Chapter 9

A Tool for Adaptive E-Assessment of Project Management Competences

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ABSTRACT

This chapter proposes an e-assessment method for project management competences, using the computer adaptive testing (CAT) principle. Competences are represented using concept space graphs. The proposed model increases the tests configurability by considering several knowledge constraints when an item is selected. The proposed model is also seen as a self-directed-learning-tool, useful in the preparation process for project management certifications. The model is validated by comparison with an existing e-assessment tool, used for simulation purposes; statistic results are presented and analyzed. Although the initial level of knowledge of each user has a great impact on the final results obtained by that user, preparation with the proposed e-assessment method proved to be more efficient.

INTRODUCTION

As a consequence of changes brought by the knowledge economy, educational processes have also undergone a metamorphosis: the collaborative and online forms of education are becoming more widespread, the focus on educating working professionals has gained importance, and the adaptive features of educational software have been significantly improved. Workers in a knowledge society develop their knowledge through learning: ‘employees need to take greater personal responsibility to ensure their skills are current and marketable’ (Garofano & Salas, 2005).

The importance of continuous learning is also demonstrated by the variety of training sessions...
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held in companies and organizations (Marimuthu & al., 2009), and by the introduction of various tools meant to develop employees’ skills or to fill knowledge gaps (Delcea & Dascalu, 2009). The selection of suitable learning instruments for competence development has, without doubt, had a tremendous impact on both corporate and personal well-being (Kröll, 2007), (Fabra & Camisón, 2009). As a consequence of the technological boom, e-learning is gaining increasing numbers of followers. Although e-learning has overcome time and place constrains (Phobun & Vicheampaanya, 2010), the need for personalized e-learning services appeared: learning performance can be significantly enhanced if individual goals, level of knowledge, background, or learning capabilities are taken into account (Beldaglia & Adiguzela, 2010). Thus, adaptive e-learning instruments represent an important advance in learning system development. Although less complex than the “one-size-fits-all” static approach, adaptive e-learning applications are characterized by greater flexibility (Beldaglia & Adiguzela, 2010) and a more interactive experience (Barla, Bieliková, Bou Ezzeddinne, Kramár, Simko, & Vozár, 2010). Two other modern learning instruments are the personal academic environment (Casanova, Holmes & Huet, 2009) and the adaptive web-based system (Dagger, Wade & Conlan, 2004).

The authors argue that an e-assessment application could be an efficient learning tool in a knowledge society (Bodea & Dascalu, 2009). This statement complies with the opinion of other researchers, who argue that ‘learning from errors is a promising method’, resembling problem-based or task-based education methods (Stergiou & al., 2009): “… every error includes the chance to learn from it, if learners can view it as learning occasion. Therefore, learners have to identify the error and understand the correct solution by comparing the incorrect solution systematically with the correct one. The tutor’s feedback is of great importance” (Stergiou, Georgoulakis, Margari, Aninos, Stamatakis, & Stergiou, 2009). In order to increase the learning dimension of an e-assessment application, the authors consider implementing adaptive behaviour, where adaptive is defined as “a capability to change when necessary in order to deal with different situations” (Beldaglia & Adiguzela, 2010).

The current study proposes an e-assessment method for project management competences. Projects, as common organizational structures in knowledge society, greatly require the development of project management competences: ‘in project management, competence development is one of the critical success factors’ (Suikki & al., 2006). The proposed method allows the development of e-assessment applications that serve not only as evaluation tools, but also as self-directed learning instruments. Two strong features of the proposed method are adaptability and orientation towards competences. In order to adapt to the user’s knowledge level, the principle of Computer Adaptive Testing (CAT) is employed.

The chapter has the following structure: after a brief introduction, the research is framed in the corpus of relevant literature regarding computer adaptive testing. The research objective is highlighted and the research methodology is presented, starting from conceptual modeling to the description of the actual computer adaptive testing software solution. In order to check the efficiency of the proposed e-testing solution, a validation experiment is designed, based on the method involving a control group which used a different e-testing solution. The results of the experiment are discussed and finally, future directions and conclusions of the research are described.

RESEARCH CONTEXT

A form of computer based testing which increases flexibility and offers more information about the examinees’ competences is Computer Adaptive Testing (CAT). The principle behind CAT is to adjust the test items’ characteristics to the examinee’s
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