Comparing the Relationship Between Teacher Quality, Instruction and Educational Outcomes in Primary and Secondary School. Evidence from Nordic Countries.

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Lack of previous research in Nordic countries.

Previous research on teacher effectiveness has shown that formal teacher training and certification affects student outcomes indirectly via their instruction. However, most studies within this field have been conducted in Germany and the US, using the mathematics achievement of lower secondary students as the outcome. We do not know whether these findings can be generalized to other countries, age groups (e.g. primary school) or outcomes (e.g. science achievement or student motivation).

In a recent study[1], we investigated the relations between teacher quality, instruction, and student outcomes across the Nordic countries. International large-scale assessment (ILSA) data provides a unique opportunity because of their standardized and comparable measures of teaching quality and student outcomes.

TIMSS is suitable to study teacher effectiveness

The only ILSA that collect data from teachers and that samples whole classes is the Trends in Mathematics and Science Study (TIMSS). This ILSA is therefore particularly suitable to study teacher effectiveness. Moreover, TIMSS samples grades 4 and 8 and assesses students competence in both mathematics and science. It hence allows for investigations of teacher effectiveness to be conducted across countries, ages and academic domains.

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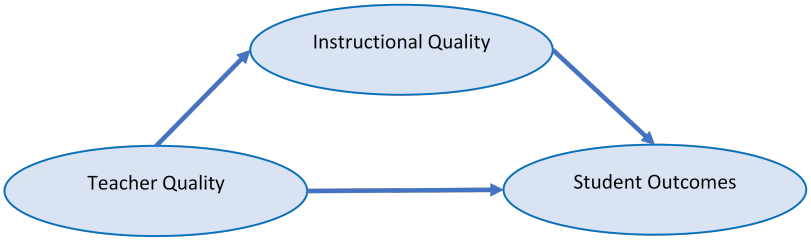
[1] https://www.udir.no/contentassets/24c699db4e104200ad60541bf54846c6/northern_lights_on_timss_and_pisa_2018.pdf

Aiming to find the effect of teachers and their instruction

In one recent study[2], we used grade 4 and 8 data from the four Nordic countries that participated in TIMSS 2015 (Sweden, Norway, Finland, and Denmark), to investigate how teacher quality and theirinstructionaffect student science achievement and intrinsic motivation (e.g. to what extent they are interested in science). Our aim was to establish whether teacher quality had an indirect effect on students' outcomes - via their instruction - as illustrated in Figure 1.

Fig. 1 The indirect effect of teacher quality on student outcomes via their instructional quality.



The method behind the research

From the student questionnaire, we used students' ratings of their teachers to measure instructional quality. From the teacher questionnaire, we used a wide range of measures on teacher quality, such as their educational level (e.g. whether they have bachelor, master, or PhD), self-efficacy in mathematics content knowledge, and teacher motivation (e.g. whether they feel inspired and enthusiastic by their work and want to continue working as teachers).

To estimate the relationship between teacher quality, instructional quality and student outcomes, a type of regression analyses called structural equation modelling was used. The results differed across grades. The findings showed that teachers' instructional quality had a significant and positive relation to student science achievement and motivation in both grades in most Nordic countries.

Different aspects of teacher quality were related to students' outcomes indirectly via their instructional quality. The types of teacher qualities reflecting more general pedagogical aspects (i.e., collaboration, self-efficacy in pedagogical content knowledge, and teacher motivation) were positively related to students' outcomes in both

[2] https://www.udir.no/contentassets/24c699db4e104200ad60541bf54846c6/northern_lights_on_timss_and_pisa_2018.pdf

grades. On the other hand, teachers' formal qualifications (e.g. whether they have their specialized in science and science education, their educational level) seemed to be of more importance in grade 8 than in grade 4.

These findings are aligned with the state of the art in this field as reflected by meta-studies and reviews. Our study is an example on how ILSAs may contribute to replicate findings across countries, domains and cohorts.

The conclusion

Teacher quality matters for both student achievement and motivation, as long as the teachers also provide high quality instruction. Specifically, teachers' knowledge of science is more important for students in lower secondary than primary school, while teachers' motivation for their work, ability to collaborate and pedagogical content knowledge are important for students in both primary and lower secondary school.

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