

# Chapter 33

## Paired Multiple Choice Questionnaires: A Novel Assessment Tool

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### ABSTRACT

*Multiple Choice Question (MCQs) tests have long been used as assessment tools. A significant problem of MCQs tests is the positive grades bias introduced by guessing. This chapter describes a novel assessment tool in which the questions given in the test constitute pairs, referred to as “paired” MCQs (p-MCQs). Every pair addresses the same topic, but this similarity is not evident for a student who does not possess adequate knowledge on the topic addressed in the questions of the pair. The answers to the questions are graded in pairs, providing a bonus, if both questions of the pair are correctly answered, or a penalty, if only one of the pair’s questions is answered correctly. If both answers are wrongly answered no marking is collected by the examinee. Application examples are reviewed, indicating that the p-MCQs method removes the guessing factor bias, in a way that might not overtly induce the dissuading effects of direct negative marking of incorrect answers, commonly used in mixed-scoring schemes.*

### INTRODUCTION

Multiple choice questionnaires (MCQs) consist of a set of questions in which examinees, or more general responders, have to select or eliminate response items, i.e., answers, from a list that is proposed to them. The term “questionnaires” is somewhat restrictive, since in some cases the item to which the examinee has to respond might not

be phrased as a question but, for example, as an incomplete phrase that has to be completed by selecting an item from a list. MCQs are used in educational settings for testing students. One of the most characteristic features of MCQs, along with true/false questions, is that scoring can be done without the need of judgment application by the scorer, since the scoring rules are strictly set and straightforward to follow. In this sense MCQs

DOI: 10.4018/978-1-4666-9634-1.ch033

tests' scoring is objective (Bush, 2006; Freeman & Lewis, 1998; Scharf & Baldwin, 2007). On the same hand, this characteristic makes the use of MCQs especially appropriate for electronic examination settings.

Electronic examinations have been consistently used as part of the online activities offered to students based on the introduction of personal computers (PCs) in education, which by itself constituted a landmark, promoting the implementation of innovative learning methods. The variety of learning material-related online activities available is impressive. It extends from simple access to static course content in electronic files, to complete courses followed by the student. Such "packages" often include self-assessment modules (Tsiakas, Stergiopoulos, Nafpaktitis, Triantis, & Stavrakas, 2007). In such cases the merits of MCQs become evident, since they are one of the basic tools available to content developers for providing comprehensive self-assessment examination material, along with true/false questions. Overall, in comparison to traditional teaching methodologies, a significant amount of literature exists to support the superiority of computer-aided learning for skill learning, including critical thought and problem solving (Bowman, 1995; Safrit, Ennis, & Nagle, 1988).

Electronic examinations, in modern educational settings constitute a part of computer-aided testing systems. In turn, those systems, being part of the available armamentarium of assessment and testing tools, provide one of the foundations needed for Learning Management Systems (LMSs). Successful LMSs integrally support the activity cycles related to the interactions between instructors, students, administrative staff, as well as learning material (Chu et al., 2010; Ellis, 2009a). Assessment and testing is only one of the many features than an LMS provides to its users, in conjunction with reporting and statistical processing of educational activities, compliance tracking, management approval, certification of participants, as well as authoring of material and content management.

While electronic examinations are assessment items delivered by the LMS, the items that the electronic examination consists of are usually developed, managed and published by a Learning Content Management System (LCMS). LCMS are software applications either incorporated into or closely interacting with the LMS that the educational institution uses (Feldstein, 2002). It has been persuasively argued that creating electronic examinations in the framework of LCMSs and using them as computer-based learning and evaluation items in a LMS, could be considered for enriching existing assessment methodologies and, concurrently, constructing innovative assessment techniques (Ganguli et al., 2006; Triantis, Anastasiadis, Tsiakas, & Stergiopoulos, 2007). Additionally, findings of the surveys conducted on users of LMSs by the American Society for Training and Development (ASTD), in 2009 and 2010, stressed the importance of assessment and testing for LMSs (Ellis, 2009b; Ellis, 2010). Since an important part of assessment and testing tools used by LMS are electronic examinations, innovative assessment techniques can be readily incorporated into electronic examination modules and might be expected to expand the use of LMSs.

The use of MCQs in electronic examinations provides benefits to the academic and administrative personnel of the institutions using such examinations in the framework of LMSs, since MCQs are inherently suited to such examination, mainly due to the very easy extraction of the final score of the examinee in a fully automated mode (Mattheos et al., 2008; Van der Linden & Glas, 2000). Therefore, at a first level, MCQ use enables the drastic reduction of the time allocated to scoring the answers and the administrative burden that the registration of the examination grades incurs. On a second level, students' assessment is enhanced by the automated extraction of statistical indicators concerning the performance of the students. The computation of such indices can be easily incorporated into the electronic examination and management software modules (Mattheos et al.,

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