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A systematic review on the indirect effects of teaching quality on student outcomes

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### **Abstract**

Influential theoretical models (e.g., the opportunity-use model, TBD) suggest the constructivist idea that teaching quality affects student motivation and achievement via their learning activities. However, students' learning activities have been defined and operationalized extremely diverse in the literature (e.g., motivation, engagement, self-regulation). The present systematic review identified and categorized the types of learning activities that have been examined as mediators, clarified their operationalization, and summarized their mediation effects on student outcomes. The results are mixed in confirming learning activities as mediators with 37 significant (49%) and 36 non-significant mediating effects (47%) out of 76 paths in 26 quantitative studies. For three paths (3%) mediation analysis was not conducted. One important result is that when teaching quality was operationalized as including different dimensions, then it has mostly positive effects on the mediators. Future reviews should also examine specific dimensions of teaching quality and specific learning activities in more depth.

### **Extended summary**

A large number of empirical studies have assessed the relation between teaching quality and student achievement and motivation over the last decades. These studies aim to generate evidence on effective learning environments for student learning. Some recent reviews, however, indicated that studies found positive but also non-significant relations between teaching quality and student outcomes (e.g., Praetorius et al., 2018). These inconclusive results can be explained by a constructivist perspective, mechanisms underlying the relation between them. Following this rationale, prominent models in the field (opportunity-use model, Helmke, 2012; TBD, Klieme, Pauli, & Reusser, 2009) suggest students' learning activities (e.g., engagement) as mediators in the relation between teaching quality and student outcomes.

### **Theoretical Background**

The MAIN-TEACH model was proposed based on an international overview of teaching quality frameworks (Charalambous & Praetorius, 2020). The model consists of eight dimensions: differentiation and adaptation, classroom and time management, socio-emotional support, support for active engagement, supporting practicing, cognitive activation, formative assessment, selecting and addressing the content and subject-specific methods. This model also assumes the indirect relation between teaching quality and student outcomes. Considering this assumption, a closer look at the mediators, namely learning activities seems essential. We see that learning activities are defined differently within empirical studies. For example, while Reyes et al. (2012) defined student engagement in a motivational manner, Leon et al. (2017) focused on volitional and self-regulatory aspects of engagement. Various conceptualizations of learning activities are recognized within different theoretical models. For instance, within the elaborations of the opportunity-use model, researchers highlighted different aspects of learning activities. Whereas Helmke (2012) mentioned

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time-on-task during instruction and learning outside of the classroom, Seidel (2014) emphasized students' motivational and emotional experiences. These differences in learning activities complicate the indirect relation between teaching quality and student outcomes. Not only the different types of learning activities, but also different definitions and operationalizations of learning activities used by researchers in the field lead to a lack of common understanding. To overcome this problem, the present systematic review focuses on providing an overview of the mediating role of different learning activities between teaching quality and student outcomes. In the current review, we categorized teaching quality dimensions in the studies according to the MAIN-TEACH model and learning activities according to a motivational framework focusing on three questions (Wigfield et al., 2006): Can I do this task? Do I want to do this task and why? What do I have to do to succeed on this task?. Thus, the main aim of this review is to identify different conceptualizations and measurements of learning activities and summarize the results of the studies. Accordingly, the research questions are as follows:

1. What types of learning activities are assessed as mediators between teaching quality and student outcomes?
2. How are teaching quality and learning activities operationalized?
3. What are the findings of the empirical studies regarding the mediating role of learning activities for the relation between teaching quality and student outcomes?

### **Methods**

We searched for the relevant studies in EBSCO (ERIC, PsycINFO, and PsycARTICLES), Web of Science, Scopus, FIS Bildung, and Google Scholar. We included quantitative studies published in peer-reviewed journals written in English or German. Studies assessed students' behavioral, motivational, emotional, and cognitive learning activities as mediators and classroom settings from kindergarten to undergraduate level were included. Studies focusing on students with special needs or gifted students were excluded. The database search resulted in 995 references. Abstracts were selected when: the quality or effectiveness aspect of teaching was mentioned either in the title, abstract, or keywords, and a hint for mediation analysis was given. Full-text screening and quality assessment were also conducted (Petticrew & Roberts, 2006). We extracted the following data: citation of the publication, aims and/or research questions, country, setting, sample size, subject, research design, data analysis, conceptualizations and operationalizations of teaching quality and learning activities, and the results of the studies.

### **Results**

We selected 26 studies that had been conducted in different countries mostly in the U.S. and European countries. The studies were published between 2007 and 2019. Motivation and engagement-related learning activities (e.g. goals, motivation, self-regulation, and engagement) were found as mediators, related to the second and third questions. Interestingly, learning activities were mostly measured by students' self-reports besides teacher perceptions and observations. Overall, out of 55 mediation paths, the results showed 23 statistically significant and 30 statistically non-significant indirect effects of different dimensions of teaching quality on achievement outcomes. Moreover, out of 21 paths, the results showed 14 statistically significant and six statistically non-significant indirect effects on other outcomes. In total, for three paths (3%) mediation analysis was not conducted because of a non-significant correlation between teaching quality and learning activities. Our systematic review highlights the extreme diversity within the literature in terms of definition, conceptualization, and measurement which would be worth working on in the future as a community to gain a more coherent understanding.

### Relevance

This review is relevant to the QUINT ambition especially for Theme 1: Studying teaching quality across subjects and settings. First, in this theme, “a key research topic will be the role of student engagement and how teacher-student interactions support student learning”. Our review shows various operationalizations of learning activities, including engagement, and indirect effects of teaching quality on student outcomes. Second, Theme 1 aims to answer “Do subject and cultural specific patterns in teaching and learning emerge?”. In our review, we summarized these indirect effects in different subjects (mostly in mathematics and reading) and cultural backgrounds (mostly in the U.S. and Europe). Third, Theme 1 focuses on teaching quality aspects through classroom video recordings, so it is interesting to compare particularly the result of the studies which measure teaching quality by observer ratings or video recordings. Our review also summarized operationalizations of teaching quality in mediation studies. Particularly, in the reviewed mediation studies teaching quality was also measured by observer ratings. Overall, QUINT is interested in “the role of student engagement and interaction across different subjects and national contexts” and for the reasons above we believe that our review meets QUINT expectations.

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