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Reliability and validity of the Classroom Observations of Student–Teacher Interactions (COSTI) for kindergarten reading instruction

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ABSTRACT

This paper describes the technical adequacy and potential uses of an observation system used to measure the quality of literacy instruction in kindergarten classrooms. The Classroom Observations of Student–Teacher Interactions (COSTI) documents the frequency of four student–teacher interactions during beginning reading instruction: explicit teacher demonstrations, student independent practice, student errors, and teacher corrective feedback. Data were collected during kindergarten reading instruction, and the analyses address reliability, stability of the coded teaching behaviors, and predictive validity. Results indicated that data could be collected reliably and that teachers' provision of opportunities for independent student practice was stable across the school year. Student independent practice opportunities also predicted gains in several important reading outcomes. Implications are discussed, including potential uses of the instrument for providing teachers with feedback on their literacy instruction and for extending the knowledge base on effective literacy instructional practices.

1. Introduction

Teaching and learning basic skills, such as beginning reading, require a high level of interaction between teachers and their students. Interactions such as demonstrating new skills, affording opportunities for independent practice, recognizing mistakes, and providing corrective feedback serve as an essential vehicle for teaching children fundamental concepts and skills (Archer & Hughes, 2011). In order to provide teachers with feedback on their instruction in basic skills and to document student–teacher interactions for research on effective instructional practices, it is important to reliably measure student–teacher interactions during instruction and demonstrate that teachers' ability to provide sufficient and timely interactions contributes to student learning. The Classroom Observations of Student–Teacher Interactions (COSTI) instrument was developed to quantify the rates of specific instructional interactions that occur between teachers and their students. This paper describes the COSTI and reports the reliability and validity of the instrument from a study on beginning reading instruction.

1.1. Role of instructional interactions in beginning reading instruction

Instructional interactions between students and teachers are thought to lay the foundation for acquiring initial reading skills based on basic principles of learning and retention (Carver & Klahr, 2001; Ebbinghaus, Ruger, & Bussenius, 1913). Explicit teacher demonstration of new skills and frequent opportunities for student independent practice, coupled with specific, corrective feedback on student errors are particularly important during beginning reading instruction because they provide children with a basic foundation for acquisition of early reading skills (Aylward et al., 2003; Goswami, 2004; Shaywitz, Morris, & Shaywitz, 2008; Simos et al., 2002; Stevens, Fanning, Coch, Sanders, & Neville, 2008; Temple et al., 2003). Teacher demonstrations and corrective feedback make clear to students what they are learning and what it looks and sounds like when accomplished correctly. Independent practice helps students gain mastery and fluency with newly learned skills, concepts, and vocabulary. Evidence from this body of research suggests that these interactions, particularly practice, appear to be particularly important (Ericsson, Roring, & Nandagopal, 2007; Fields, 2005; Meltzoff, Kulh, Movellan, & Sejnowski, 2009; Sutherland, Alder, & Gunter, 2003; Swanson & O'Connor, 2009). Findings from these distinct but related bodies of research suggest that the rates of specific student–teacher interactions are related to the acquisition of basic academic skills such as decoding, math facts, and spelling. These interactions are particularly important during preschool and grades K-2 when children

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are taught the basic skills that will be essential in order for them to learn and apply more advanced knowledge and skills throughout their school and working careers. In this section, we define the interactions and describe the theoretical and research support for their link to student learning.

1.1.1. Teacher demonstration

Teacher demonstration is a key feature of explicit instruction (Archer & Hughes, 2011). Teacher demonstration is defined as the teacher giving students new information or showing students how to apply a new skill, such as "the letter *m* makes the sound/mmm/" or "I'm going to sound out the word *man*,/mmm//aaa//nnn/." Teacher demonstration is used when teaching a new skill, when students need more practice, or when students do not reply or make an error. The teacher says, "Listen to me"; "Watch me"; "My turn." The teacher then shows students the skill that is being taught – what it looks like and sounds like.

Considerable evidence supports the role of teacher demonstration in the teaching of initial reading skills. Students of teachers who use explicit instruction to teach basic skills learn more than students who receive less explicit instruction such as discovery learning (e.g., Foorman, Francis, Fletcher, Schatschneider, & Mehta, 1998; Gunn, Smolkowski, Biglan, Black, & Blair, 2005; Klahr & Nigam, 2004; Kulik, Kulik, & Bangert-Drowns, 1990; Stallings, Robbins, Presbrey, & Scott, 1986). Modeling the appropriate response allows students to imitate the response, which is faster than trial-and-error learning and individual discovery (Meltzoff et al., 2009; Smith, 1979). Teacher demonstrations are also an effective instructional tool for teaching basic skills to young children who may be unable to learn new information or skills from a less-direct approach.

1.1.2. Student independent practice

Increased rates of independent practice are associated with the successful acquisition of new skills and a defining feature of proficiency in music, sports, and basic academic learning (Ericsson et al., 2007; Fields, 2005). For literacy acquisition, practice that targets word-level and reading fluency has been shown to improve comprehension (Vadasy, Sanders, & Peyton, 2005) independent of working memory (Swanson & O'Connor, 2009). Practice has also been shown to promote language acquisition (Meltzoff et al., 2009).

In the classroom, independent practice is conceptually similar to opportunities to respond (Council for Exceptional Children, 1987) and engagement in academic responding (Greenwood, Delquadri, & Hall, 1984), which refers to a combination of classroom behaviors including reading aloud, asking and answering questions, and participating in tasks. In early reading, where fluent and accurate word recognition is a key instructional goal, practice is the main vehicle by which young learners learn to decipher new words and sounds on their own.

The importance of student independent practice is based on evidence from several decades of research supporting the impact of opportunities to respond or academic engagement on students' academic achievement (Greenwood, Horton, & Utley, 2002; Rosenshine, 1995). A brisk rate of independent opportunities for practice helps ensure that students' attention is focused on the lesson (Carnine, Silbert, & Kame'enui, 1997; Gleason & Hall, 1991) and that they receive frequent opportunities to develop automaticity and fluency in basic skills, a prerequisite to skilled reading (Samuels, 1997; Share, 2008). Among students with moderate and severe disabilities, increasing rates of practice have been found to be an effective teaching practice for improving both academic and behavioral outcomes (Logan, Bakeman, & Keefe, 1997; Sutherland et al., 2003; Sutherland & Wehby, 2001). Similarly, researchers have found that the most effective general education teachers provide extensive practice to help their students to develop well-connected networks (Brophy & Good, 1986; Fields, 2005; Rosenshine, 1995).

1.1.3. Student errors

Student errors are defined as an incorrect response or no response during independent practice. Errors can happen for a number of reasons. The student may not understand what to do for the task, may have learned the skill incorrectly, or may not have learned the skill at all. Regardless of the reason, documenting student errors provides important information about the effectiveness of teachers' instructional practices. We acknowledge that, in isolation, student errors do not represent an instructional interaction or approach per se, but we have chosen to document student errors because the rate of errors (a) gives an indication of the effectiveness of teachers' instructional practices, (b) helps frame the interpretation of corrective feedback, and (c) provides an objective means for studying the relationship between error rates and reading gains.

1.1.4. Corrective feedback

Corrective feedback is defined as an instructional practice that directs students' attention to their incorrect responses. To be corrective feedback, the teacher must provide some information about the task or skill (e.g., "remember, the letter makes the/mmm/sound"). Repeating a question or guiding the student to the correct answer is not corrective feedback (e.g., "What sound do these letters make?" or "Sound it out."). Corrective feedback following a student error indicates that the teacher is monitoring students' understanding during instruction and is responsive to their errors.

The significance of corrective feedback stems from research focused on comparisons of feedback techniques and the effects on word recognition in beginning readers (e.g., Barbetta, Heward, Bradley, & Miller, 1994; Meyer, 1982; Pany & McCoy, 1988). Findings from these studies suggest that the use of direct corrective feedback enhances word recognition accuracy and, in some cases, reading comprehension. An analysis of these studies conducted by McCoy and Pany (1986) found that corrective feedback was associated with more accurate word recognition and did not appear to interfere with comprehension during reading. Findings from both types of research also indicate that young children require more corrective feedback than those at a more advanced level of learning because they have not mastered the skills needed to automatically self-correct (Gardner, 1998).

1.2. Growing use of observational instruments

Observations of instruction inform researchers about real-time teaching practices and about the intervening classroom variables that affect changes in student outcomes. Findings from observations can be used to evaluate and improve the quality of instruction that students receive. Observational data also have the potential to advance the science of learning and build a closer link between research and classroom practice (Bransford, Brown, & Cocking, 2000).

Observation instruments are increasingly being utilized to document implementation of federally funded programs, such as Reading First (Baker et al., in press), and as an integral part of large-scale professional development systems. Widely used observation instruments measure multiple aspects of classroom instruction and provide useful information on the overall quality of early literacy teaching, including teacher affect, classroom settings, instructional design, content, and delivery. Global measures, such as the Classroom Assessment and Scoring Instrument (CLASS; Pianta, La Paro, & Hamre, 2008) and The Early Childhood Environment Rating Scale-Revised (ECERS-R; Harms, Clifford, & Cryer, 2004) assess the presence or absence of broad classroom