later shift towards incorporating more MF activities (Connor, Morrison, and Katch 2004). For students who struggle in the early reading acquisition phase, a longer period of time practising CF skills is required (Connor et al. 2013). Thus, balancing the types and emphases of literacy instruction at individualised level is important based on students' different skills (Connor, Morrison, and Katch 2004) and particularly for students who are at risk of reading difficulties (Puliatte and Ehri 2018).

In their framework and observational coding scheme of literacy instruction, Connor et al. (2009) focus on three dimensions that capture the variations in literacy instruction. These comprise the context (e.g. whole vs. small group instruction), management (e.g. teacher vs. child managed direction of attention), and content of instruction. The present study centres on the *content* of literacy instruction which contains the categories of CF or MF activities. *CF* activities aim at providing support for early decoding and spelling skills, such as blending phonemes, or doing spelling exercises, and later, practising reading fluency. In contrast, *MF* activities seek to support students' comprehension skills via meaning-based discussions and reading comprehension tasks, for example.

In the beginning phase of reading acquisition, students benefit from the explicit instruction of CF skills (Connor, Morrison, and Underwood 2007) and practising of comprehension skills together with the teacher (Connor, Morrison, and Petrella 2004). For those students who can already decode, independent practising of reading fluency and comprehension would rather support them in consolidating their skills towards better reading performance (Connor, Morrison and Katch 2004, Connor, Morrison, and Underwood 2007)

The two languages of focus in the present study, Estonian and Finnish, belong to the Baltic-Finnic group of the Finno-Ugric family of languages. The languages are not mutually intelligible but have many commonalities such as complex morphologies but highly transparent orthographies and some common lexicon (e.g. number one is üks [/yks/] in Estonian and yksi [/yksi/] in Finnish). Both are agglutinative languages, meaning that grammatical roles as well as semantic information are indicated by inflectional suffixes (Kaivapalu and Martin 2017). In both languages, phonetic speech-sound duration is used to carry meaning.

Because of the highly transparent orthography (almost perfect phoneme-grapheme correspondence), reading instruction is phonics based. After the first phonemes are introduced to students, phonemic assembly and progress towards full mastery of accurate decoding are relatively easy for beginning readers (Aro 2017). Estonian children receive explicit instruction on reading one- to two-syllable words already in kindergarten, and thus, over 90% of children can read at least some words before the beginning of first grade (Soodla et al. 2015). In Finland, children are not systematically taught to read in kindergarten, but their emerging literacy development is promoted by playful activities involving letters and phonological awareness activities (Lerkkanen 2007). Even in the absence of formal reading instruction prior to school, approximately 30% of the Finnish children can already read upon entering school (Soodla et al. 2015).

The national core curriculum guidelines in Estonia concerning the kindergarten year (Vabariigi Valitsus [2011] 2018) emphasise practising foundation-level decoding

accuracy and at the first grade on fluency, but in Finland (Finnish National Agency for Education 2016), this particular emphasis on decoding spans the first school year while in kindergarten the focus is to support pre-literacy skills such as letter knowledge and phonological awareness. In both countries at school, seven 45 minutes lessons per week is allocated to literacy instruction in the first grade. The emphasis on supporting students' development of reading fluency and comprehension increases in both countries from first grade spring semester onwards. Both Estonian and Finnish teachers have high professional autonomy, which allows them to adapt and differentiate their teaching practices and pedagogical approach in their instruction.

The aims of the study

The present study examines the instructional activities during Literacy lessons in Estonia and Finland and their associations with students' reading performance during the first school year. The following research questions and hypotheses were set in the study:

(1) How is literacy instruction implemented in the observed Estonian and Finnish classrooms in first grade spring? We expected (1a) to identify more MF activities, especially listening and reading comprehension activities, in the Estonian first grade classrooms in contrast to the Finnish context as Estonian students receive formal reading instruction for one year longer and their decoding skills are ahead of those of Finnish students at school entry (Soodla et al. 2015). Although teachers in both countries have reported providing individual support for students with poorer reading skills (for Estonian, see Kikas et al. 2016; for Finnish, see Kiuru et al. 2015), we expected (1b) to observe more individualised practices in Finnish classrooms as Finnish first graders are likely to vary more in their literacy skills at school entry (Torppa et al. 2019).

(2) How are the amounts of time used for CF vs. MF literacy instruction contents in Estonian and Finnish classrooms associated with the students' reading performance (fluency and comprehension) in the spring of first grade? Are these associations similar for students with different entry-level reading fluency? We assumed (2a) that Estonian students' reading performance would be associated more with high amount of MF activities and that of Finnish students with high amount of CF activities because Estonian students' reading fluency is on average higher than those of Finnish students in first grade autumn (Connor, Morrison, and Katch 2004; Soodla et al. 2015). We further assumed (2b) that in both countries students showing the highest reading fluency would show higher reading comprehension performance when attending a classroom with greater amount of time on MF activities, whereas for beginning readers with low reading fluency reading comprehension would be associated with the presence of both CF and MF activities (Connor, Morrison, and Petrella 2004; Connor et al. 2013).

Method

Participants and procedure

The participants consisted of 33 classroom teachers (21 from Estonia, 12 from Finland) and a total of 569 students from 33 first grade classrooms. The Estonian sample is part of a longitudinal Reading Study study (Soodla et al. 2015), including classrooms from three municipalities in different parts of Estonia. The Finnish data are part of a longitudinal First Steps study (Lerkkanen et al. [2006] 2016), of which the present sample comprises classrooms from two municipalities in Central Finland.

Teachers

Ten Estonian first grade teachers in spring 2012 and 11 teachers in spring 2013 in seven schools, and 12 Finnish first grade teachers in ten schools in spring 2008 participated in the classroom observations. The teachers filled out a questionnaire on their educational background and teaching experience. All 33 teachers (21 Estonian and 12 Finnish teachers) were female and their teaching experience was as follows, respectively: less than one year of experience (23.8% vs. 8.3%), 1–5 years (0% vs. 25%), 6–10 years (14.3% vs. 16.7%), 11–15 years (4.8% vs.16.7%), and more than 15 years of experience (57.1% vs. 33.3%). The majority (n = 18, 85.7%) of the Estonian teachers had a masters' degree in education, and three teachers (14.3%) had a bachelor's degree in education. All of the Finnish teachers had a masters' degree in education. The teachers of the two countries did not differ in their teaching experience ($\chi^2(4) = 8.37$, $p = .079$) or educational background ($\chi^2(1) = 1.89$, $p = .170$).

Students

The Estonian sample consisted of 415 students (51% boys; mean age of students in first grade autumn 88.07 months, SD = 3.82). The data were collected in two cohorts during the academic years 2011–2012 and 2012–2013. The Finnish sample consisted of 154 students (54% boys; mean age of students in first grade autumn 85.80 months, SD = 3.38) in the academic year 2007–2008. Mean class sizes were 19.76 students (SD = 2.86) in Estonia and 12.83 students (SD = 3.71) in Finland, respectively. The samples did not differ in terms of the distribution of students' gender, $\chi^2(1) = .49$, $p = .485$, but Estonian students were on average 2.6 months older, $t(565) = 6.47$, $p < .001$, and the Estonian class size was bigger, $t(31) = 6.00$, $p < .001$.

In both countries, the students' parents were asked to give their written informed consent for their own and their child's participation in the study. Three categories were formed based on the parents' reported educational levels: 1) low level (less than secondary education, <12 yrs of education); 2) medium (secondary, 12 yrs of education); and 3) high (higher than secondary education, >12 yrs of education). The highest level of education in the family was included in the analysis. In Estonia, a total of 3% (10% in the general population based on Eurostat 2013) of the families had a low educational level, 31% (52% in the general population) had a medium education level, and 65% (37% in the general population) had a high education level. The educational levels in Finland from low to high were: 3% (12% in the general population), 25% (46% in the general population), and 57% (42% in the general population), respectively. Parental educational levels were similar in Estonia and Finland ($\chi^2(2) = .30$, $p = .863$), but in both countries,

the proportion of parents having the highest educational level was higher in the present sample than in the general population.

Measures

Classroom observations of literacy instruction activities

Observations in the classrooms were carried out in first grade spring (April) during three lessons on one day in Estonia and during three lessons on each of two days in Finland. The observations were scheduled at the teachers' convenience. In Estonia, all three lessons for each classroom were recorded using Dictaphones. In Finland, one of the lessons on both days was recorded using an MP3 recorder. Only the recordings of Literacy lessons were used in the present analyses. In eight cases in Estonia and in one case in Finland, two Literacy lessons were obtained. In these cases, the first Literacy lesson was included in the study. The lessons averaged 43 minutes in length (SD = 5.68 min; ranging from 27 minutes to 61 minutes). The length of the lessons did not differ between Estonian and Finnish classrooms ($\chi^2(32) = 33.00$, $p = .418$). Because of the variation in the length of the lessons, the results are presented as percentages of time of activities.

The Literacy lessons were coded with respect to the duration of the contents of instructional activities following the Individualising Student Instruction (ISI) classroom observation system developed by Connor et al. (2009). The detailed manual of the original ISI/Pathways coding system (Connor et al. 2010) was closely followed and revised to meet the language and content-specific features of Estonian and Finnish literacy instruction (adaptation by Poikkeus et al. 2013). Instructional activities were coded using the Observer Pro software (Noldus Information Technology 2001). The coding scheme included codes for content areas such as fluency and listening and reading comprehension, as well as non-instructional activities (e.g. transitions between activities or orientation). In the analysis phase, the codings assigned in each category (as durations in seconds) were summed under broader categories of *CF* and *MF* activities and non-instructional activities according to the manual. Classification of the codes of literacy instruction content activities into CF or MF categories is indicated in Table 1 via superscripts. In addition, the amount of individualising of literacy contents (e.g. the teacher gave at least two different tasks, such as writing at the word or sentence level) was included to the analyses as *individualised work*.

Every activity that lasted at least 10 seconds was coded. Two researchers carried out all of the codings (one from Estonia and one from Finland). Both of the researchers participated in adapting the ISI method for the Estonian and Finnish instructional contexts and languages. During the adaptation, examples from the data and suggestions for modifications to the coding manual were carefully discussed with the research team. For reliability analysis, four Estonian and four Finnish lesson transcripts were cross translated by a native Estonian who speaks fluent Finnish. Interrater agreement between the coders was calculated, and the percentage of full agreement was 88.8%.

Student reading performance

Students' reading skills were assessed using group-administered tests in the classrooms in first grade autumn (reading fluency) and first grade spring (reading fluency and reading comprehension). The reading measures were drawn from a Finnish national normative

Table 1. Descriptive information of the study variables.

	Total sample			Estonia			Finland		
Variables	*N*	Min	Max	*n*	*M*	*SD*	*n*	*M*	*SD*
Students' measures									
Word reading fluency, Grade 1 autumn	548	0	41	397	12.42	7.266	154	8.04	5.998
Word reading fluency, Grade 1 spring	566	5	50	415	17.78	7.809	154	19.44	8.594
Reading comprehension, Grade 1 spring	566	0	12	412	6.09	2.904	154	5.66	3.279
Instructional contents, Grade 1 spring									
Non-Instructional	33	12.05	48.22	21	26.17	9.230	12	26.06	9.118
Phonological Awareness[1]	5	2.62	26.53	3	13.96	11.634	2	5.70	4.357
Morpheme Awareness[2]	4	1.54	58.57	3	2.86	1.152	1	58.57	
Word Identification/Decoding[1]	9	.99	14.67	5	3.71	3.227	4	6.20	6.261
Word Identification/Encoding[1]	16	.96	44.06	8	10.75	8.902	8	16.44	13.537
Grapheme-Phoneme Correspondence[1]	2	2.10	13.77	2	7.93	8.250	0		
Fluency[1]	17	.53	15.63	9	7.27	4.464	8	10.21	5.382
Print and Text Concepts[2]	15	.36	19.32	9	2.15	2.051	6	5.35	7.179
Oral Language[2]	26	.47	44.92	15	9.21	10.918	11	8.61	11.448
Print Vocabulary[2]	24	.41	46.72	19	10.74	10.881	5	7.06	8.280
Listening and Reading Comprehension[2]	32	.58	43.64	21	20.73	11.704	11	9.92	9.111
Text Reading and Listening[2]	32	4.08	42.82	20	17.23	9.770	12	14.14	9.590
Writing[1,2]	13	3.02	53.81	7	26.57	19.834	6	21.45	15.399
Other Subjects[2]	9	.97	10.55	4	4.45	4.447	5	1.94	.976
Code-Focused (CF)	30	.96	56.44	18	19.91	16.145	12	25.39	14.910
Meaning-Focused (MF)	33	13.92	83.45	21	58.25	21.234	12	48.55	15.320
Individualised work	5	1.64	44.89	0			5	20.59	20.695

[1]Summed up under CF activities; [2] summed up under MF activities.
Writing activities included both CF activities (e.g. *Dictation* and *Copying* on sentence level cf. *Spelling* tasks in *Word Identification/Encoding*) and MF activities (e.g. *Writing process instruction* or *Student group writing*) and were summed up under the corresponding total sum.

test battery (Lindeman 1998) and translated into Estonian (for more information, see Soodla et al. 2015).

Reading fluency. In this two-minute speeded test, the students were asked to match a picture to a corresponding word from four phonologically similar words. The sum score of correctly matched items was used (maximum score = 80). Test–retest reliability was .78 in the Estonian data and .67 in the Finnish data, respectively. In Finland, students who cannot read at school entry improve more in their reading fluency during the first grade than others and this heterogeneity among students' entry-level skills is likely to explain the lower reliability for the test–retest measure in the Finnish sample (Lerkkanen, Ahonen, and Poikkeus 2011).

Reading comprehension. The reading comprehension test consisted of an expository text and a total of 12 comprehension questions. There were 11 multiple choice questions with four alternative answers for each question and one question that required the students to order the informational units according to the text. The sum of the correct responses (maximum score = 12) was used. Cronbach's alphas were .88 in the Estonian data and .78 in the Finnish data.

Data analyses

We first examined the implementation of literacy instruction activities in Estonian and Finnish first grade classrooms. As it was not expected that all content areas would occur

in every classroom, we recoded each lesson as either including or not including the specific content. We then ran chi-square tests of independence for the associations between country and instructional activities. Further comparisons of the durations of the instructional activities in each country were run for those activities that were observed in almost all (i.e. over 90% of the classrooms) or all classrooms. Because of the small number of Literacy lessons and deviations from the normal distribution in instructional activities, non-parametric Mann–Whitney U tests were used in the analyses. The probability-based effect size measure *A* was used for the Mann–Whitney U tests for its documented suitability for non-parametric tests (Ruscio 2008). The *A* value ranges from .5 (lowest probability) to 1.0 (highest probability) for the probability of a randomly chosen member from Group 1 (in this study Estonia) to score higher than a randomly chosen member from Group 2 (in this study Finland).

Second, multilevel modelling techniques (Muthén 1997) were applied to analyse the associations between the CF and MF activities and country with students' reading fluency and reading comprehension. In the analyses, classroom was used as a clustering variable.

Intraclass correlations (ICC; Heck 2001; Muthén 1991) were calculated to determine the proportion of variance in students' reading fluency and reading comprehension that was attributable to the classes in both Estonia and Finland. In addition, correlations among study variables at within and between levels were computed. Second, two random coefficient multilevel regression models (Muthén and Muthén [1998] 2015) were constructed to investigate the extent to which differences existed between Estonian and Finnish classrooms' associations between the content of activities (CF or MF) and students' reading performance (reading fluency and comprehension) in first grade spring. Furthermore, we examined the impact of entry-level reading performance in first grade autumn on these associations. Analyses were conducted separately for CF and MF activities.

In the multilevel models (see Figure 1), variances in the reading performance variables in first grade spring were differentiated into two components: variations that were due to similarities among students in the same classroom (between-class level variation) and variations that were due to students' differences within the classrooms (within-class level variation). Other variables were treated as either between- or within-level variables as follows. At the student (within) level, the level of students' reading fluency and reading comprehension in first grade spring were predicted by students' entry-level reading fluency in first grade autumn while adjusting for parents' level of education. The level of reading fluency and comprehension in first grade spring were allowed to vary randomly across classrooms (L_1 and L_2 in Figure 1). Similarly, the strengths of the associations (i.e. slopes) of entry-level reading fluency in first grade autumn on reading fluency and comprehension in first grade spring (S_1 and S_2 in Figure 1) were allowed to vary randomly across the classrooms. These random levels and slopes are denoted in Figure 1 by black dots at the within level and as larger circles denoting latent variables at the between level. Then, the aforementioned random variations in the levels and slopes were modelled at the classroom (between) level by four continuous latent variables (Muthén and Muthén [1998] 2015). These latent variables were predicted by the content of activities (either CF or MF), country, and their interaction.

Multilevel analyses were performed using the Mplus statistical software (version 7.4; Muthén and Muthén [1998] 2015). As the variables were skewed, the parameters of the models were estimated using maximum likelihood estimation with non-normality robust

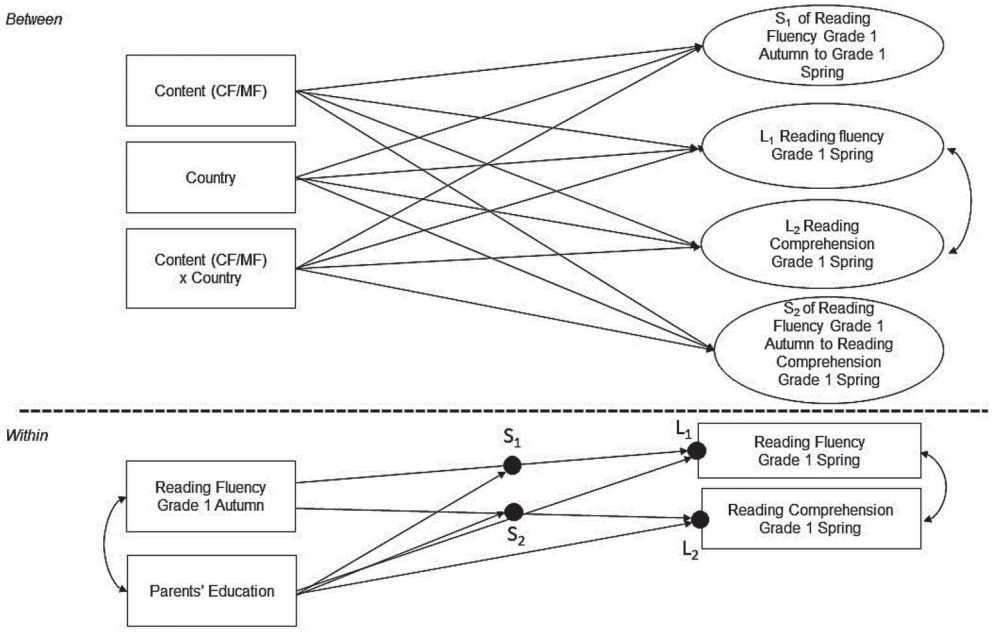

Figure 1. Hypothetical model of the associations of the literacy instruction activities in Estonia and Finland on reading fluency and reading comprehension at the end of first grade. Reading fluency at first grade autumn and parents' education were controlled for.

standard errors maximum likelihood robust (MLR). The Full-Information-Maximum-Likelihood (FIML) procedure was used to account for missing data (Enders 2010). This method uses all available data to estimate the model without imputing data.

Results

Implementation of instructional activities

The descriptive statistics of the study variables are shown in Table 1.

Instructional contents varied between the lessons as the content reflected the topics of the Literacy lessons. In every classroom, some non-instructional activities (M = 26.13%, SD = 9.05%) and a large proportion of MF activities (M = 54.72%, SD = 19.62%) were observed. CF activities were observed in 30 out of the 33 (90.91%) classrooms, and their proportion was smaller than that of MF activities (M = 22.10%, SD = 15.64%). No statistically significant differences were found in the extent of CF (p = 0.096) or MF (p = 0.122) activities between Estonian and Finnish classrooms at the composite level. Certain predominant MF activities, especially *listening and reading comprehension* and *text reading and listening*, were observed in all or nearly all classrooms, whereas the range of different CF activities used by the teachers was larger.

Even though students' vocabulary was supported in some form in most of the classrooms, it was supported more often in printed form in Estonian classrooms than in Finnish classrooms ($\chi 2(1) = 9.17$, p = .002, r = .53). The durations of text reading and listening as well as listening and reading comprehension activities, which were observed

in all but one classroom, were compared between countries. A statistically significant difference between countries was found for *listening and reading comprehension* ($U = 54.00$, $p = .014$, $A = .77$), which was observed more in Estonia than in Finland. *Individualised work* was observed solely in Finland ($\chi 2(1) = 10.31$, $p = .001$, $r = .56$) in 5 out of 12 classrooms.

The associations between students' reading performance and instructional activities

The results of the ICC for reading fluency and reading comprehension showed that differences between classrooms were statistically significant and explained 9% to 17% of the total variance in the total sample (Table 2). However, further analyses showed that differences between classrooms were significant only in Estonia whereas in Finland differences between classrooms were negligible. Students' reading fluency and reading comprehension showed moderate to strong correlations at within level and, in Estonia, also at between level. In Finland, a strong correlation was found especially between the amount of CF activities in the observed Literacy lessons, and students' reading fluency in first grade spring.

Next, the relationships between the content of instruction, country, and entry-level reading fluency on students' level of reading fluency and reading comprehension in first grade spring were investigated. Separate analyses for CF and MF activities were conducted. At the within-level, students' reading fluency and reading comprehension were statistically significantly associated with each other (CF: unstandardised estimate = 2.04, $p = .001$; MF: unstandardised estimate = 1.98, $p = .001$). The estimates and standard errors of the estimates at the between-level are presented in Table 3. The results related to the level of reading fluency (L_1 in Figure 1) and the strength of the association from entry-level reading fluency to reading fluency in first grade spring (S_1 in Figure 1) are presented next, followed by the results related to the level of reading comprehension (L_2 in Figure 1) and the strength of the association from entry-level reading fluency to reading comprehension in first grade spring (S_2 in Figure 1).

Interactions between the content (CF or MF) of instruction and country were associated with the level of reading fluency (Table 3). In both models, Finnish students' levels of reading fluency were somewhat higher than their Estonian peers. In Estonia, the amount of CF or MF instruction was not associated with the students' level of reading fluency (for CF: $z = -1.21$, $p = 0.227$; for MF: $z = 0.73$, $p = 0.466$). In the Finnish sample, the amount of both CF ($z = 5.08$, $p < .001$; Figure 2) and MF ($z = -2.89$, $p = 0.004$) activities was associated with the students' level of reading fluency: high amount of CF activities and low amount of MF activities were associated with higher level of reading fluency among the students. In addition, the level of reading fluency differed in Estonia and Finland when a high amount of CF activities ($z = 43.94$, $p < .001$; Figure 2), a low amount of MF activities ($z = 5.09$, $p < .001$) and a high amount of MF activities ($z = 1.98$, $p = 0.048$) were observed.

Neither the content of instruction, country, nor their interaction predicted the random slope of reading fluency in first grade spring (Table 3). That is, the strength of the association between entry-level reading fluency and reading fluency in the spring of first grade was similar in the Estonian and Finnish classrooms regardless of the amount of CF or MF activities.

Table 2. Intraclass correlations (ICC) of students' reading fluency and reading comprehension and correlations among them at within and between levels in the Estonian (above the diagonal) and Finnish (below the diagonal) samples.

Variable		ICC in the total sample (N = 569)	ICC in Estonia (n = 415)	ICC in Finland (n = 154)	1.	2.	3.	4.	5.
1. Reading fluency, Grade 1 autumn	Within Between	0.17***	0.15**	0.00	–	.80*** .67***	.48*** .58**	−.01	−.04
2. Reading fluency, Grade 1 spring	Within Between	0.15**	0.19*	0.04	.68*** .47	–	.47*** .57***	−.04	-.31
3. Reading comprehension, Grade 1 spring	Within Between	0.09***	0.09**	0.06	.55*** -.24	.44*** -.00	–	−.06	−.01
4. Amount of CF instruction, Grade 1 spring	Within Between				.16	.71	.34	–	−.93***
5. Amount of MF instruction, Grade 1 spring	Within Between				.25	−.37	−.13	−.82	–

*p <.05, **p <.01, ***p <.001.
CF = code-focused, MF = meaning-focused.

Table 3. Estimates and standard errors of the CF and MF multilevel random regression models at the classroom (between) level.

	Level 1 (L_1) reading fluency Grade 1 spring		Level 2 (L_2) reading comprehension Grade 1 spring		Slope 1 (S_1) from reading fluency in Grade 1 autumn to reading fluency Grade 1 spring		Slope 2 (S_2) from reading fluency in Grade 1 autumn to reading comprehension Grade 1 spring	
Independent variables	β	*S.E.*	β	*S.E.*	β	*S.E.*	β	*S.E.*
CF	−.53	.44	−.14	.26	−.19	.28	**.23****	**.09**
Country	**3.73*****	**.75**	−.02	.46	−.00	.79	**.88****	**.23**
CF*Country interaction	**2.01****	**.53**	.57	.46	−.05	.76	**−.82*****	**.25**
MF	.35	.48	.05	.25	.19	.30	−.15	.11
Country	**3.68*****	**.73**	−.04	.52	.34	.67	**.97*****	**.26**
MF*Country interaction	**−1.81****	**.70**	−.48	.60	.86	.52	**.99*****	**.27**

CF = code-focused; MF = meaning-focused.
* p <.05, ** p <.01, *** p <.001.

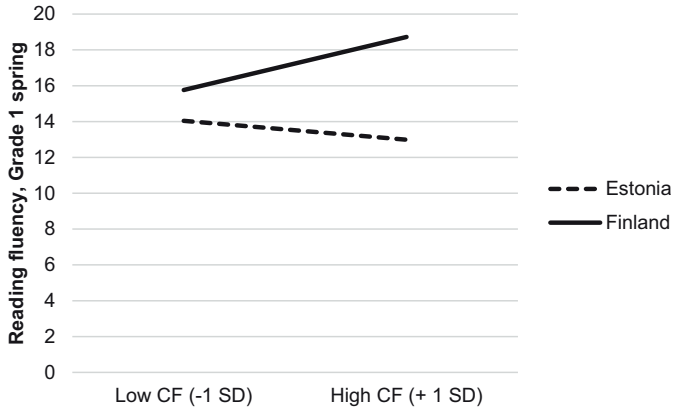

Figure 2. The strength of the association between CF instruction and country with level of reading fluency in Grade 1 spring.
CF = code-focused.

Both interactions between the content of instruction (CF or MF) and country only predicted the random slope of reading comprehension in first grade spring (S_2; Table 3). That is, the strength of the association between entry-level reading fluency and reading comprehension at the end of first grade differed in the Estonian and Finnish classrooms, according to the amount of certain literacy instruction content. This was found for both CF and MF.

Further analyses for CF showed that the amount of CF activities did not have different effects on the reading comprehension of Estonian students with different reading fluency levels in the beginning of the school year or on Finnish students who had high reading fluency levels at the beginning of first grade (Figure 3). Instead, their reading comprehension was at the level with their autumn reading fluency. In contrast, for Finnish students whose reading fluency was one standard deviation below the mean in first grade autumn, the amount of CF activities seemed to matter. Their slope S_2 differed statistically significantly from that of Estonian beginning readers (slope difference: z = 3.06,

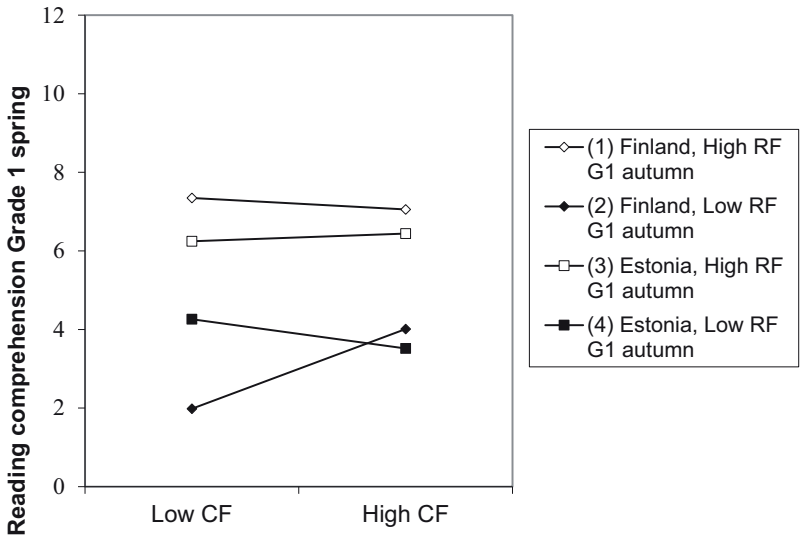

Figure 3. The differences in the strength of associations in CF model from reading fluency in Grade 1 autumn to reading comprehension in Grade 1 spring in Estonia and Finland.
CF = code-focused; RF = reading fluency.

$p = 0.002$), as well as from the more advanced readers in Estonia ($z = 2.85$, $p = 0.005$). Based on the slopes, the Finnish beginning readers tended to have better reading comprehension if they were exposed to high rather than low amounts of CF activities.

Similar results were found in the MF model as in the CF model. Only the S_2 of Finnish beginning readers differed statistically significantly from other groups: the slope difference between Finnish and Estonian beginning readers was $z = -2.33$ ($p = 0.020$), between Finnish beginning readers and more advanced readers in Estonia $z = -3.40$ ($p = 0.001$), and between Finnish beginning readers and Finnish more advanced readers $z = 1.99$ ($p = 0.047$), respectively. Based on the slopes, the Finnish beginning readers' reading comprehension tended to be poor if they were exposed to a high amount of MF activities.

Discussion

The aim of the present study was to investigate literacy instruction in Estonian and Finnish first grade classrooms by the ISI observation coding system, and to examine associations between literacy instruction and reading performance among Estonian and Finnish students. We found more similarities than differences in literacy instruction between Estonia and Finland, but the analyses of the associations with students' reading performance revealed some country-specific interaction effects. These findings suggest that both differences in students' entry-level reading skills and in teachers' predominant emphases may be relevant in determining the amount of CF and MF activities that would provide an optimal balance for the group and phase of literacy learning.

First, we investigated how literacy instruction was implemented in Estonian and Finnish classrooms. Our findings supported the hypothesis (Soodla et al. 2015) that in contrast to Finnish teachers, Estonian teachers spend more classroom time on listening

and reading comprehension activities. Furthermore, we expected to observe more individualising activities in Finland as Finnish students pre-literacy skills vary more, but surprisingly individualising practices when teaching basic literacy skills were found only in Finland. This pattern of findings appears to reflect teachers' adapting their instructional strategies to the different phases of students' formal literacy learning careers. As almost all of the Estonian students were able to decode words upon entering school, in Estonian first grade classrooms, the emphasis on comprehension was stronger than in Finnish classrooms. In Finland, teachers tended to engage more often in individualising literacy contents based on students' reading skills. Smaller class sizes and presence of a qualified teacher in the Finnish classrooms, in comparison to Estonian bigger class sizes and some teachers without a master's degree, may have contributed to the finding that individualised activities were observed only in Finland. Furthermore, there are some differences in curriculum, teaching material and contents in teacher training which may also link to the different findings of instructional activities (Kikas and Lerkkanen 2011).

Second, we examined the associations between instructional activities and students' reading fluency and comprehension. Our hypotheses of the associations were only partially confirmed. The amount of either CF or MF activities did not associate with the level of reading fluency or comprehension among Estonian students nor had any additional effect on students' first grade spring performance when students' entry-level reading fluency was taken into account. The results for Finnish students were more in line with our hypotheses and the earlier findings of Connor et al. (e.g. 2007, 2009), as a high amount of CF activities was associated with higher levels of reading fluency. In addition, the amount of time spent in CF activities was also positively associated with better reading comprehension results among students with low entry-level reading fluency.

One possible explanation for the discrepancies between the countries in these results is likely due to the differences in the onset of reading instruction and, hence, the students' entry-level reading skills. In contrast to Finnish first graders, Estonian first graders' low reading fluency at the beginning of first grade may be a stronger sign of a more persistent deficiency in reading fluency and not just a natural manifestation of variations in children's rates of early literacy development (Torppa et al. 2019). We expected Estonian slow readers to show better performance when higher amount of CF activities was observed based on earlier findings of the need for a longer period of time for CF activities among lower performing students (e.g. Connor et al. 2013), but this was not verified in our study, and this kind of support was not provided by differentiating the literacy contents based on students' skill levels. It is possible that a lot of time spent on reading comprehension activities might have been too demanding for some of the Estonian students and hindered their further development. This may be linked to the worrying findings of low performing Estonian students lagging behind in their skill development (Torppa et al. 2019)

In Finland, the development of reading fluency among students who do not read before entering school is very rapid during the first few months of formal education in first grade autumn (Lerkkanen et al. 2004). As the assessment of reading fluency at the beginning of first grade provides a less stable estimate of Finnish students' skills than those of Estonian students (Torppa et al. 2019), more time spent on activities that supported the development of CF skills seemed to support the development of students' reading fluency in

general, and it also appeared to be associated with the reading comprehension of the lowest performing beginning readers. In addition, the somewhat higher incidence of individualised activities in Finland suggests that teachers may be more likely to take students' different skill levels into account when implementing literacy activities. Finnish teachers reported that they provide more individualised support to students with poorer skills (Kiuru et al. 2015), and this may take place with tasks of different levels of difficulty.

Limitations

This study has limitations, which should be taken into account. First, the analyses were based on the literacy instruction activities of one lesson in each classroom. As teacher choices of contents are likely to differ somewhat from lesson to lesson the observation cannot reflect the whole spectrum of literacy instruction activities in Estonian and Finnish classrooms. However, as the analyses were conducted on the level of summative categories of CF and MF, we expect that the observed differences between classrooms, especially at country level, are characteristic of typical instructional practices in these countries. Second, the current analyses were based on audio-recorded data, which does not give complete information about the instructional activities provided to students. Third, owing to the small sample size our study may have suffered from limited statistical power. This may have resulted in an inability to detect some of the more subtle interconnections between country, content of instruction, and reading performance. Also, it should be noted that the results relating to the interconnections between content, country, and reading performance do not imply causal relationships as they were mostly measured within the same time point.

Conclusion

Overall, students' spent more time on MF activities than on CF activities on first grade spring. Yet, CF activities are important as there is variation in students' reading performance and there are still students who are learning to decode in first grade spring and, hence, need support to consolidate these skills. These results highlight that in early years literacy instruction, students need ample support and exposure to literacy content and instruction adapted to their skill level. This is especially important for readers with low reading fluency skill who, thus, need more support on coding skills.

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II

LITERACY INSTRUCTION IN FIRST GRADE: CLASSROOM-LEVEL ASSOCIATIONS BETWEEN READING SKILLS AND LITERACY INSTRUCTION ACTIVITIES

by

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Literacy instruction in first grade: classroom-level associations between reading skills and literacy instruction activities

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Background: Adapting instruction to individual students' needs is known to be effective, but there is a lack of evidence whether students' reading skills are associated with literacy instruction activities at classroom-level. Both the content of the literacy instruction and teachers' instructional support through instructional management are considered.
Methods: The data were collected in the context of Finland where first graders' reading skills show great variation at school entry but rapid progress. Students (n = 616) were individually tested on their reading skills, and literacy lessons in 35 classrooms were video recorded in the autumn of first grade. Multilevel path analyses were conducted to examine the classroom-level associations between reading skills (accuracy and fluency) and three types of literacy instruction activities (coded from the video recordings). The number of students present and the teachers' work experience were controlled in the analyses.
Results: The results indicated that, at classroom-level, lower average reading skills were associated with more lesson time allocated to code-focused activities such as decoding and spelling tasks in which instructional management was directed for the whole group. In turn, higher average reading skills in classrooms were associated with more lesson time allocated to individual or small group assignments. The reading skills were not associated with meaning-focused activities such as text-level reading activities and class discussions with the whole group.

Conclusions: In early literacy lessons, students' reading skills were associated with teachers' implementation of different literacy instruction activities at classroom-level. In classrooms with more students having already acquired basic decoding skills, teachers provided more classroom time for independent practice and individual support, which is likely to support consolidation of students' literacy skills.

Keywords: literacy instruction, reading accuracy, reading fluency, first grade

Highlights

What is already known about this topic

- Students' reading skills vary greatly at the entry to primary school.
- Adapting both the content and amount of instructional support based on a student's skills has been shown to be effective, but the knowledge of these processes is limited into studying adaptations at the level of the individual student or specific learning situations. However, the students' skills at classroom-level may also affect the instruction.
- In order to support students' reading skills development, both the content of the instruction and adequate support for learning are important.

What this paper adds

- This study is among the first to analyse classroom-level associations between students' reading skills and literacy instruction activities in the lesson.
- Students learning to read have been shown to benefit from code-focused activities with teacher support, whereas more advanced students have been shown to benefit from independently practicing their skills. This study showed that teachers typically engaged their students in whole group instruction on accurate decoding and spelling when the students reading skills were lower at classroom-level (i.e. there were more students learning to read), whereas higher reading skills (i.e. more students that were able to read) were associated with more time spent in independent practicing.
- Higher skills of students in a classroom (i.e. more students that are able to read) may invite and offer more opportunities for the teacher to adapt instruction at the level of the individual student.

Implications for theory, policy or practice

- Teachers should sensitively observe the skills development of their students and adapt their instruction based on this information.
- Teachers' continued professional development on adapting literacy instruction activities and flexible planning of lessons according to their students' skills should be supported.

The wide variation in children's literacy skills at school entry places high demands on teachers for practices of individualisation across various skill levels. Adapting instruction based on learners' different needs is not a new concept, although a range of terms has been used to describe it (for a review, refer to Parsons et al., 2018). Also not new is the notion that these adaptations are challenged by the complexities of the classroom context, which entails teachers simultaneously interacting with a diverse group of students (e.g. Corno, 2008). Instructional adaptations can take place at multiple levels from fine-tuned micro-level adaptations such as differentiation of tasks or providing further examples during instructional situations to macro-level adaptations, such as specific programmes based on learners' skills (Corno, 2008).

Notwithstanding macro-level adaptations (Corno, 2008), the term 'adapting instruction' is typically used to imply teachers responding to individual students' learning needs during instruction (e.g. Hardy et al., 2019; Parsons et al., 2018). Less is known about whether the students' skills at classroom-level are associated with the teacher's instructional practices (as exceptions, refer to Kikas et al., 2017; Pakarinen et al., 2011), and, to our knowledge, this understanding is lacking with respect to early literacy instruction. In this study, we will examine the classroom-level associations between reading skills and teachers allocation of instructional time on different types of literacy activities, for example activities focusing on decoding of syllables or words versus text-level reading and comprehension tasks, in Finnish classrooms in the autumn of first grade when formal reading instruction has just begun. To analyse teachers' literacy instruction activities, the Individualising Student Instruction (ISI) observation system (Connor et al., 2009; Connor & Morrison, 2016) was used to examine both the content of the activities and the instructional support through instructional management that teachers provided for their students in the classrooms. Thus, the present study seeks to throw light on the potential role of students' skills at classroom-level on first grade literacy instruction by a detailed analysis of video recordings of the literacy instruction activities, not the process of adaptation itself.

Literacy instruction and its adaptation to students' skill development in early grades

Adapting instruction based on learners' needs is interactive in nature and involves reciprocity in cyclical adjustments of teachers' practices with students' responses and characteristics. Even though Bronfenbrenner's bioecological model of human development (Bronfenbrenner & Morris, 2006) did not take a stance on instruction per se, its consideration of transactions in different contexts across time and especially the role of proximal processes as the main driver of development depict many important aspects of instruction as well. Jaeger (2016) and Connor et al. (2009, refer also to Day et al., 2015) have provided examples of how the bioecological model of human development (Bronfenbrenner & Morris, 2006) can be applied to studying and understanding classroom instruction. An important aspect in instruction is acknowledging the child's active role in learning situations. As Jaeger (2016) noted, the teacher does not just affect students' learning but is also affected by the students (refer also to Day et al., 2015).

Jaeger (2016) argued that teaching entails flexible planning and 'remaining tuned to the child's response to text/activity and revising the plan as needed' (p. 177), rather than striving for perfect unchangeable lessons. Thus, the teacher's knowledge of the students' diverse needs in the classroom should optimally be reflected in the overall design and

practices of the lesson with in situ modifications during the lessons. This was reflected in Hardy et al.'s (2019) division into intended and implemented adaptations. Intended adaptations refer to teachers' instructional planning and actions based on their knowledge of individual students' needs, whereas implemented adaptations refer to teachers' adaptations while teaching, such as questioning and prompting when a learner faces difficulties (cf. micro adaptations, Corno, 2008).

A major claim for adapting instruction is that it contributes to student learning (e.g. Connor et al., 2013; Juel & Minden-Cupp, 2000; Pressley et al., 2001). Instruction that supports young students' reading and spelling acquisition is crucial in order to achieve the ultimate goal of providing independent access to texts for the students. Effective decoding and spelling instruction includes explicit skills instruction, such as the systematic use of phonics, paying attention to sublexical parts within words and demonstrating the relationship between graphemes and phonemes (e.g. Connor et al., 2004; de Graaff et al., 2009; Lerkkanen, 2007). Differences in orthographies, however, have been shown to affect the instructional strategies of early literacy instruction as well as the pace of skills development (e.g. Seymour et al., 2003).

In implementing decoding and spelling instruction, the teacher needs information on the students' prerequisite skills, for example phonological awareness and letter knowledge, and decoding and spelling at the syllable and word levels, in order to be able to adapt instruction accordingly. To keep pace with the increased complexity of the proximal processes which support a child's growing skills by age (e.g. Jaeger, 2016), the foci and level of literacy instruction should change over time. There is evidence, which indicates that practicing grapheme-phoneme correspondence and word-level reading and spelling after the student has acquired a sufficient level of accuracy has not proven to provide any further advancement for reading skills development (e.g., Connor et al., 2004; Lerkkanen et al., 2016). Rather, in concert with the student's growing skills, the emphasis should shift from mainly code-focused (CF) instruction to practicing meaning-focused (MF) skills such as reading of texts, comprehension and productive skills. Access to texts and explicit practicing of comprehension skills, however, have been shown to be important for beginning readers as well to advance their listening and reading comprehension skills (Lepola, Lynch, Kiuru, Laakkonen, & Niemi, 2016; Lerkkanen, Rasku-Puttonen, Aunola, & Nurmi, 2004). Practicing of comprehension has been shown to be most beneficial for beginning readers when it was practiced together with the teacher (Connor et al., 2004).

While it is important to match the content of literacy instruction to a student's current skill, it is also important to adapt the type of instructional support. A wide consensus attests that teacher's instructional support should be stronger when a student is learning a new skill or is facing difficulties, but support needs to be phased out in a timely fashion to strengthen student autonomy and ownership of learning (e.g. Corno, 2008; Pressley et al., 2001; van de Pol et al., 2010). For example, the studies by Connor et al. (2004, 2013) combining content of the instruction with instructional management have shown that after students master the basics of decoding, instructional practices ought to shift more towards autonomous practicing of the skills. The teacher can then afford higher autonomy to those students who are further along on their literacy learning paths and provide tailored support to those who need to consolidate the basic skills (Corno, 2008; Kiuru et al., 2015; Virinkoski et al., 2021).

Literacy instruction in Finland

Finnish students enter the first grade of comprehensive school in the year they turn 7 years of age. By that time, their development in phonological awareness and letter knowledge skills have been supported in pre-primary education, but the children do not receive formal instruction for decoding and spelling before first grade (Finnish National Agency for Education, 2016). Despite this relatively late onset of formal reading instruction, a recent nationwide study among school beginners (Ukkola & Metsämuuronen, 2019) documented that more than half of the students were able to decode at least simple single words at school entry, and only a third of the students did not yet have full mastery of grapheme-phoneme correspondence. Due to the transparent orthography of the Finnish language and systematic phonics-based instruction, reading acquisition takes place in a rapid fashion, and nearly all children are accurate and rather fluent decoders at the end of their first year of formal reading instruction (Holopainen et al., 2020; Lerkkanen et al., 2004).

Even though the variations in literacy skills among Finnish school beginners are wide, the differences between classrooms are small (Ukkola & Metsämuuronen, 2019). A likely reason for this is the non-selective practice of Finnish comprehensive schools due to which nearly all students are enrolled in their nearest publicly funded school (Linnakylä et al., 2007). The national core curriculum (Finnish National Agency for Education, 2016) outlines the broad content and age-specific goals for literacy instruction, but teachers are given high autonomy in planning and implementing their instructional practices, including how they allocate their time for teaching different literacy contents in literacy lessons (seven lessons per week in first grade). With respect to decoding and spelling instruction, phonics-based practices are widely used to progress from letter-sound correspondence to syllable and word levels of reading (Lerkkanen, 2007), and these practices are also supported by the ABC books and related study materials. In the early grades, some literacy lessons are often taught to half of the students in a classroom to allow for smaller class size. In addition, flexible groupings during activities are widely used.

The teachers are expected to carefully monitor students' development and individualise their instruction based on their students' needs (Finnish National Agency for Education, 2016; Linnakylä et al., 2007). With respect to students facing difficulties, teachers collaborate with the special needs teacher in both the assessment and provision of support (Virinkoski et al., 2017). Self-reports by teachers have indicated that teachers are sensitive to their students' skill levels, and they tend to adapt their instruction to provide more individual support to children with poor reading skills (Kiuru et al., 2015; Nurmi et al., 2013). Although a recommendation for adapting instruction to students' skills is stated in the national curriculum guidelines (Finnish National Agency for Education, 2016), research evidence on its implementation in the instruction of first grade students' classrooms is not yet available.

Aim of the study

The aim of the present study was to examine classroom-level associations between students' reading skills and teachers' allocation of instructional time to different types of literacy instruction activities in observed literacy lessons at the beginning of first grade.

In line with Connor et al. (2009) and Connor and Morrison (2016), both instructional management and the content of instruction were included into the analysis of literacy instruction activities. The following three research questions were set in the study:

1 To what extent do teachers provide support through instructional management for the whole group or for students working independently?
2 To what extent do teachers implement CF and MF contents during their literacy lessons?
3 Are the students reading skills associated with the extent of different types of literacy instruction activities during the lesson? To our knowledge, direct research evidence on these associations at classroom-level is lacking in regular classrooms. Thus, hypotheses were not set.

Method

Participants and procedure

The data for the present study were drawn from the Teacher and Student Stress and Interaction in Classroom study (Lerkkanen & Pakarinen, 2021). Before commencing the study, the ethical committee of the university granted ethical approval for the study. The present data comprise individual assessments of 616 students (51.8% boys; M = 7.19 years, SD = 0.34 years) from a total of 35 first grade classrooms in 21 schools and video-recorded literacy lessons from these same classrooms in the autumn of 2017. The mean class size in the sample was 19.89 (SD = 3.79) – reflecting the typical class size of Finnish first grade classrooms. The majority of the video-recorded literacy lessons (26 out of 35) were regular 45-minute lessons (M = 39 minutes & 20 seconds, SD = 10 minutes & 59 seconds). Six of the lessons lasted less than 30 minutes (minimum of 24 minutes), which was usually due to the lunch schedule, and three of the lessons lasted 90 minutes. In five cases, more than one video-recorded literacy lesson was available in the classroom. In these cases, only one lesson was included in the analyses by applying the following selection criteria: (1) a 45-minute lesson was prioritised over shorter or longer lessons (n = 2), and (2) the first of the literacy lessons (n = 3) from the classroom was selected for the analysis. In the latter case, the classroom had been divided into two groups, both of which received the same instruction by the class teacher during different lessons (one in the morning and one in the afternoon).

Both the students' individual reading skills assessments and the video recordings in the classrooms took place during the autumn term (between September and December) 2017 of first grade. Skill assessments and video recordings were carried out in each classroom within a two- to three-week time period (M = 12.66 days, SD = 8.45 days). A questionnaire was completed by teachers providing information on their educational backgrounds and work experience. The vast majority of the teachers (32 out of 35) were female. All teachers had a master's degree in education. The teaching experience of the teachers participating in the study ranged from 6 months to 39 years (M = 15.74 years, SD = 9.75 years). The teachers and the students' parents on behalf of their child provided written consent to take part in the study. Using a questionnaire, the parents reported their educational levels: 2% had completed the 9-year compulsory education, 35% had completed secondary education, 34% had either a bachelor's degree or a vocational college degree and 29% had completed a master's degree or higher. The educational level of the parents was somewhat higher than

that of the general population in Central Finland (Official Statistics of Finland, 2018), which ranged from low to high – 8%, 47%, 24% and 21%, respectively. The information on parental education was missing for 37% of the families participating in the study.

Measures

Reading skills. Students were assessed individually on their reading accuracy and reading fluency with two nationally widely used reading tests. The *reading accuracy* test (Lerkkanen et al., 2006) comprised a 20-item word list of two- to five-syllable words of increasing difficulty in terms of their length and familiarity. There was no time limit for the test, but it was discontinued if the student did not provide a response or gave an incorrect response for three consecutive test items. Students were awarded one point for each correctly read word (maximum 20 points). In the *reading fluency* test (Häyrinen et al., 1999), the students' task was to read aloud words from the word list (maximum of 90 words) within a 45-second time limit. The student was awarded one point for each correctly read word (maximum score of 90 points). The reading accuracy measure allows also the beginning readers to show their ability to decode separate words, whereas the reading fluency measure shows more of the individual variation of the speed in word recognition. The correlation between the two measures was .731 ($p < .001$). For the analyses, a composite (mean) score for reading skill was calculated based on the standardised test scores of reading accuracy and reading fluency using equal weights for these two tests. Cronbach's alpha for the composite reading skill was .85.

Individualising Student Instruction in literacy lessons. The guidelines of the ISI (Pathways) observation system (Connor et al., 2010) and its manual adapted to the Finnish language context (Poikkeus et al., 2013) were applied for coding of literacy activities in the video-recorded lessons. The original ISI coding manual (refer to Connor et al., 2009, 2010) had been developed to analyse instruction received by individual focal students in a classroom situation; however, in the present study (and in a previous study by Ruotsalainen et al., 2022), the focus was on coding the instruction the teachers provided for all students in their classrooms attending the specific lesson. In the ISI coding system, literacy instruction is analysed along three dimensions: *context*, *instructional management* and *content*. In the present study, information of context was integrated into codes of management. Analyses are reported as combined codes reflecting the types of instructional support the teachers provided to the students.

Coding of the dimension of *instructional management*, focused on determining the locus of responsibility for directing the students' attention in the task at hand. Activities with a teacher lead (e.g. read aloud session and explicit instruction on decoding for the whole group) were coded as teacher/child-managed (TCM). Learning situations in which the majority or all of the students managed their work without the teacher's support were coded as child-managed (CM). As we conducted the coding at the classroom-level rather than at the level of individual students, the dimension of management integrated information of the *context* (whole group, small group and individual). TCM was coded when the teacher directed the instruction to all students who were present in the lesson (for whole group), whereas CM was applied for independent small group and individual work.

With respect to *content*, language-specific features of Finnish were taken into account when adapting the coding scheme from literacy instruction in the English language context (Poikkeus et al., 2013). For example, activities focusing on onset and rime (included as a subcode in the original manual; Connor et al., 2010) are not effective methods for decoding instruction in the Finnish language context because of its very transparent (almost perfect) one-to-one grapheme-phoneme correspondence (Aro, 2006). Rhyming is, however, widely used in early-stage literacy instruction in both the English and Finnish contexts to foster phonological sensitivity in the early preschool years (refer to Goswami, 1999; Silvén et al., 2007). Words in the Finnish language are typically long because of their agglutinative morphology and rich derivational system, and monosyllabic words are fewer than in many other languages (refer to e.g. Aro, 2006). Thus, many early decoding and spelling activities in the early phases utilise syllables, which are perceptually salient units of the spoken language. Students are typically first taught to decode syllables (blending of syllables with two or three graphemes and their corresponding phonemes) before proceeding to decoding multisyllabic words (Lerkkanen, 2007). In spelling exercises, the teacher might say aloud the whole word, then repeat the first syllable and ask the students to write down the syllable. In the adaptation of the Finnish ISI manual, this emphasis on early decoding and spelling instruction utilising syllables led to the addition of some subcodes.

In the coding process, each activity lasting at least 10 seconds was first coded with respect to both the management of attention in the activities and the content of literacy instruction. In the original ISI/Pathways manual (Connor et al., 2010), the minimum duration was 15 seconds, but a 10-second criterion was considered better suited to the Finnish context (Poikkeus et al., 2013). *Content* of literacy instruction was coded using 10 codes. These codes represented activities with a focus on decoding, reading fluency, comprehension from text, or oral language exercises, for instance. The codes were categorised under the broader categories of CF and MF activities. Table 1 provides more detailed description

Table 1. Codes for instructional management type and content of instruction (Poikkeus et al., 2013).

Codes for instructional management of instruction[a]	Codes for content of instruction
1. Teacher/child-managed (TCM) activities: Teacher and students managed students' attention to the task together 2. Child-managed (CM) activities: The majority of the students managed their work independently or with peers, but the teacher provided support to one student or a small group of students at a time	1. Code-focused activities (CF) • Phonological awareness • Grapheme-phoneme correspondence • Decoding (syllables and words) • Spelling (syllables and words) • Fluency 2. Meaning-focused activities (MF) • Oral vocabulary activities, e.g. class discussions to promote vocabulary development and sharing experiences • Print vocabulary activities • Text reading and listening • Listening and reading comprehension • Writing on a sentence or text level

[a]TCM activities by definition concern instruction directed to the whole group, whereas CM activities are coded in the whole group setting, but they involve students' independent or small group work.

of the two codes used to code management (TCM and CM) and the 10 codes used to code content (CF and MF activities) from video-recorded literacy lessons.

For the analyses, three combination categories of management and content were formed out of the initial codings.

1 TCM-CF: whole group instruction consisting of CF reading and writing activities at grapheme-phoneme, syllable or word level. TCM-CF activities were observed in all but one classroom (in 34 out of 35)
2 TCM-MF: whole group instruction consisting of MF reading and writing activities at sentence or larger text level, or activities that supported students' vocabulary development, such as story reading and class discussions. TCM-MF activities were observed in 28 classrooms out of 35.
3 CM-CF/MF: combined code for any small group activity or independent work (i.e., combining CF and MF activities). CM-CF activities were observed in 27 classrooms out of 35. CM-MF activities were observed in five of the classrooms in which CM-CF activities were also observed, and typically, these were observed simultaneously with CM-CF activities as the teacher individualised the content, such as reading on a syllable/word- (CF) or sentence/text- (MF) level based on students' reading skills, or a student began to read a book independently (MF) after finishing the previous CF task.

Because the goal was to examine to what extent the teacher allocates literacy lesson time into different types of instructional activities across the total instructional time of the lesson, percentages of TCM-CF, TCM-MF and CM-CF/MF were calculated, that is total durations of the combination categories divided by total instructional time during the lesson. Instructional time was specified as time from when the teacher started the lesson to time when the teacher finished it. The number of students present during the observed literacy lessons was controlled for in the analysis. In most cases, this meant the whole classroom, whereas in three cases, only half of the classroom was present (the other half received the same lesson later that day). Instruction was considered TCM if the teacher directed the instruction to all students who were present in the lesson.

Of the lessons, 20% (seven lessons) were double coded. Intraclass correlations (ICCs) were calculated of the durations (in seconds) of different types of literacy instruction in order to determine intercoder reliability. The ICCs were .98 (95% *CI* = .90, .99) for TCM-CF, .99 (95% *CI* = .92, .99) for TCM-MF, and .99 for CM-CF/MF (95% *CI* = .95, .99) indicating excellent reliability (Hallgren, 2012).

Analyses

The ICCs for reading skills (composite of accuracy and fluency) showed statistically significant differences between the classrooms, indicating that belonging to a certain classroom explained 7% ($p = .003$) of the total variance in the sample. In the subsequent analyses, multilevel path analyses were conducted with Mplus (Version 7.3; Muthén & Muthén, 2012) to examine the classroom-level associations between students' reading skills and the percentages of literacy instruction of TCM-CF, TCM-MF and CM-CF/MF (between-level in Figure 1). The reading skills measured at the individual-level (within-level in Figure 1) were allowed to vary between classrooms (cf. random intercepts), but regression coefficients (slopes) were fixed. As potential structural factors impacting instruction, we controlled for both the number of students present during the

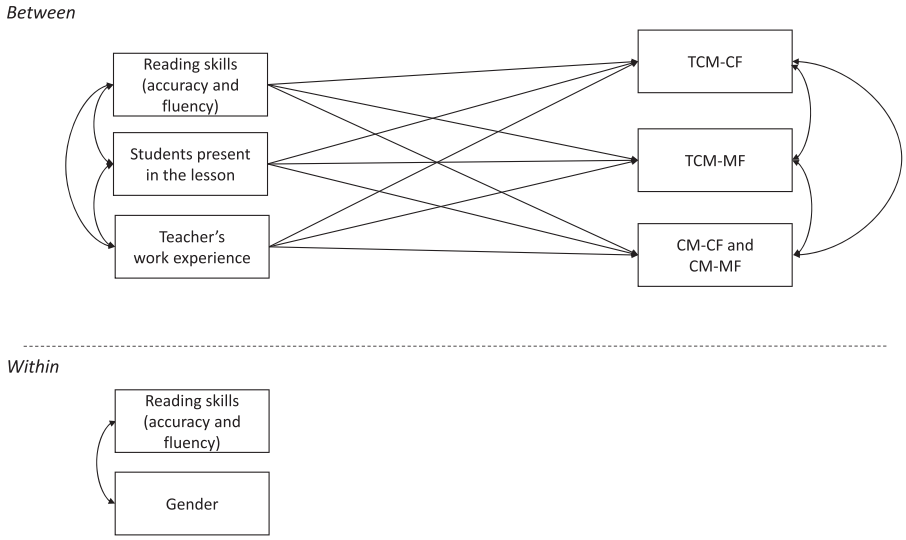

Figure 1. Schematic representation of the structural model. CF, code-focused; CM, child-managed; MF, meaning-focused; TCM, teacher/child-managed.

video-recorded lessons and teachers' work experience. At the within-level, students' reading skills were controlled for by gender. Nonsignificant paths were set to zero.

In the initial phase of analyses, the time of the assessment and the time of video recording were included in the model (represented as time in days between school beginning and the day of assessments/observations in the classroom). The time of the video recording was positively correlated with reading skills in the classrooms (between-level; $r = .42$, $p = .002$), but not with the percentages of types of literacy instruction nor with the students' reading skills measure at the within-level. In the analyses of the final model, the time of the students' reading assessment (at the within-level) and the time of the classroom video recordings (at the between-level) were omitted to reduce the number of parameters. Associations between the reading skills and the percentages of literacy instruction of TCM-CF, TCM-MF and CM-CF/MF remained similar in the final model, which did not include the time variable as in the model that did include time. The parameters of the models were estimated using the FIML estimation with non-normality robust standard errors (MLR estimator, Muthén & Muthén, 2012). The goodness-of-fit of the estimated model was evaluated using four indicators: chi-squared test, comparative fit index (CFI), root mean square error of approximation (RMSEA) and standardised root mean square residual (SRMR). Good model fit is indicated by a small, preferably nonsignificant χ^2, CFI $> .95$, RMSEA $< .06$ and SRMR $< .08$ (Hu & Bentler, 1999).

Results

The students' reading skills varied from those of non-readers to rather competent readers in terms of reading accuracy and fluency. The word reading accuracy assessment indicated that the students could read, on average 14 words but the variation was larger on within-level ($SD_W = 7.36$, range 0–20) than on between-level ($SD_B = 2.90$, range 8.15–17.42). Similarly, in the reading fluency assessment, the students read correctly 15

words, on average, within the 45-second time limit, but the variation was larger at the within-level than at the between-level (SD_W = 13.53, range 0–62; SD_B = 4.00, range 8.38–24.00).

Teachers varied in the extent to which they implemented different contents and management types. On average, TCM was observed 46.17% (*SD* = 17.79%) of the instructional time and CM 30.06% (*SD* = 25.05%). Nearly half (*M* = 46.86%, *SD* = 17.57%) of the instructional time comprised CF activities, whereas 27.48% (*SD* = 16.65%) of the instructional time was spent in MF activities. In further analyses, combinations of management and content were used.

Multilevel path analyses were conducted to analyse the classroom-level associations between reading skills (composite of accuracy and fluency) and the percentages of the three types of teachers' literacy instruction activities (TCM-CF, TCM-MF and CM-CF/MF) in the lessons. The number of students present in the video-recorded lessons and the teachers' work experience were controlled for in the analysis. The final model fit the data well: $\chi^2(8) = 9.69$, $p = .29$, CFI = .97, RMSEA = .02, $SRMR_{within} = .04$ and $SRMR_{between} = .10$: These indices, according to Hu and Bentler (1999), represent a good model fit except for $SRMR_{between}$, which is somewhat higher than suggested. Descriptive statistics of the study variables and their correlations at the between-level are presented in Table 2.

The results (Figure 2) indicated that the reading skills, at classroom-level, were negatively associated with the percentage of TCM-CF activities during the lesson. This suggests that in classrooms with lower average reading skills, teachers allocated greater amount of lesson time to TCM-CF activities. On the contrary, reading skills, at classroom-level, were positively associated with the percentage of CM-CF/MF activities. This suggests that in classrooms with higher average reading skills, teachers allocated a greater amount of

Table 2. Descriptive statistics and correlations at the between-level.

Variable	*n*	*M*	*SD*	2.	3.	4.	5.	6.
1 Reading skills	616	.00	.33	−.34*	.05	−.45*	−.04	.62***
2. Students present in the lesson	35	17.60	4.41		.15	.00	.36*	−.46***
3. Teacher's work experience	34	15.74	9.75			.33*	−.18	−.15
4. TCM-CF	34	22.53%	13.17%				−.05	−.55***
5. TCM-MF	28	23.55%	13.88%					−.67***
6. CM-CF/MF	27	30.06%	25.05%					

CF, code-focused; CM, child-managed; MF, meaning-focused; TCM, teacher/child-managed.
Note: Percentages indicate to a total duration of the combination category divided by total instructional time during the lesson.
*$p < .05$,
**$p < .01$,
***$p < .001$.

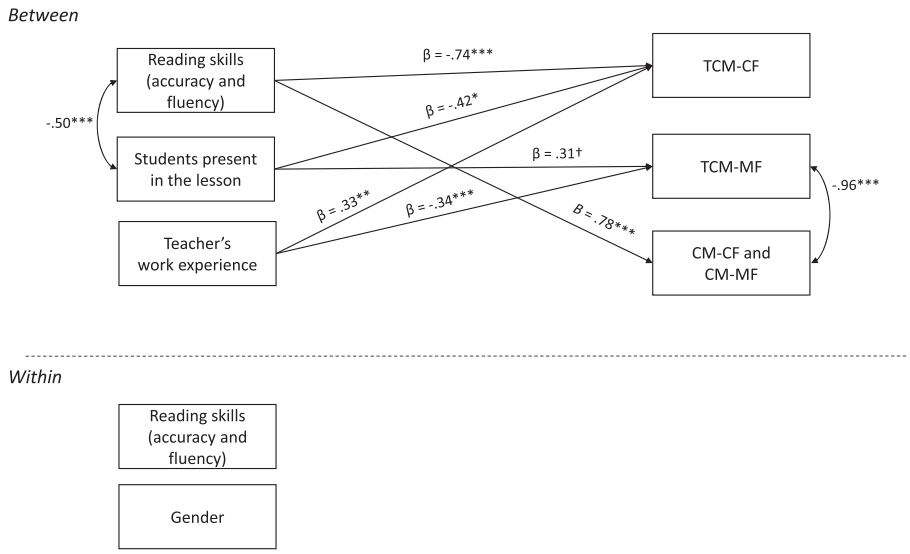

Figure 2. Associations between students' reading skills and types of literacy instruction activities, with number of students in the lesson and teacher's work experience controlled for. †$p < .10$, *$p < .05$, **$p < .01$, ***$p < .001$. CF, code-focused; CM, child-managed; MF, meaning-focused; TCM, teacher/child-managed. Standardised estimates.

lesson time to individual or small group work. Reading skills were not associated with the percentage of lesson time teachers allocated for TCM-MF activities, but the number of students present during the lesson had a marginally significant positive association with the percentage of TCM-MF. Moreover, TCM-MF activities were used to a greater extent by less experienced teachers, whereas more experienced teachers incorporated TCM-CF activities in their instruction to a greater extent. At the level of individual students (within-level), students' gender was not significantly associated with the students' reading skills.

Discussion

The present study provides novel information on the classroom-level associations between reading skills and types of literacy instruction activities observed in first grade classrooms' literacy lessons. In this sample of 35 Finnish teachers' lessons, nearly half of the instructional time in literacy lessons was spent in whole group TCM activities where instructional management to the tasks was done by the teacher, whereas approximately third of the time spent in literacy activities students' attention was managed by themselves (in small groups or in individual work). Moreover, in nearly half of the instructional time, the content of the instruction was spent in CF activities (e.g. decoding and spelling). The latter finding complements previous findings (Ruotsalainen et al., 2022) from a separate sample of first grade spring where half of the literacy instruction activities were found to be MF activities. This difference in the predominant type of literacy content may be linked to the rapid reading skill development of Finnish students during the first grade (Lerkkanen et al., 2004; Soodla et al., 2015) and teachers adapting their instruction accordingly.

The results indicated that, at classroom-level, students' reading skills were associated with the extent to which students' attention to the tasks were managed by the teacher or

by the students themselves (managing attention via instruction at the whole group level vs. independent student work) rather than the content of the instruction. The findings indicated, on the one hand, that teachers allocated a higher percentage of CF activities, such as decoding and spelling, in a whole group with TCM of attention when they were teaching a group consisted of students with lower skills, that is many of their students were still acquiring basic skills of reading and required support to consolidate decoding. On the other hand, higher average reading skills in the classroom, that is more students having surpassed the foundation phase of reading acquisition, was associated with more classroom time spent in independent or small group practicing of both CF and MF content. It has earlier been established that the reading proficiency among those Finnish school beginners who do not yet read at school entry typically changes rapidly in the autumn term of first grade from not being able to decode any words to relatively accurate reading (Lerkkanen et al., 2004). The present classroom-level associations between reading skills and teacher instruction suggest that teachers may adapt their instruction to match the group's overall needs. However, demonstrating this assumption would require a longitudinal design.

In addition to instructional support for all students during whole group instruction, the teachers also provided first grade students with individual support and tailored individual or small group assignments, and this kind of independent work appeared also to be associated with the reading skills. Previous studies have shown that teachers report giving more support to those students who are struggling with their reading (Kikas, Silinskas, Jõgi, & Soodla, 2016; Kiuru et al., 2015; Nurmi et al., 2013). As the focus of the present study was at the classroom-level, the data did not provide information on how much instructional support for literacy learning the teachers gave to individual students. However, it has been suggested that as more students are able to work independently, teachers have more opportunities to provide instructional support specifically to students with less advanced skills (Corno, 2008; van de Pol et al., 2010). Practicing skills independently in the classroom can also give teachers valuable information on how to adapt the content of their instruction by assigning tasks at the syllable, word or text level, depending on the students' skills.

Some joint activities can support all students in the classroom (Jaeger, 2016; Lerkkanen, 2007) regardless of the students' skills, such as engaging in vocabulary-enriching MF discussions on various concepts. In the current study, this type of enrichment was seen in the use of TCM-MF activities, which were not associated with reading skills at classroom-level. Instead, our results involved a trend suggesting that TCM-MF activities would be more likely to be implemented when a higher number of students were present during the lessons. As first grade classrooms in the autumn term include students who are not yet decoding words or whose reading is still very slow, TCM-MF activities commonly comprised a story read by the teacher and listening comprehension tasks and discussions about the story. Hence, these activities provided all students with experiences of the texts and language comprehension, which are known to be important for later reading comprehension (Connor et al., 2004; Lepola et al., 2016; Lerkkanen et al., 2004). Even though this study focused on the associations between students' reading skills (accuracy and fluency) and different types of literacy instruction, listening and reading comprehension and oral language skills constitute an important domain in the early phase of literacy instruction.

The results also indicated differences in the associations between teachers' work experience and the percentages of different types of literacy instruction activities: more experienced teachers allocated more time to TCM-CF activities in their lessons, whereas less experienced teachers allocated more time to TCM-MF activities in their lessons. These

differences may reflect the increasing knowledge among younger teachers of the importance of language comprehension skills already as a part of early literacy instruction (Lepola et al., 2016; Lerkkanen et al., 2004) while acknowledging the importance of word-level decoding and spelling instruction.

Limitations

This study has limitations, which need to be taken into account. Firstly, the data of the current study consist of a small number of classrooms, and only one literacy lesson per classroom was analysed. Hence, the results do not capture the whole spectrum of literacy instruction activities in these classrooms, nor whether the teachers change their instruction across the academic year. As student assessments and observational data were both collected in the autumn (approximately two weeks apart), causality cannot be inferred between them. The associations between the concurrent skills and instructional activities in the autumn of first grade are, however, drawn from a period when range of children's reading skills is wide, but changes occur rapidly in Finnish classrooms (Lerkkanen et al., 2004; Soodla et al., 2015). Secondly, measures of literacy instruction activities were based on video recordings at the classroom-level; thus, the analyses lack more detailed information of the activities and materials provided to individual students (cf. e.g. Connor et al., 2009, 2013).

The present study provided preliminary information of how skills at classroom-level may inform teachers to adapt their instruction. However, with these data we cannot directly infer what kind of adapting instruction is beneficial for the students at classroom-level and what are the effects for students with various skills. This is an important question for further studies. Future research would also benefit from combining observational methods and analyses of both classroom-level and individual students at several time points during the academic year in order to analyse associations with students' skills and to gain more understanding of the complex nature of literacy learning and teaching in the early phase of schooling.

Conclusions

The present study provided insights into teachers' use of instructional activities and their associations with the students reading skills in their classrooms. In the early reading instruction, the skills of the students in a classroom may have an impact on the extent of instructional support that teachers provide to the whole group as well as to individual students. As higher proportion of students in a classroom acquires basic decoding skills, individual and small group work are likely to serve as an arena for individualising literacy content and instructional support to match each student's literacy skills development. Teachers' awareness of the means for adapting instruction based on their students' skills should be supported in order to provide instruction that is optimally adjusted to both their students skills at the classroom-level and each student's learning needs.

Disclosure statement

No potential conflict of interest was reported by the authors.

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Data availability statement

Research data are not shared.

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III

ASSOCIATIONS BETWEEN STUDENTS' READING PERFORMANCE AND LITERACY INSTRUCTION IN FIRST GRADE: A CROSS-LAGGED STUDY

by

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