Using Online Learning Systems to Improve Student Performance: Leveraging Prior Knowledge

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ABSTRACT

A key responsibility of educators is to enable meaningful learning and to help students acquire the knowledge and skills they need to make decisions and solve real-life problems. The knowledge that students bring to class (i.e., prior knowledge) has been identified as a major factor enabling meaningful learning. Leveraging this knowledge depends on instructors being able to assess it and adjust their teaching accordingly. This paper proposes a learning model aimed at enriching, assessing, and activating prior knowledge. To provide a preliminary evaluation on the feasibility of the model, it was implemented using an online learning system and assessed using survey and interview data gathered from students and faculty. The results showed positive changes in student study behavior, motivation, classroom experience, and learning outcomes. Opportunities for improvement of the learning model were also identified.

Keywords: Learner-Centered Education, Online Learning Systems, Prior Knowledge, Student Performance, Teaching Strategies

INTRODUCTION

The Information Systems (IS) field is constantly changing, becoming broader and more complex. This increases the demand on IS educators to ensure that graduates have awareness of more content as well as higher knowledge level skills such as critical thinking, problem solving, and application. However, content delivery and activities that enable the development of higher level skills often compete for the limited contact time available in the classroom. To address this problem, instructors encourage students to prepare before coming to class—this enables them to devote less time to content delivery and more time to learning tasks that promote deeper learning and higher knowledge levels. However, there is often no compulsion for students to prepare fully and too often (as this research will show) many do not prepare prior to coming to class. It is difficult for the instructor to accurately identify the extent of the students’ preparation and the knowledge they bring to class. Valuable class time is then often spent on content delivery to ensure a common knowledge base, before the instructor can move on to activities that engage students in higher-level learning.

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The knowledge that students bring to class (i.e. their prior knowledge) is well-recognized as one of the strongest factors which influences educational achievement, understanding of the learning material, and the potential for meaningful learning (Ausubel, 1968; Hailikari, Katajavuori, & Lindblom-Ylanne, 2008; Lazarowitz & Lieb, 2006). Not only does prior knowledge affect performance, with high prior knowledge learners outperforming low prior knowledge learners (Hmelo, Nagarajan, & Day, 2000; O’Donnell & Dansereau, 2000), studies also show that prior knowledge affects how students approach and use available content (Corredor, 2006; Rezende & Barros, 2008). The ability to enrich and assess the knowledge that students bring to the classroom would therefore be invaluable for their learning and for improving teaching effectiveness.

Building on prior knowledge is very difficult to implement in practice as the instructor needs to be able to assess what knowledge is common to students before the class. This is particularly challenging for entry-level courses in Management of Information Systems (MIS) as they attract large numbers of students from various backgrounds in terms of their content knowledge, computing experience and motivation. Where there is a high level of variance in prior knowledge, it is not sufficient to assess the knowledge base only. It is necessary also to ensure that this includes a common base of knowledge for all students, which can then be leveraged in the classroom to achieve higher-level learning objectives.

Although previous studies have examined prior knowledge in teaching and learning, most focus on either the assessment of prior knowledge (Dochy & Alexander, 1995; Hailikari, Katajavuori, & Lindblom-Ylanne, 2008) or its activation in the classroom (Marrs, Blake, & Gavrin, 2003; Novak et al., 1999). In most cases these activities are carried out in isolation. Yet assessment and activation are clearly related. Instructors cannot activate knowledge that does not exist. Therefore, they need to build and assess knowledge prior to activation. This suggests an important gap both in practice and in the literature regarding the question of: How can instructors effectively build and leverage the prior knowledge that students bring to the classroom?

To address this question a more effective approach to teaching would be to ensure that students (1) have the knowledge required for the class and (2) to align teaching with this common knowledge base. The purpose of this research is to develop, implement and evaluate a learning model that seeks to enrich prior knowledge, and assess and use this to enable a more meaningful learning experience for students when they come to the classroom. This study therefore proposes a learning model that supports the principles of enriching, assessing and activating the knowledge base that students bring to their learning.

The next section presents a review of the literature on prior knowledge. A practical approach to enriching, assessing and activating the knowledge that students bring to class is then described and evaluated. The paper closes with a discussion of the results and summary of the conclusions.

BACKGROUND

Prior knowledge can have both positive and negative effects on learning. For example, research shows that pre-existing knowledge has a cumulative impact on individual development, accelerating the learning process (Dochy, Segers, & Buehl, 1999; Shapiro, 2004). However, existing knowledge can inhibit learning if it contains misconceptions (i.e. faulty beliefs or knowledge based on misinformation). For example, incorrect knowledge often resists change and is hard to overcome (Simons, 1999), while prior negative experiences can affect students’ motivation to learn (Holt & Crocker, 2000). It is incumbent to find ways to help students acquire the requisite correct conceptions prior to a learning event and to identify and address inaccurate conceptions as soon as possible to maximize the effectiveness of the learning event. It is therefore important for teachers to
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