Using Digital Game-Based Learning to Improve the Academic Efficiency of Vocational Education students

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ABSTRACT

Educators have started exploring the potential of digital game-based learning (DGBL) to enhance the learning experience of students. The objective of this experimental research was to explore the potential of DGBL to improve the academic efficiency among vocational education students in South Africa. Students were separated into two groups, an experimental group and control group. Each group received course instruction in the subject of computer programming but using differing instructional strategies. Subsequent to the planned intervention, the academic achievements of both groups were measured through the contrasting results received for pre- and post-intervention tests. The learner-motivation was measured through feedback elicited via a post-intervention questionnaire. Results of the study revealed that the learning motivation of students had a significant impact on their academic achievement, and the academic achievement of students using DGBL as an instructional strategy were better than those learning through the traditional approach.

KEYWORDS

Academic Achievement, Academic Efficiency, Digital Game-Based Learning, Keller ARCS Model, Learner Motivation, Simulations, South Africa, Student Engagement, Vocational Education

INTRODUCTION

An industry estimated to be worth billions (Huang, Johnson, & Han, 2013; Van Eck, 2006), a technology within reach of people around the globe (Bekebrede, Warmelink, & Mayer, 2011; Roodt & Joubert, 2009a), and a fixation misunderstood by most who grew up in the pre-digital era could potentially hold the key to overcoming deficiencies in 21st century education (DiLullo, 2015; Reinders, 2012; Prensky, 2003). Current literature further reveals that computer gaming (digital games) is a trend among children and adults alike, and its integration into the classroom as a learning tool renders learning more effective and fun (Erhel & Jamet, 2013; Ahmad & Jafaar, 2012). Digital Game-Based Learning is a technology that leverages the motivational influence of games, and mapping it to educational objectives and subject matter for the purpose of learning, and leads to learning which is more learner-centred and interesting, and thus more effective (Li, Cheng, Lou, & Tsai, 2012; Sofflano, Connolly, & Hainey, 2015). Hunt, Huijser, & Sankey (2012) have found that, the concept of using games to learn has been successful in many other formal education structures such as the military and in medicine, and it is these philosophies that make the incorporation of digital games into vocational education programs well worth considering.

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A report by the Further Education and Training (FET) Institute (Papier, 2009) reveals the substandard state of National Certificates offered by FET colleges across the Western Cape in South Africa. The National Certificate Vocational (NCV) program was introduced in South Africa in 2007 (Nzimande, 2012) and was aimed at secondary school, grade nine learners specifically, who knew what field of specialisation they wanted to pursue. This afforded learners an opportunity to pursue studies in their field of specialisation earlier rather than completing the traditional grades 10, 11 and 12 at mainstream school. The process required enrolment into an NCV program at a Further Education and Training (FET) college for the duration of three years in order to complete the NCV program equated at level 4 on the National Qualifications Framework (NQF). Upon completion of the three year program, levels 2 through 4, graduates would have achieved an equivalent of a “technical” grade twelve certificate, which enabled them to enter into entry level jobs in industry within their area of specialisation, or further their studies at a university of technology. Provincial education statistics indicate certification levels for first year NCV students across all 11 programs being as low as 20% in 2007, 23% in 2008 (Papier, 2009) while demonstrating a very modest improvement in subsequent years (Nzimande, 2012).

The inherent quandaries and minimal throughput levels of NCV programs on a national scale, since its inception, has raised questions among educators and government regarding the success of the program (Papier, 2009; Nzimande, 2012). A study by Papier (2009) titled - “Getting the right learners into the right programmes”, highlighted the necessity to address the specific academic needs of this diverse class of learners in order to improve the state of vocational programs within the Western Cape. A similar sentiment was echoed by Soflano et al. (2015) who contend that a digital divide exists between today’s teachers and students, and results in misalignment between the language of learning and the language of teaching. They further argue that this misalignment between teacher and student is the underlying cause for the decline in 21st century education.

The aim of the research was to establish whether Digital Game-Based Learning could improve the academic efficiency of students in vocational education programs. Prior studies highlighted two major areas of concern among vocational education students – (a) the motivation of students to learn, and (b) the poor academic achievement of students (Papier, 2009). It is these two concepts, learner motivation and academic achievement which constitute the researchers definition for academic efficiency, and will be adopted throughout this study.

A study by Papastergiou (2009) highlighted the need for further empirical studies that investigates:

- The use of DGBL to improve on core academic benefits. This being the ability to acquire and improve on domain related knowledge, and the ability to meet course- specific related learning outcomes.
- The use of DGBL among older adolescents in their early teens rather than younger school children, which has been the focus of most prior studies.
- The study of DGBL use in related Computer Science disciplines.

It is these gaps in the body of knowledge that this research aimed to address, exploring the use of DGBL as a means to improve academic efficiency among vocational education students. It is envisaged that the results yielded from this study will lay a foundation for future studies in vocational education and DGBL, and provide additional insight for educators and institutions considering the adoption of DGBL.
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