Chapter 8.6

Enhancing Electronic Examinations through Advanced Multiple–Choice Questionnaires

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ABSTRACT

The present chapter deals with the variants of grading schemes that are applied in current Multiple-Choice Questions (MCQs) tests. MCQs are ideally suited for electronic examinations, which, as assessment items, are typically developed in the framework of Learning Content Management Systems (LCMSs) and handled, in the cycle of educational and training activities, by Learning Management Systems (LMS). Special focus is placed in novel grading methodologies, that enable to surpass the limitations and drawbacks of the most commonly used grading schemes for MCQs in electronic examinations. The paired MCQs grading method, according to which a set of pairs of MCQs is composed, is presented. The MCQs in each pair are similar concerning the same topic, but this similarity is not evident for an examinee that does not possess adequate knowledge on the topic addressed in the questions of the pair. The adoption of the paired MCQs grading method might expand the use of electronic examinations, provided that the new method proves its equivalence to traditional methods that might be considered as standard, such as constructed response (CR) tests. Research efforts to that direction are presented.

INTRODUCTION

Learning Management Systems (LMS) ideally support the whole cycle of activities related to the interactions between instructors and students, as well as their interactions with administrative staff and learning material (Chu, Young, Ngai, Cun, Pearl, & Macario, 2010; Ellis, 2009a). This "all encompassing" characteristic provides an extensive set of features that are available to the users of a LMS. Educational institutions and corporations can use features such as certification of participants, compliance tracking, reporting and statistical processing of educational activities, management approval, authoring of material and content management, as well as assessment ans testing. In the present chapter focus will be placed on the assessment and testing features of a LMS and, more specifically, on variants of electronic examination methods. An electronic examination is an assessment item delivered by the LMS, while the development, management and publishing of the items that the electronic examination consists of are usually tasks of a Learning Content Management System (LCMS), a software application that is either incorporated into a LMS or closely interacts with it (Feldstein, 2004). The use of electronic examinations methods, in the context of LMS, as computer-based learning and evaluation items, created in the framework of a LCMS and managed by a LMS, should be considered for enriching and strengthening the existing assessment schemes, while at the same time constructing innovative assessment techniques (Ganguli et al., 2006; Triantis, Anastasiadis, Tsiakas, & Stergiopoulos, 2007).

As stated above, LMS are not directly involved in producing the contents provided to the users of the systems. Nevertheless, the whole "superstructure" that a LMS provides to an educational organization that seeks to benefit from an automated system for managing educational processes, is based on a set of foundations, among which are the assessment and testing tools incorporated

into the LMS. The American Society for Training and Development (ASTD) conducted two surveys, in 2009 (189 participants) and 2010 (342 participants), on users of LMS. When asked to rank the most valuable features of LMS, in both years, among 15 features, assessment and testing ranked 1st with 59.3% of participants ranking it most valuable feature in 2009 and 54.5% in 2010 (Ellis, 2009b; Ellis, 2010). In 2009 the feature that ranked 2nd was content management, with 48.4%, and in 2010 reporting, with 51.5%. Electronic examination modules are an important part of assessment and testing tools used by LMS. In the light of the above, research concerning innovative assessment techniques, incorporated into electronic examination modules, might be an efficient way to further the adoption of LMS.

Electronic examinations, as part of computer-aided testing systems, enhance student assessment procedures in a variety of ways. For example, the time allocated to scoring the answers of the students and the administrative burden related to the registration of the examination grades might be drastically reduced or even eliminated. Self-examination material can be provided, which can be used on a distance-based learning framework by the students (Tsiakas, Stergiopoulos, Nafpaktitis, Triantis, & Stavrakas, 2007). The automated extraction of statistical indicators of the students' performance can also be straightforwardly incorporated to the software implementing and managing the electronic examination (Mattheos et al., 2008; Van der Linden & Glas, 2000). One of the basic features of a LMS is that it enables to keep track of the performance of students across the various types of training activities that the students are engaged in. The existence and management of quantitative indicators, in the framework of a LMS, might enable the detection by the teacher of topics whose assimilation is not satisfactory by the students. In turn, the knowledge that specific material has been deficiently learned by the examinees might focus remedial action in subsequent teaching periods of the examined courses

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