

# Chapter 11

## Educational Technology Assessment: A Model for Analyzing Online Psychometric Tests for Course Evaluations

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### ABSTRACT

*In this chapter a digital assessment and an associated novel mathematical statistical model are provided as online psychometrics designed to evaluate College and University courses. The psychometric evaluation tool is a Student Ratings of Instruction [SRI] instrument used at a Historically Black College and University [HBCU] for course evaluation purposes. The research methodology is an a posteriori post hoc investigation that examines the reliability and validity of the items used in the SRI instrument. The sample under analysis consisted of the responses to 56,451 total items extracted from 7,919 distributed Student Ratings Instruments delivered online during the 2012 academic year. The post hoc application of the novel Tri-Squared Test analysis methodology is used to intricately analyze the results of an earlier study on SRIs that yielded strong construct validity from Cronbach's Alpha Reliability Model, Goodman & Kruskal's Lambda, and Principal Component Factor Analysis with Varimax Rotation.*

### INTRODUCTION

Throughout the academy there has always been concern about improving the skills and knowledge of students. Many colleges and universities have promoted a multitude of strategies to enhance student success, and are constantly exploring ways

that would further improve teaching excellence and student success. In attempting to acquire data regarding teaching efficacy, many universities have, over the years, utilized independent student survey designs to evaluate teaching and determine if student learning outcomes are met. Internationally, educational researcher Richard-

DOI: 10.4018/978-1-4666-8363-1.ch011

son noted several significant student evaluations of teaching [“Student Ratings” referred to as “Student Evaluations of Instruction” or “SEI”] in use in research projects in the US, England, and Australia, including the use of the British Noel–Levitz “Student Satisfaction Inventory”; the “Course Perceptions Questionnaire”; the “Student Evaluations of Educational Quality”; and the “Course Experience Questionnaire” (as cited in Skowronek, Friesen, & Masonjones, 2011).

Certainly, of the various assessment designs available to evaluate teaching effectiveness and student success, the student ratings are the most widely used in many universities worldwide because they offer an organized, methodical, and effective means of obtaining feedback on students’ responses to instructors and courses (Agbetsiafa, 2010), and have been around since the mid–1920s (Cohen as cited in Donnon et al., 2010; d’Apollonia & Abrami as cited in Safavi, Bakar, Tarmizi, & Alwi, 2012; Wright, as cited in Gravestock & Gregor–Greenleaf, 2008). In general, there have been some agreements that, students’ ratings seem sufficient to evaluate what they seek to determine: teaching effectiveness, student satisfaction, educational experience, and program curriculum (Abrami as cited in Gravestock et al., 2008; Agbetsiafa, 2010; Beran, Violoto, & Kline, 2007; Skowronek, et al., 2011; Zhao et al., 2012). Gravestock et al. (2008) also noted “the quantifiability and comparability of most course evaluations makes the imprecise art of evaluating teaching seem more objective and manageable” (pp. 10). In addition, Titus (2008) noted that, apart from securing teaching efforts to preferred outcomes, probing students about their knowledge underpins the commitment of classroom efforts and events. Additionally, other academics also agreed that student ratings can be an integral part of the evaluation of an instructor’s performance (El Hassan, 2009; McKeachie & Hofer as cited in Skowronek et al., 2011).

Though most academics may reach a conclusion that student ratings are consistent tools,

there is fewer unison regarding their universal validity and reliability with respect to the level at which the design correctly evaluates concrete terms (e.g. “Teaching Effectiveness”), or present a comprehensive rating of the course or instructor (Agbetsiafa, 2010; Beran & Rokosh, 2009; Beran et al., 2007; Clayson, 2009; Gravestock et al., 2008; Marsh, 2007; McKeachie, 2007; Perry & Smart, 2007; Spooren, Mortelmans, & Denekens, 2007). Certainly, while some researchers have argued there is little evidence of a correlation between student ratings and teaching effectiveness (Madden, Dillon, & Leak, 2010; Pounder, 2007), others have considered the ratings to be a worthwhile evaluation of teaching effectiveness and student success (Abrami as cited in Gravestock et al., 2008; Frick, Chadna, Watson, Wing, & Green, 2009; Schrodtt et al., 2008; Zhao et al., 2012). Student ratings can also be imperfect and answerable to manifold exterior influences independent of the teacher’s capacity to teach and to foster and sustain an effectual course (Marsh, 2007; McKeachie, 2007; Perry et al., 2007). Also, some research studies have proposed student ratings may be vulnerable to elements unconnected with teaching effectiveness (Kozub, 2010). Some academics have established that, the student and the instructor’s gender may affect student ratings (Emery as cited in Kozub, 2010). Donnon et al. (2010) also noted that, student ratings may vary according to the students’ characteristics. Theall (2010) also said a somber difficulty was the prevalent hapless exercise in the expansion and utility of rating instruments, the assessment and reportage of data, and the explanation and usage of results.

There is an inconsistency within academia by academics in reaching an agreement on the validity and reliability of student ratings. The authors have found this is most often due to the inherent “highly contextual” method of teaching employed by institutions specifically dependent upon the particular institutions mission and vision that most often leads faculty in their development

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