Suitability of Adaptive Self-Regulated e-Learning to Vocational Training: A Pilot Study in Heat Pump System Installation

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ABSTRACT

Many studies have been conducted, mainly in a university environment, and researchers have identified both advantages and disadvantages of e-learning. Very little is known about the applicability and suitability of e-learning to vocational and skills-based training. The research presented in this paper evaluates an adaptive e-learning model (INNOVRET) which combines skills-based learning by means of the Competence based Knowledge Space Theory (CbKST) with the principles of self-regulated learning (SRL) for a practically-oriented vocational training area, namely highly skilled heat pump system installation, in Ireland. The research methodology employed to carry out this study consists of a participative study to develop the INNOVRET approach for e-learning for heat pump systems installation and an empirical study carried out to evaluate the INNOVRET system. The results show that it is the IT skills of the installers that determine the way they perceive the system and the whole learning experience, as well as the level of knowledge acquired.

Keywords: Adaptive e-Learning Model, Competence Based Knowledge Space Theory, e-Learning, Heat Pump System Installation, Vocational Education and Training

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INTRODUCTION

The relatively recent development of information and communication technologies (ICT) has changed all the aspects of our lives, including education (Conole, 2006; Stephenson, Brown, & Griffin, 2008). The use of computers and digital media in education (known as ‘e-learning’) has become an important component of teaching and learning especially in third level education (Paechter, Maier, & Macher, 2010; Stephenson et al., 2008). It is common practice to complement face-to-face lectures with online material and activities (using learning environments such as Moodle or Blackboard), which is known as ‘blended learning’ or ‘hybrid learning’ (Deli-alioglu & Yildirim, 2008; Glogowska, Young, Lockyer, & Moule, 2011; Vernadakis, Antoniou, Giannousi, Zetou, & Kioumourtzoglou, 2011). Another approach is distance learning that may be implemented as pure online learning, where the face-to-face component is completely eliminated. In this case, the course material is usually either presented in a structured manner and includes multimedia (e.g. images and videos) and various forms of interaction (including self-assessments – quizzes) or as a recorded lecture presented synchronously or asynchronously (Stephenson et al., 2008).

Self-Regulated Learning (SRL) (Zimmerman, 2002; Zimmerman & Schunk, 1989) is where learners are encouraged to control and regulate their own learning process towards their learning goals, it plays an important role in e-learning and even more in distance learning. In order to enhance self-regulatory skills, online courses should be built on SRL principles (Bernacki, Byrnes, & Cromley, 2012; Lee & Tsai, 2011).

As learning assisted by ICT is relatively new, research regarding the effects of e-learning versus traditional face-to-face classes is not conclusive. Many studies have been conducted, mainly in a university environment, and researchers have identified both advantages and disadvantages of e-learning (Klimova, 2012; López-Pérez, Pérez-López, & Rodríguez-Ariza, 2011; Paechter & Maier, 2010). Very little is known about the suitability of e-learning, especially adaptive e-learning, where vocational training content is personalised to the learner’s needs (Holmgren, 2012; Martin, Platis, Malilta, & Ardeleanu, 2011; Pfefferle, Van den Stock, & Nauerth, 2010).

The research presented in this paper aims to answer the question: is adaptive self-regulated e-learning a viable alternative for practically-oriented vocational training? Based on findings from existing research (Holmgren, 2012; Martin et al., 2011; Pfefferle et al., 2010), the assumption would be that yes, it is a viable option. To test this, an evaluation of the adaptive self-regulated learning approach in the context of vocational training has been carried out. An experiment was organised in order to:

- Assess the influence of different learning systems on the level of knowledge gained by the learners (effectiveness);
- Identify the users’ opinion on their learning experience and their behaviour when interacting with the SRL system, the influence of the type of learning system on the users’ time, effort and comfort (efficiency).

The test case was based on the training of the skills required to install heat pump systems.

The paper begins by presenting a review of the literature on e-learning and associated aspects. The focus is on several areas: first, on types of e-learning, self-regulated learning and the influence of e-learning on developing self-regulatory skills; secondly, on measures of effectiveness and efficiency of e-learning; thirdly, on the use of e-learning in vocational training; current limitations are identified. Next, the research methodology and data collection methods are presented and the findings are discussed and analysed. Finally, the paper discusses the contributions and limitations of the study and makes suggestions for further research.
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