

Chapter 1

The Need, Use, and Future of Cognitive Diagnostic Assessments in Classroom Practice

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ABSTRACT

Given the increases in technology, improvements in cognitive theory, and proliferation of assessments, the differentiation of classroom instruction to meet the individual needs of a diverse student population is overdue (Huff & Goodman, 2007; Leighton & Gierl, 2007). In order to meet the instructional needs of students, K-12 classroom- and university instructors need assessments that not only identify background knowledge, but also measure skills and diagnose troubles of their students (Huff & Goodman, 2007). Thus, the purpose of this chapter is to: a) explain the role and types of assessments in instructional settings, b) identify a gap in classroom assessments, c) describe how cognitive diagnostic assessments can fill that gap, d) identify the theoretical and practical impediments of implementing cognitive diagnostic assessments, and e) provide an example of a cognitive diagnostic assessment (MOCCA) that is overcoming those impediments.

DOI: 10.4018/978-1-5225-3132-6.ch001

INTRODUCTION

Given the increases in technology, improvements in cognitive theory, and proliferation of assessments, the differentiation of classroom instruction to meet the individual needs of a diverse student population is overdue (Huff & Goodman, 2007; Leighton & Gierl, 2007). In order to meet the instructional needs of students, K-12 classroom- and university instructors need assessments that not only identify background knowledge, but also measure skills and diagnose troubles of their students (Huff & Goodman, 2007). However, there have been theoretical, methodological, and practical impediments preventing development and implementation of cognitive diagnostic assessments in classroom settings (Rupp, Templin, & Henson, 2010). Therefore, the purpose of this chapter is to: a) explain the role and types of assessments in instructional settings, b) identify a gap in classroom assessments, c) describe how cognitive diagnostic assessments can fill that gap, d) identify the theoretical and practical impediments of implementing cognitive diagnostic assessments, and e) provide an example of a cognitive diagnostic assessment (MOCCA) that is overcoming those impediments.

CLASSROOM ASSESSMENT IN GENERAL

Assessment means different things to different people in different positions (Cizek, 1997; Erwin, 1991). Broadly, assessment is a process of collecting and using student information (Butler & McMunn, 2006; Scriven, 1967); assessment can also refer to the instrument or tool used to collect that student information. In post-secondary settings, assessment also refers to the large-scale process of collecting data (student, faculty, and institutional) within and across campus departments for the purposes of accreditation. Ideally, assessment is the process of using this student information to measure learning/achievement, evaluate performance, and to inform and foster future learning (Phye, 1997).

Assessment serves several purposes. Traditionally, assessments have been used to measure student achievement and consequently serve as a basis for grades (Erwin, 1991). With greater frequency, assessments are also used to document student progress to inform instruction (i.e., “data driven instruction”; Erwin, 1991; Popham, 1995). Assessments can be used to identify student or programmatic needs, and then plan program improvement (Erwin, 1991; Alexander, Clinton, & Kean, 1986). Assessment can even assist in student learning and retention (i.e., “testing effect”; McDaniel, Wildman, & Anderson, 2012), and is more effective with appropriate feedback (Black & Wiliam, 1998). Assessment is also used at institutional levels for accountability and reporting purposes (Erwin, 1991). These accountability and reporting processes, however, can also have unintended consequences (that sometimes act as the purpose of assessment). For instance, while the use of common assessments can ensure that instructors are measuring learning in valid ways (Simosko, 1988), common assessments lead to the narrowing of the curriculum (Popham, 1987, 1995). Specifically, instead of measuring what has been taught and learned in class, teachers need to “teach to the test.” Finally, accreditation assessments can define an institution by what students can do in its school or program. Given the various purposes for assessment, it is imperative that instructors and administrators have a strong understanding of those purposes, characteristics, and limitations of assessments.

Instructors should also have a multi-dimensional understanding of assessment (Xu & Brown, 2016), especially given the amount of time they invest in the assessment process and creating their own assessments (Hoover & Abrams, 2013; Stiggins, 1991). However, many instructors do not receive much

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