



Study protocol: “Two Teachers”

A randomized controlled trial investigating individual and complementary effects of teacher-student ratio in literacy instruction and professional development for teachers

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ARTICLE INFO

Keywords:

RCT
Teacher-student ratio
Literacy instruction
Study protocol
Professional development

ABSTRACT

This paper presents a research protocol for a randomized controlled trial investigating individual and complementary effects of teacher-student ratio and professional development for teachers. We do all effect analyses on the following domains of measures: (i) Students achievement in word reading, reading comprehension and spelling, (ii) Students' literacy interest, reader self-concept and achievement strategies, (iii) Classroom climate and emotional support (iv) Teaching practices in literacy instruction. 150 schools, with two classes per school, participate in the trial. We vary treatment in two tiers: 1) increased teacher-student ratio, and 2) adaption of a program that aims to facilitate the development of learning communities by inspiring teachers to reflect upon their practice and try out new, research-based methods for promoting children's literacy skills. The two-tiered design allows us to investigate effects of increased teacher-student ratio, effects of professional development, and importantly: complementary effects of these two treatments. This protocol details background, design, intervention, and outcome measures.

1. Background

Teacher practice matters for student learning. Students learn more when teachers provide learning material in each student's zone of proximal development (Connor et al., 2013; Coyne et al., 2013; Walpole, McKenna, & Corley, 2007), provide frequent formative feedback (Hattie & Timperley, 2007), and build close student-teacher relationships (Cadima, Leal, & Burchinal, 2010; Curby, Rimm-Kaufman, & Ponitz, 2009). However, to provide such individualized support, teachers experience many obstacles: time for multi-levelled instruction, management of multiple groups; flexibility for uneven pacing of students' progress and opportunities for the one-to-one interactions necessary for formative feedback and relationship building (Ankrum & Bean, 2008; Schumm, Moody, & Vaughn, 2000; Schumm & Vaughn, 1995). These obstacles increase with larger class sizes, and challenge the ingenuity of even the most skilled teachers (Crockett, 2000). As a consequence, a higher teacher-student (T-S) ratio is often called for.

It seems evident that by increasing opportunities for individualized support, a higher T-S ratio could increase student learning. Nevertheless, the empirical evidence on T-S ratio is mixed. In fact, several studies conclude that there are no effects of T-S ratio on student achievements (see e.g. Falch, Sandsør, & Strøm, 2017; Hoxby, 2000; Leuven & Løkken, 2017). Moreover, when T-S ratio increases, teachers often fail to optimize the opportunities to provide more individualized support (see e.g. Hattie, 2005; Mueller,

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<http://dx.doi.org/10.1016/j.ijer.2017.09.002>

Received 28 June 2017; Received in revised form 28 August 2017; Accepted 1 September 2017

Available online 15 October 2017

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2013; Pate-Bain, Achilles, Boyd-Zaharias, & McKenna, 1992). However, there are also compelling findings demonstrating a positive effect of increased T-S ratio on student learning (see e.g., Blatchford, Bassett, Goldstein, & Martin, 2003; Finn & Achilles, 1999; Fredriksson, Öckert, & Oosterbeck, 2013), especially for low achievers (Buckingham, Wheldall, & Beaman, 2012; Fien et al., 2011), minority students (Finn & Achilles, 1990; Molnar et al., 1999; Nye, Hedges, & Konstantopoulos, 2001; Shin, 2012) and students from lower socioeconomic backgrounds (Fredriksson, Öckert, & Oosterbeck, 2014; Vaag Iversen & Bonesrønning, 2013). The mixed evidence calls for studies investigating conditions under which an increased T-S ratio may affect student achievement.

In an effort to better understand how T-S ratio can affect student learning, Blatchford, Moriarty, Edmonds, and Martin (2002) conducted a naturalistic, observational longitudinal study with 10,000 children in the UK, enrolled in small and large classes. They found that students received more individualized support for learning in small classes. This support occurred both in individualized and small group instructional settings, but also in the large group instruction. Additionally, the data implied that teachers provided support via scaffolding, which may take the form of immediacy of feedback, sustained interactions and effective questioning.

The literature indicates promise for student learning when increased T-S ratio co-occurs with more individualized support. However, the research base has clear limitations: in particular, there exist few high-powered randomized controlled trials (RCT), and, to the best of our knowledge, there exist no RCT systematically investigating complementarities between T-S ratio and professional development. Additionally, the existing RCTs are becoming dated and the majority have occurred in a limited set of countries (United States, United Kingdom, France, Hong Kong). Our project conducts a high-powered RCT with two-tiered randomization, designed to investigate complementarities between T-S ratio and professional development. It provides insight in current day classrooms, which have increased educational technology, and extends the experimental research literature on T-S ratio to the context of Norway. Moreover, our project is unique because previous research on T-S ratio has mainly investigated the effect of reducing class size. As such, we have less knowledge about alternate approaches of increasing T-S ratio, namely by providing a second teacher in selected subjects, which might be a more cost-effective and flexible method of utilizing the opportunities offered by increased T-S ratio in critical subjects.

2. Interventions

We have 150 schools, with two classes at each school, participating in the trial. We vary treatment in two tiers: In the first tier, we used a computer program (STATA) to randomly assign (see Section 3 for details on randomization) one incoming class as treatment and one as control. The treatment class receives an additional teacher in Norwegian lessons, 8×45 min a week for 38 weeks, from grades 1 through 4. The control class receives no additional resources, but we assess student achievement and motivation in the same way as in the treatment class. In the second tier, we used a computer program (STATA) to randomly choose 50 schools to adapt to a program for professional development in literacy instruction (Language Track) (Condition 1), and 50 schools to adapt the Language Track Program with additional instructions for how to use the extra teacher in the treated class (Condition 2). The remaining 50 schools are not asked to change their instructional approach, thus creating a “business as usual” situation (Condition 0).

The Language Track Program in Condition 1 and 2 is a part of a Norwegian policy-initiated Strategy for Language, Reading and Writing 2016–2021 (see, www.sprakloyper.uis.no). The program aims to improve language and literacy competency of students via increasing the content knowledge and pedagogical skills of teachers in the areas of language development, reading and writing. More specifically, this professional development strategy aims to reduce the number of students with reading and writing difficulties and increase the number of high performing students. The program is delivered as free, online, educational resources. Developed by the Norwegian Reading Centre at the University of Stavanger, Language Track is informed by two lines of research: (i) professional development, teacher learning and teacher change (see e.g., Desimone, Porter, Garet, Yoon, & Birman, 2002; Garet, Porter, Desimone, Birman, & Yoon, 2001) and (ii) literacy content knowledge and best practice in literacy instruction (see e.g. Morrow & Gambrell, 2011; National Reading Panel, 2000; Pressley, 1998).

Previous research on professional development has identified a set of characteristics that are essential to increase teachers' knowledge and practice (Desimone, 2009; Garet et al., 2001). The Language Track program is developed in line with this research and highlights: *collective participating*, *active learning*, *content focus*, *coherence* and *duration*. As such, Language Track is designed to be used in groups of teachers from the same school – either the staff as a whole, or by smaller professional groups or teams – encouraging opportunities for discussion, reflection and active learning (Stoll, Bolam, McMahon, Wallace, & Thomas, 2006). The program aims to facilitate the development of learning communities among teachers at schools by inspiring teachers to reflect upon their current practice as well as try out new, research-based methods for promoting children's reading and writing skills.

All schools, in Conditions 1 and 2, start their work with Language Track by implementing a point-of-view analysis. In this way, teachers in each school assess their current practice in literacy instruction, and identify key areas where they would like to improve. After this initial assessment, teachers in each school agree on a main theme they want to pursue (e.g. “Letter learning and methods” or “Assessment of reading”). As such, the content focus in the intervention will differ between schools, as each school chooses the main themes and topics, within the field of reading and writing instruction, that best meet their specific needs.

Within each main theme, Language Track offers professional development kits on a range of different topics. Each kit includes several group sessions, each with a typical duration of one hour. Each group session includes diverse session elements (e.g. films, spoken presentations, articles, classroom lesson plans etc.) as well as questions intended to initiate discussion and reflection within the group (see example of typical structure of a group session in Fig. 1). After a group session, teachers work with assignments or try our new instructional methods in the classroom. These experiences can then serve as starting point for evaluation and discussion in upcoming group session.

As previous research has found that the intensity and duration of professional development is related to the degree of teacher

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