Author: Hannah Bijlsma   TITLE The factors influencing digitally measured student perceptions of teaching quality

Your full name: Hannah Bijlsma

Affiliated authors with institutions: Bijlsma, H. J. E., Glas, C. A. W., Visscher, A. J.

Affiliation: University of Twente

Current position: PhD

Title of your paper: Factors related to differences in digitally measured student perceptions of teaching quality.

Abstract (300 words)

Modern digital technologies enable the efficient collection and processing of student perceptions of teaching quality. However, students' ratings could be confounded by student, teacher, and classroom characteristics. We investigated students' ratings of 26 teachers who used the digital tool Impact! in their mathematics lessons with 14- and 15-year-old students (*n* = 717). A Bayesian IRT-model approach was used to model potential associations. High-performing students on average rated their teacher higher than low- and middle performing students. More likeable and more experienced teachers received higher ratings from their students, and the higher the class' average math grade, the higher the students rated their teachers. Other variables investigated in this study (e.g., student and teacher gender, class size) were not associated to student perceptions of teaching quality. In this presentation, both related and unrelated factors are discussed. Some implications of the findings for practice, limitations of the study and suggestions for further research are presented.

(153 words)

Extended summary (1000 words, excluding reference list) introduction, theoretical background, methods, preliminary findings/findings, results, reference list.

Introduction

Student perceptions of teaching quality have become increasingly prominent in teacher evaluations. The perspective of the target group in teaching can give valuable information about the quality of a lesson (Kane & Staiger, 2012), for example, for assessment, research and improvement purposes (Mislevy, 2013). In schools, teachers can use this feedback to improve their professional competences and the quality of their teaching.

However, students' ratings can be confounded by student, teacher, and class characteristics. For example, background characteristics of teachers (e.g. age, teaching experience, their popularity among students), but also student characteristics (e.g. gender, performance level, attitude towards the feedback) and class characteristics (e.g. class size and the average performance level of the students in the class) may confound these perceptions (Den Brok, Fisher, & Rickards, 2006; Fauth, Decristan, Rieser, Klieme, & Büttner, 2014).

Insight into confounding variables of student perceptions of teaching quality can help to understand better what we measure precisely when we collect student perceptions for teachers' evaluation and for feeding back the results to teachers. Innovative statistical methods (e.g. modelling student-effects, item-effects and multiple measurement points) can be used to scrutinize the specific effects of these variables, as will be demonstrated by investigating the following research question: What

factors on student, teacher and class level are related to differences in student perceptions of teaching quality?

Method

We investigated students' ratings of 26 teachers who used a digital feedback tool in their mathematics lessons with 14- and 15-year-old students (n = 717) using multi-level modelling. Three combined item response theory and generalizability theory models were examined to model potential associations (Glas, 1999, 2016). The models differ systematically: 1) a full model, where differences between students, teachers, measurement timings and interactions between these variance components were included; 2) a model where the interaction between time and teachers was removed; 3) a linear regression model, to analyze teachers' growth curve over time. Comparing the models with the deviance information criterion (DIC) showed that the full model had the best fit. Theoretically grounded variables that are potentially associated with differences in student perceptions of teaching quality were added as covariates to the model (see Figure 1).
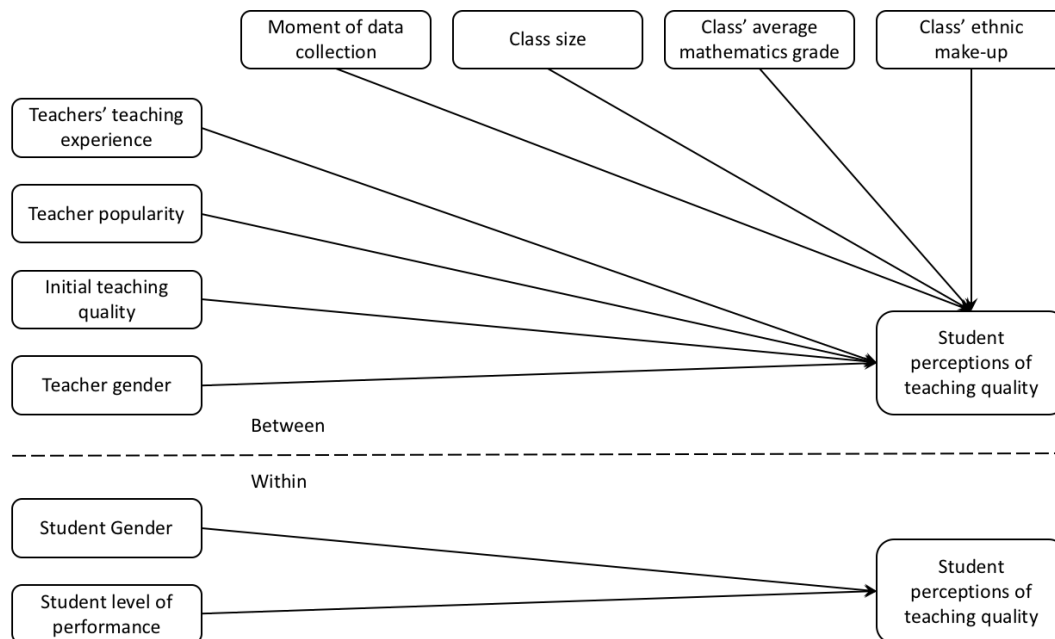

Figure 1: Factors potentially influencing student perceptions of teaching quality included in this study.

Results and discussion

The results show that high-performing students on average rated their teacher higher than low- and middle performing students. More popular and more experienced teachers received higher ratings from their students, and the higher the class' average math grade, the higher the students rated their teachers. It is however not clear whether the effects provide evidence for biases or are just a resemble of differences in students' teaching quality perceptions. Other variables investigated in this

study (e.g., student and teacher gender, class size) were not associated to student perceptions of teaching quality.

Looking at the content of the four influencing variables, it can be questioned: what explains what? In other words, how are variables interrelated? Further questions arise for possible interaction effects between variables and for variables that are comparable to each other. How does, for example, teachers' age relate to the number of years of teaching experience? How does the popularity of teachers relate to their teaching experience? Etcetera. Moreover, the findings of the current study contrasts with findings of other studies, for example, research on gender-related perceptions of interpersonal teacher behavior (Brophy, 1985; Den Brok, Brekelmans, & Wubbels, 2007) and studies in higher education (Centra, 2003; Centra & Gaubatz, 2000).

During the presentation at the QUINT 2021 conference, both related and unrelated factors are discussed, as well as the advantages of the complex statistical multi-level approach suggested to evaluate extensive longitudinal designs and to give robust and in-depth insights into factors potentially biasing student perceptions of teaching quality. Limitations of the study and suggestions for future research will be presented. We also look into implications for practice, e.g., how can digitally measured student perceptions of teaching quality be used validly and reliably within the context of schools?

(662 words)

References

Brophy, J. (1985). Teacher-student interaction. In J. B. Dusek (Ed.), *Teacher expectancies* (pp. 303–328). Hillsdale, NJ: Lawrence Erlbaum.

Centra, J. A. (2003). Will teachers receive higher student evaluations by giving higher grades and less course work? *Research in Higher Education, 44*(5), 495-518.

Centra, J. A., & Gaubatz, N. B. (2000). Is there gender bias in student evaluation of teaching? *The Journal of Higher Education, 71*(1), 17-33.

Den Brok, P., Brekelmans, M., & Wubbels, T. (2007). Multilevel issues in research using students' perceptions of learning environments: The case of the Questionnaire on Teacher Interaction. *Learning environment research*(9), 199 (start page).

Den Brok, P., Fisher, D. L., & Rickards, T. (2006). Factors affecting Australian students' perceptions of their science teachers' interpersonal behaviour. In D. L. Fisher & M. S. Khine (Eds.), *Contemporary approaches to research on learning environments: world views.* (pp. 51-74). Singapore: World Scientific.

Fauth, B., Decristan, J., Rieser, S., Klieme, E., & Büttner, G. (2014). Students ratings of teaching quality in primary school: Dimensions and prediction of student outcomes. *Learning and instruction, 29*, 1-9.

Glas, C. A. W. (1999). Modification indices for the 2-pl and the nominal response model. *Psychometrika, 64*(3), 273-294.

Glas, C. A. W. (2016). Frequentist model-fit tests. In W. J. Van der Linden (Ed.), *Handbook of Item Response Theory: Vol 2. Statistical Tools.* (pp. 343-362). Boca Raton, FL: Chapman and Hall/CRC.

Kane, T. J., & Staiger, D. O. (2012). *Gathering feedback for teaching: Combining high-quality observations with student surveys and achievement gains. Research paper. MET project*. Washington: Bell & Melinda Gates Foundation.

Mislevy, R. J. (2013). *Four metaphors we need to understand assessment. Report of The Gordon Commission on the Future of Assessment in Education*. Princeton, NJ: Educational Testing Service.

Author: Hannah Bijlsma   TITLE The factors influencing digitally measured student perceptions of teaching quality