Protocol: 'On Track', a group-randomized controlled trial of an early reading intervention

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ABSTRACT

This paper presents a research protocol for a group randomized controlled trial of the 'On Track' early reading intervention. The 'On Track' project seeks to reduce the incidence of reading difficulties (RD) by developing screening materials to identify children at risk of RD at an early stage of schooling, by developing research-based teaching programs, and by measuring the long-term effects of early reading interventions. The total sample contains 1200 Norwegian 6-year-olds, and the reading intervention will be evaluated among the lowest-achieving 20 percent of the students. Outcome measures are word reading, spelling, reading comprehension, interest in reading, and reading self-concept. The project is led by the Norwegian Reading Centre, University of Stavanger, and supported by the Research Council of Norway.

1. Background

Reading difficulties (RD) are the most frequent cause of special-needs education in Norway (Grøgaard, Markussen, & Hatlevik, 2004), and the percentage of students receiving special-needs education to remediate RD increases throughout primary and secondary school (Ministry of Edcuation & Research, 2011). RD can be caused by insufficient practice, inadequate teaching methods, slow development, or dyslexia. Regardless of the origin, adaptive teaching and early intervention can improve children's learning outcomes and reduce the overall incidence of RD. There is considerable evidence that RD can be remediated and even prevented through early intervention (Torgesen, 2002; Vellutino & Zhang, 2008) and that early intervention is more effective than later intervention (Ehrhardt, Huntington, Molino, & Barbaresi, 2013), reducing the probability of persistent RD (Fletcher, Lyon, Fuchs, & Barnes, 2007).

Recent research has identified several approaches that can be used to identify children at risk of RD. Rapid automatized naming (RAN) and phonological awareness at preschool and kindergarten age were identified as significant predictors of reading and spelling difficulties in Norwegian and Swedish first- and second-graders (Furnes & Samuelsson, 2010), with RAN as the better long-term predictor of RD (ibid.). In Finnish children, familial risk, letter knowledge, and RAN were found to be the best predictors of later RD (Puolakanaho et al., 2007). Helland, Plante, and Hugdahl (2011) found that questionnaires regarding health, laterality, motor skills, language, special-needs education received, and heredity, which were administered to Norwegian parents and preschool teachers of

children aged five, could predict dyslexia in those children at the age of eleven. The present project will combine insights from the above-mentioned research to develop a tool that teachers can use to identify children at risk of RD in a Norwegian context.

Several studies have demonstrated the effect of various reading interventions in children with RD, undertaken at different ages and in different orthographical systems. Such interventions include training in phonological awareness, letter knowledge, guided reading and/or writing, and dialogic reading/comprehension (see, e.g., Hatcher et al., 2006; Saine, Lerkkanen, Ahonen, Tolvanen, & Lyytinen, 2011; Scammacca, Vaughn, Roberts, Wanzek, & Torgesen, 2007; Slavin, Lake, Davis, & Madden, 2011; Vellutino & Zhang, 2008).

In the present project, we implement high-intensity interventions for at-risk children, based on a hermeneutic approach to reading and writing. One fundamental idea of hermeneutics is that the parts and the whole must always be understood in relation to each other (see, e.g., Gadamer, 1960). Through training of letter knowledge, word recognition, text reading, spelling, and comprehension, the skill of reading is enhanced from different angles. Every session includes alternations between the parts (letters or words) and the whole (words or texts) (Tønnessen & Uppstad, 2015). Such alternations enable the children to progressively improve their inter-pretation skills, moving from *seeing* the letters or words to *noticing* characteristic patterns in them (ibid.).

Delayed reading acquisition has been associated with working-memory difficulties (Beneventi, Tønnessen, Ersland, & Hugdahl, 2010), and dyslexic children have difficulties with automatization (Nicolson & Fawcett, 2008). Hence, compared with typically de-veloping children, those with reading delays are likely to need more explicit instruction and to spend more time on the task in order to automatize phoneme–grapheme correspondences and other literacy-related skills (ibid.). Further, to ensure that such children actually spend as long as they need on the task, their motivation for training must be enhanced. The 'On Track' project seeks to maintain and strengthen children's motivation to read by using meaningful and engaging teaching materials such as easy-reader story books, digital tablets and applications for training literacy-related skills, including a Norwegian version of GraphoGame (see Richardson & Lyytinen, 2014), a highly adaptive reading game with promising effects (Saine et al., 2011). The play-like features of the game, providing individualized instruction and optimally triggered feedback, is assumed to motivate the child to carry out multiple and repeated training tasks, making decoding practice less formidable.

2. Intervention

The interventions to be tested start after seven weeks of formal schooling and consist of four weekly 45-min sessions during a period of 25 weeks. According to Torgesen, Wagner, Rashotte, Herron, and Lindamood (2010), this level of intensity should represent a sufficient dosage. In schools allocated for intervention, students identified at risk for RD receive the intervention (see Table 1) when the class is divided into small groups for literacy centers/station teaching in reading and writing. No students are taken out of the classroom when the class as a whole receive instruction from the teacher.

The intervention programme is described in detail in a teacher's manual developed in the project. Each of the 100 sessions consists of the following four lessons, each lasting for ten minutes: ABC, Guided Reading, Free Spelling, and Shared Reading. In addition, teachers were given a total of five minutes for switching from one activity to the next.

The only difference between intervention *a* and *b* in grade 1 is whether students use the adaptive GraphoGame (*a*) or the less-adaptive On Track app (*b*) in the ABC lessons (see Table 1).

The interventions are led by school teachers who has received prior training. The schools commit to prioritize intervention sessions even if they encounter staffing problems, and to record whether the students attended each of the 100 sessions. For this reason, one additional teacher in each school is trained in case the primary intervention teachers would be absent because of illness, etc. There are no individual supervision of teachers during the intervention, but one of the researchers in the project team observe each teacher during one session in the fall and one session in the spring. Also, the teachers meet each other after approximately two

Table 1
Learning objectives and materials in the 'On Track' interventions.

Lesson	Learning objectives	Materials
ABC (a) 10 min.	Letter knowledge. Linking graphemes and phonemes. Word-reading skills.	Digital tablet and headphones. GraphoGame—a highly adaptive play-like app where the students master about 80 percent of the tasks.
ABC (b) 10 min.	Letter knowledge. Linking graphemes and phonemes. Word-reading skills. Phonemic analysis.	Digital tablet and headphones. The "On Track" app—a play-like app with five mini games. Different levels to be chosen by the student/teacher.
Guided Reading 10 min.	Word-reading skills. Decoding. Word recognition. Reading comprehension. Awareness of challenging orthographic patterns.	Easy readers with increasing difficulty (a new book each session). Everyone receives a copy of the same book. Detailed instructions pertaining to each book given in the teacher's manual.
Free Spelling 10 min.	Promote reading skills through writing. Enhance phonemic analysis. Promote spelling skills. Letter knowledge.	Headphones and writing software (School Font) on the tablet. The students heard the letter sound when pressing a letter key, and the full word when pressing the spacebar. The writing tasks were described in the teacher's manual; they were often linked to books used in Guided Reading or Dialogic Reading. The texts were printed on paper after each session.
Shared Reading 10 min.	Experiences with children's literature, written language, text structure, and comprehension strategies. Promote positive attitudes towards reading.	Children's books (picture books, children's poetry and chapter books). Suggestions for how teachers could talk about the texts and words were given in the teacher's manual.