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Using online assessments to stimulate learning strategies and achievement of learning goals

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ABSTRACT

The main goals of this research are: (i) to explore the influence that announcement of certain type of online assessment has on students' learning strategies and (ii) to explore the influence of stimulated learning strategies on achievement levels that students exhibit during assessments. Research has been conducted by testing and surveying 351 students from higher education institutions. Results indicate that students' learning strategies can be influenced in a relatively short period of time by announcing various types of online assessments and that steering to more desirable deep learning strategies has positive impact on both formal and perceived levels of success in achieving the desired learning goals. These findings can be used to create a novel adaptive online assessment system that incorporates the elements of adaptivity within a series of assessments and uses post-assessment feedback to steer students' learning strategies.

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1. Introduction

The subject of this paper is to study the effects of announcing and solving certain types of online knowledge assessments on stimulation of students' deep and surface learning and achievement of required learning goals.

Knowledge assessment is an important component in the process of achieving desired learning goals among students. Besides the obvious role of quantifying students' knowledge, research suggests (Macdonald, 2004) that online knowledge assessments have several additional important roles in the context of online education: (i) to stimulate the learning process in critical places of online courses, usually containing more demanding content (e.g. through post-assessment feedback), and (ii) to help in the gradual development of required skills.

Despite extensive research in the field of online education and online knowledge assessment, the relationships between applications of certain forms of online knowledge assessment and their influence on stimulating learning strategies and achieving various levels of required learning goals (e.g. according to Bloom's Taxonomy) are still insufficiently explored.

Multiple-choice questionnaires are the predominant form for practical applications of online knowledge assessment (Kim, Smith, & Maeng, 2008). Although numerous researches (Nowicki & Jones, 2005; Oliver & Dobele, 2007; Scouller, 1998; Shumway & Harden, 2003) indicate that this form of assessment predominantly tests only lower levels of cognitive skills. The effectiveness of this, easiest to implement, type of online assessment on stimulaton of learning strategies and the

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achievement of required learning goals is still insufficiently explored. In addition, there is a question of whether the other methods of online knowledge assessment enable the achievement of higher levels of learning goals and the stimulation of deep learning strategies. As one of the scientific contributions of this paper, this research aims to provide additional insights about their effectiveness.

This paper is structured as follows: in Section 2 we explore research findings and analyze research literature in respect to two sub-domains: (1) Learning strategies and online assessments, and (2) Learning strategies and learning goals. Section 3 shows the hypotheses while Section 4 describes the research sample, procedure and the two questionnaires used. Section 5 reveals research results and consists of two parts that correspond to the hypotheses. Extensive results from previous sections are summarized in Section 6. Section 7 describes the plans for further research having in mind the online system that will be built based on the findings of this research. We conclude in Section 8.

2. Research background

This section describes previous research in related areas (learning strategies, levels of knowledge, learning goals) that have been predominantly conducted in the context of traditional education and e-education in general. Only a few efforts have been directed towards researching their influences within a narrower field of online knowledge assessment.

2.1. Learning strategies and online knowledge assessment

Hartley (1998) defines learning strategies as the different combinations of activities (i.e. 'strategies') students use while learning. He also states that, when compared to learning styles, learning strategies are considerably more conditioned by the task at hand and display greater variability over time. These are the main reasons why this paper consideres learning strategies over learning styles and why this paper is focused on the stimulation of desireable learning strategies in order to achieve required learning goals. Despite playing a very important role in overall achievement of learning goals, staticallity of learning styles makes them non-viable target for manipulation. On the other hand, learning strategies are dynamic in nature and can be manipulated within shorter periods (such as one semester).

Instead of the term “learning strategy”, the replacement term “learning approach” is often used in literature (Entwistle, 1988; Hoeksema, 1995; Marton & Säljö, 1976; Sankaran & Bui, 2001). Therefore, in context of this paper “deep learning strategy” can be interpreted as “deep learning approach”, while “surface learning strategy” can be interpreted as “surface learning approach”. According to the above-mentioned authors, these approaches can be described as follows:

- Surface approach – typical in situations where the dominant goal is the reproduction of learning contents (rote memorization of facts and isolated sets of data, mechanical substitutions in formulas, etc.). Understanding of learning contents is either very low or non-existent.
- Deep approach – typical in situations where the dominant goal is to understand learning contents (questioning of alternatives, raising additional questions, exploration of newly learned contents' application limits, etc.).

Watkins and Hattie (1985) and Gow and Kember (1990) have also identified these two basic strategies. According to these findings Biggs, Kember, and Leung (2001) developed a modified SPQ (*Study Process Questionnaire*) instrument, named “*The revised two-factor Study Process Questionnaire*” (R-SPQ-2F), which is based on two factors, i.e. measurement of two learning strategies: deep strategy and surface strategy. This instrument has been used in this paper in order to identify learning strategies that were stimulated by announcing particular type of online knowledge assessement. The proposed instrument is suitable for this purpose because it is (i) in-line with dominant theoretical concepts in the field of learning strategies and (ii) is additionally improved for application within academic environment in its second version, which is actually used in this paper.

Although there are clear indications that the influence of assessment types on appearance of learning strategies has been thoroughly researched within the context of a traditional classroom environment (Anderson, 2003; Black & William, 1998; Entwistle, 2000; Rushton, 2005), the same cannot be said within a context of e-education and online knowledge assessment. Only partial research has been done, which opens-up the area for more research to additionally confirm or refute the validity of certain concepts originating from traditional teaching and assessment within new environment, created by e-education (especially in blended form).

With reference to such contexts, Hein and Irvine (1998) have stated that participation in “ … on-line discussions could have been a catalyst to promote deeper learning for participating students … ”. Students that participated in voluntary on-line discussions were able to examine each other's reactions to the discussion topics and work collaboratively on finding solutions to problems, while strengthening their understanding by responding to the others. Shen, Hiltz, and Bieber (2008) have been researching the influence of collaborative (team) online knowledge assessment on the appearance of learning strategies and comparing the results with traditional knowledge assessement. It was their conclusion that collaborative online exams significantly reduce the appearance of surface learning strategy and increase the perceived level of learning. Slack, Beer, Armitt, and Green (2003) presented a case study, researching the influence of synchronous online education on stimulation of deep learning. They concluded that using synchronous communications and online meetings as a means of delivering lectures increases the appearance of deep learning. It has to be mentioned that their research was not focused on studying the

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