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From structure to process: Do students' own construction of their classroom drive their learning?

Katerina Schenke

Graduate School of Education & Information Studies, University of California, Los Angeles, Los Angeles, CA 90095-1521, United States

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ABSTRACT

Student perceptions of their classroom interactions play an important role in understanding how students learn. This paper tests whether student perceptions of the quality of classroom interactions explained the association between observed instructional practices and two outcomes: mathematics achievement and effort. The sample included 2986 students in 176 middle school math classrooms and 3269 students in 322 elementary school math classrooms from the Measures of Effective Teaching dataset. Observations measured emotional support, instructional support, and classroom management, and students were surveyed on their perceptions of the quality of classroom interactions and their effort. Multilevel structural equation models showed: (1) classroom rated higher on classroom organization (controlling for other dimensions) were associated with higher student achievement, and (2) observations of emotional support were associated with student perceptions of the quality of classroom interactions. Findings suggest that students' subjective experiences of classroom interactions influence their learning and behavior.

1. Introduction

A primary goal of educational research is to understand how and under what conditions students learn in classrooms. Truly understanding a teacher's impact on their students and how best to improve student learning requires a richer picture of the classroom experience—instructional practices *and* student experiences—than can be provided from test scores alone. Whereas effective instructional practices have been identified in a variety of studies (e.g., Palardy & Rumberger, 2008; Rittle-Johnson & Star, 2007; Stipek, Givvin, Salmon, & MacGyvers, 2001), understanding students' role in their own learning as they relate to these instructional practices is less emphasized in the current discussions of teacher effectiveness (for exceptions, see Kunter et al., 2008; Wagner, Göllner, Helmke, Trautwein, & Lüdtke, 2013).

This study is situated in social-cognitive theory (Bandura, 1986), which emphasizes an individual's own construction of her environment in understanding her subsequent behavior. In the case of learning, students' perceptions of that environment shape their achievement and learning-related behaviors (e.g., Karabenick, 2004; Schenke, Lam, Conley, & Karabenick, 2015; Wolters, 2004). In this model, the effect of instructional practices on student achievement is not *directly* examined; Instead, the effect of teaching on student learning takes the form of intermediary pathways (see Berliner, 1976), such as through students' use of cognitive processing strategies. As such, students' interpretation of their environment is critical to their responses to that environment (Patrick, Anderman, Ryan, Edelin, & Midgley, 2001; Ryan & Grolnick, 1986; Skinner & Belmont, 1993). The present study tests a model suggesting that observations of classroom quality influence students' perceptions of that environment, which in turn influence their achievement and effort. The organization of this paper is as follows: First, I will describe the theoretical model, then describe previous literature on students' perceptions of their classroom environment, then describe work on observing classroom quality, and finally introduce the present study.

1.1. Cognitive mediation models of teaching and learning

Student perceptions of their environment are thought to be critical mediators (in a theoretical sense) of the association between students' experiences and their motivation and behavior (Bandura, 1986; Eccles et al., 1983; Weiner, 1985). Within this view, students form their perceptions of their classroom environment based on their interactions with and in that environment. Participants take an active role in processing their environment. Instead of the direct link between a teacher's action and student learning as being direct and “overly simple” (p. 24, Berliner, 1976), intermediary associations that describe the *process* by which a teacher's behavior influences her students must be investigated. Despite the strong theoretical support for using student perceptions as mediators of the environment and student outcomes, empirical evidence of this pathway is limited. As such, the purpose of this paper is to

E-mail address: kschenke@ucla.edu.

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test if the pathway of instructional practices on student achievement outcomes can, in part, be explained by students' perceptions of those instructional practices.

I draw on cognitive mediation models, which suggest that individuals are active in interpreting their environments, to describe how instructional practices have their effect (Ames & Archer, 1988; Ryan & Grolnick, 1986; Weinstein, 1982, 1989; Winne & Marx, 1980). Ryan and Grolnick (1986) describe a cognitive mediation model in terms of the *functional significance* (p. 550) of the environment that suggests that the meaning the individual ascribes to the environment is more important than measures of the actual environment in determining behavior. Winne and Marx (1980) describe a cognitive mediation model where the learner must first cognitively process the instructional practice before being able to act on the practice. For example, if the teacher engages in the instructional process of asking students to respond to a question, students must first engage in psychological processes associated with answering the question. Specifically, they must first perceive the instructional practice before responding to it. Alternatively, a teacher can be observed as being emotionally supportive during instruction by taking students' perspectives into account when assigning material; however, students must first perceive the instruction as being emotionally supportive, before the association between observed emotional support and student achievement can be considered. This perspective considers students' construction of their environment and suggests that not all students within the same classroom (i.e. same instructional environment) perceive that classroom in the same way.

1.2. Students' perceptions of the quality of their classroom interactions

There has been a long tradition of using student perceptions of the classroom to understand students' behavior (e.g., Ames & Archer, 1988; Brattesani, Weinstein, & Marshall, 1984; Feldlaufer, Midgley, & Eccles, 1988; Trickett & Moos, 1973). More recently, students have been used as single or interraters of the classroom (Fauth, Decristan, Rieser, Klieme, & Büttner, 2014; Kuhfeld, 2017; Marsh et al., 2012; Wagner et al., 2013) where surveys are administered as the only or additional measures of classroom practices. Because students have daily experiences in the classroom, student reports are often used to measure dimensions of the quality of classroom interactions based on the assumption that external observations do not accurately capture their long-term interactions within the classroom (Dorman, 2008; Kane & Staiger, 2012; Wagner et al., 2013).

There are multiple perspectives on how student perceptions of the quality of classroom interactions are statistically and theoretically used. The architects of the Measures of Effective Teaching study (MET; Bill & Melinda Gates Foundation, 2013) take the perspective that students are *objective* raters of the classroom, and thus consider deviations on survey responses as rater variance or error (p. 149, Raudenbush & Jean, 2014. Also see Guion, 1973, James, 1982, and Sirotnik, 1980 for discussions and comments on this perspective). This view results in the practice of first residualizing scores based on individual-level characteristics (such as student demographics and previous achievement) before finding classroom averages and privileges the classroom-level variables created from the aggregated student-level reports to understand processes of teacher effectiveness. Support for this view would assume that students within the same classroom have relatively high agreement on the constructs they are rating because students are all rating the same classroom environment. However, growing evidence suggests that student perceptions of the classroom cannot be reliably aggregated to the classroom level and students within the same classroom only loosely agree (e.g., Lam, Ruzek, Schenke, Conley, & Karabenick, 2015; Miller & Murdock, 2007; Schweig, 2014).

In contrast, the perspective taken by many educational psychologists suggests that student perceptions of the quality of classroom interactions provide unique accounts that may not represent a common, shared experience (Ames & Archer, 1988). This "psychological environment" (Maehr, 1991) is what educational psychologists measure when using student perception data and this approach privileges an individual's interpretation of their learning environment in understanding the association between teaching and learning.

There are approaches that privilege both the individual and the classroom aggregates of those perceptions (e.g., Lüdtke et al., 2008; Marsh et al., 2012; Miller & Murdock, 2007; Morin, Marsh, Nagengast, & Scalas, 2014). These models allow researchers to simultaneously examine level-1 (individual-level) and level-2 (classroom-level) effects. Modeling both the level-1 and level-2 effects of students' perceptions of the quality of classroom interactions has the advantage of better understanding *how* shared environments influence students' achievement and learning-related behaviors.

Student perceptions of the quality of classroom interactions have been described along a variety of dimensions. Some measure students' perceptions of the achievement goal structure of the classroom such that students' perceptions of learning and understanding, and performance are measured (e.g., Ames, 1992; Deemer, 2004; Urdan, 2004). Schenke et al. (2015) expanded this model to include students' perceptions of emotional support in understanding the association between perceived classroom climate and different types of help seeking. Others (e.g., Ferguson, 2010) suggest that students' perceptions of the quality of classroom interactions can be measured along seven dimensions called the 7Cs. In the present study, I focus on the following three dimensions of students' perceptions of quality of classroom interactions: emotional support, instructional support, and academic press.

1.2.1. Emotional support

Classrooms can be viewed from a perspective that focuses on supporting students' social-emotional well-being or *emotional support*. Students' perceptions of emotional support refer to the teacher-student interactions that promote students' social and emotional functioning such as feelings of belongingness, positive peer relationships, and feelings of relatedness (Pianta, Hamre, Hayes, Mintz, & LaParo, 2008; Ryan & Deci, 2000). Emotional support is related to important child-related outcomes such as engagement with school, academic performance, increased student motivation, and positive behavioral outcomes (Pianta, Hamre, & Allen, 2012; Ryan & Deci, 2000) because teachers who are aware of the students' needs structure classroom activities in line with those needs. As a result, classrooms that are perceived as high in emotional support are positively associated with students' engagement with work, academic achievement, and positive attitudes toward academics (Pianta et al., 2012; Patrick, Kaplan, & Ryan, 2011; Reyes, Brackett, Rivers, White, & Salovey, 2012; Roorda, Koomen, Split, & Oort, 2011; Ryan & Deci, 2000; Ryan & Patrick, 2001; Ryan & Shim, 2012). There are differences in the effect of emotional support depending on the outcomes that are investigated. A meta-analysis by Roorda et al. (2011) looked at the association between teacher support and student achievement and engagement and found stronger effect sizes when looking at engagement as the outcome than when academic achievement was the outcome suggesting that engagement is a more proximal learning outcome than academic achievement.

1.2.2. Instructional support

Students' perceptions of instructional support are not often investigated in the literature but may provide important insights into instruction because observations of instructional support have been theoretically supported in the literature (e.g., Pianta & Hamre, 2009). I define instructional support as the extent to which students perceive cognitive supports, feelings of competency, and teacher strategies that support cognitive and academic development such as clarity of instruction (Hamre & Pianta, 2005; Pianta & Hamre, 2009). Students who perceive teachers as providing instructional support believe the teacher is clear in her instruction, explains things in orderly ways and provides a summary of what students learned in class. In contrast with emotional