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Student ratings of teaching quality in primary school: Dimensions and prediction of student outcomes

Benjamin Fauth [a,b,*], Jasmin Decristan [a,c], Svenja Rieser [a,b], Eckhard Klieme [a,c], Gerhard Büttner [a,b]

[a] IDeA Research Center, Frankfurt/Main, Germany
[b] Department of Psychology, Goethe-University, Frankfurt/Main, Germany
[c] German Institute for International Educational Research (DIPF), Frankfurt/Main, Germany

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ABSTRACT

The contribution examines theoretical foundations, factorial structure, and predictive power of student ratings of teaching quality. Three basic dimensions of teaching quality have previously been described: classroom management, cognitive activation, and supportive climate. However, student ratings, especially those provided by primary school students, have been criticised for being biased by factors such as teacher popularity. The present study examines ratings of teaching quality and science learning among third graders. Results of multilevel confirmatory factor analyses ($N = 1556$ students, 89 classes) indicate that the three-dimensional model of teaching quality can be replicated in ratings of third graders. In a longitudinal study ($N = 1070$ students, 54 classes), we found ratings of classroom management to predict student achievement, and ratings of cognitive activation and supportive climate to predict students' development of subject-related interest after teacher popularity is controlled for. The analyses show that student ratings can be useful measures of teaching quality in primary school.

1. Theoretical framework

While student evaluations and student feedback are very common in higher education research and practice (Marsh, 2007), ratings of students in primary school are often neglected. It is an open question whether ratings of teaching quality by primary school students are reliable and valid measures (De Jong & Westerhof, 2001). Consistently, most of the previous studies of student ratings have considered only secondary school or college students. Furthermore, existing studies that do include younger students often lack methodologically sound designs. Nevertheless, we suggest that even in primary schools, student ratings can provide unique insight into classroom processes. The present research examines the theoretical foundations, factorial structure, and predictive power of student ratings.

In the following section, we introduce the multidimensional model of teaching quality upon which we based our study. Afterwards, we survey current research on student ratings to assess teaching quality and their connections with educational outcomes.

1.1. Teaching quality

Research on educational effectiveness has shown that classroom processes are an important source of variation in students' learning (Creemers & Kyriakides, 2008). Modern conceptualisations of teaching and learning address both cognitive and motivational learning processes. Additionally, domain-specific and domain-independent aspects of learning and instruction are taken into account (Seidel & Shavelson, 2007).

Klieme, Pauli, and Reusser (2009) present a theoretical framework for teaching quality that has been elaborated in the context of the 1995 TIMSS video study (Klieme, Schümer, & Knoll, 2001) and extended in the video intervention study "Quality of Instruction, Learning, and Mathematical Understanding" (Klieme et al., 2009). This model assumes that the three basic dimensions of teaching quality, namely, supportive climate, effective classroom management, and cognitive activation, are critical for student learning and motivation. These three basic dimensions are in accordance with other international theoretical models and empirical findings (Baumert et al., 2010; Pianta & Hamre, 2009).

Supportive climate covers specific aspects of the teacher–student relationship such as positive and constructive teacher feedback, a positive approach to student errors and misconceptions,

* Corresponding author. IDeA Research Center, Solmsstraße 73, D-60486 Frankfurt/Main, Germany. Tel.: +49 6924708814.
E-mail address: fauth@dipf.de (B. Fauth).

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and caring teacher behaviour (Brophy, 2000; Klieme et al., 2009). The impact of positive student–teacher relationships on student motivation and learning has been confirmed empirically (Goodenow, 1992; Pianta, Nimetz, & Bennett, 1997). It has also been conceptualised by different theoretical approaches (Davis, 2003). We focus on a concept of supportive climate that is based on self-determination theory (Ryan & Deci, 2000). It assumes three basic intrinsic needs to be associated with human motivation: social relatedness, autonomy, and competence. Classrooms that are able to fulfil these needs should have positive effects on student outcomes, especially on students' intrinsic motivation and subject-related interest (Kunter, Baumert, & Köller, 2007).

Classroom management is a well-known concept in educational research (e.g., Kounin, 1970) that focusses on classroom rules and procedures, coping with disruptions, and smooth transitions. These classroom features can be seen as preconditions for time on task that is, in turn, crucial for students' learning gains (Seidel & Shavelson, 2007). Meta-analyses consistently show substantial effects of classroom management on student achievement (Seidel & Shavelson, 2007; Wang, Haertel, & Walberg, 1993).

Cognitive activation integrates challenging tasks, the exploration of concepts, ideas, and prior knowledge, and Socratic Dialogue practice as key features (Lipowsky et al., 2009). These classroom practices should foster students' cognitive engagement, which should, in turn, lead to elaborated knowledge (Klieme et al., 2009). Cognitive activation is closely connected to the subject matter. This concept has been predominantly developed in studies of mathematics classrooms (e.g., Baumert et al., 2010). However, research has shown that this concept can successfully be applied to other domains in primary school (Hamre, Pianta, Mashburn, & Downer, 2007).

1.2. Student ratings of teaching quality

In addition to video-based observations, teaching quality is frequently measured by student ratings. In student ratings, two sources of variance can be considered: the individual (idiosyncratic) students' perceptions and the (mutually shared) perceptions of the students in the class. The former is reflected by variance within classes (differences between students) and the latter by variance between classes (differences between learning environments; Lüdtke, Robitzsch, Trautwein, & Kunter, 2009). The choice of the level of analysis depends upon the research question addressed (Marsh et al., 2012).

Regarding the reliability and validity of student ratings, discriminant validity is one of the most important concerns about student ratings of instruction (Greenwald, 1997). According to Greenwald (1997), we can distinguish two types of discriminant validity in terms of ratings of instruction. The first is the multidimensionality of the ratings, which refers to the discrimination between components of the same construct (e.g., teaching quality). The second refers to the discrimination of teaching quality from other influences on ratings, such as teacher popularity.

1.2.1. Dimensionality

The question of dimensionality is closely related to the discussion of the Halo-effect as a well-known rater error. The "inadequate discrimination model" explains the Halo-effect as the insufficient capability of raters to discriminate between different aspects (Lance, La Pointe, & Stewart, 1994). Attempts to examine dimensionality have drawn on data from secondary schools or universities to perform multilevel confirmatory factor analyses (Dubberke, Kunter, McElvany, Brunner, & Baumert, 2008; Kunter et al., 2008; Marsh, 2007; Wagner, Göllner, Helmke, Trautwein, & Lüdtke, 2013). Taking classroom and individual levels of analyses into account, their findings showed that the factorial structure can differ between levels and that factor correlations between classes tend to be higher than within classes. Thus, the multilevel data structure of student ratings should also be considered statistically.

In primary schools, Doll, Spies, LeClair, Kurien, and Foley (2010) examined the factorial properties of their ClassMaps Survey with students from grades three to five. However, confirmatory analyses were not used, and multilevel data structure was not considered, which makes the results difficult to interpret (Marsh et al., 2012). The dimensionality of primary school students' ratings remains a largely unresolved issue. Attempts to examine the factorial structure of student ratings in primary school appear promising, but they must be extended by applying state of the art methodological approaches (Allen & Fraser, 2007; Doll et al., 2010; see Research Question 1).

1.2.2. Teacher popularity

Teacher popularity is generally believed to confound student ratings of teaching quality. Aleamoni (1999) summarises the concerns typically expressed by researchers: "Most student rating schemes are nothing more than a popularity contest with the warm, friendly, humorous instructor emerging as the winner every time" (p. 154). In the present paper, we regard teacher popularity as the affectively coloured general impression of the teacher. A simple operationalisation is the item "I like my teacher". Wagner (2008) found significant correlations between this item and measures of teaching quality (within and between classes) in secondary school. In his study, teacher popularity was also correlated with measures of achievement. It is reasonable that the affective relationship between the teacher and students (teacher popularity) is especially relevant in the earlier grades of primary school (e.g., Doll et al., 2010; La Rocque, 2008). However, teacher popularity must be distinguished theoretically from the concept of teaching quality. Therefore, researchers should determine whether teaching quality can predict student outcomes after the effect of teacher popularity is controlled for. This is one of the main points of the present study (see Research Questions 2 and 3).

1.3. Connection of student ratings with learning outcomes and subject-related interest

According to our theoretical framework, teaching quality should not only foster students' achievement but also affect motivational processes (De Jong & Westerhof, 2001; Rieser, Fauth, Decristan, Klieme, & Büttner, 2013). Aspects of intrinsic motivation in the classroom have convincingly been described within the construct of subject-related interest (Pintrich, 2003). Research on interest often defines the construct within the framework of self-determination theory (Deci & Ryan, 2000; Krapp, 2007). Kunter et al. (2007) stated that experiences of social relatedness, autonomy and competence are associated with higher degrees of intrinsic motivation, engagement and subject-related interest. The following section briefly summarises empirical effects of student ratings on learning outcomes and interest.

Ratings of cognitive activation and similar constructs (e.g., task difficulty, see Fraser & Fisher, 1982) have especially been found to predict student achievement (Dubberke et al., 2008, grades nine to ten; Fraser & Fisher, 1982, grade seven). These effects are more pronounced when considering classroom aggregated ratings and less pronounced for ratings of younger students (Haertel, Walberg, & Haertel, 1981). Cognitive activation also affects students' interest via feelings of competence within classes (Kunter, 2005) and between classes (Fraser & Fisher, 1982).

Supportive climate in particular has been found to predict students' motivation and interest (Reeve, 2002; Ryan & Deci, 2000). Ryan and Grolnick (1986) and Allen and Fraser (2007) confirmed effects of supportive climate on motivational variables in primary school (grades four to six), although only in single-level analyses. The authors found no connection between teacher support and achievement in science education.