Implementing a New Class-Lab: Guidelines for Integrating Innovative Devices in Pre-Service Teachers’ Practice

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ABSTRACT

Some recent researches affirm that students’ perception of lessons is highly positive when various multimedia teaching tools are integrated. Topics seem more interesting, learners are motivated and feel that media provide them an advantage over the students in a traditional setting. However, in Italy, pre-service teachers’ training does not involve a laboratorial approach to the Information and Communication Technologies (ICT) to use in classroom. In this study, a case study on the integration of different technologies, involving a new advanced setting by which teachers can interact with diverse specific technologies, is presented. In particular, in this technology-enhanced environment, pedagogical agents in a virtual world, touch-screen technologies, and robotics can be combined in order to make enjoyable the acquisition of technological skills. Pre-service teachers’ reports show an overwhelmingly positive response, even if further case studies are necessary.

Keywords: Advanced Technology-Enhanced Settings, Digital Literacy, Learning, Learning-Teaching Methodologies, Teachers’ Education

1. INTRODUCTION

1.1. Background

In recent years, the use of specific educational technologies in classroom, as well as the assessment of their impact, is quite increased. Classroom teaching practice has been improved through different instruments, and a huge amount of education research has been carried out from a constructivist perspective (Bertacchini, Bilotta, Gabriele, Pantano, & Tavernise, 2013, 2015; Tavernise & Bertacchini, 2015, in press). Hence, novel tools and strategies for the learning of educational contents in an entertaining way have been designed and assessed in order to become cognitive amplifiers and support the approach to different school topics (Bilotta, Gabriele, Servidio, & Tavernise, 2009). For example, web-based communication platforms have

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been implemented in order to allow learners, without limitation of time and place, to access educational tools, such as program information, course content, teaching assistance, discussion boards, document sharing systems, and learning resources (Chen, 2009). Furthermore, advanced 3D virtual worlds have been designed and implemented for the study of different disciplines, from history (Bouck, Okolo, Englert, & Heutsche, 2008) to science education (Bertacchini, Bilotta, Pantano, & Tavernise, 2012; Bertacchini, Bilotta, Gabriele, Pantano, & Tavernise, 2012). Some systems have been used for storytelling, which is essential for children’s development of language expression, logical thinking, imagination, and creativity (Fridin, 2014). In interactive worlds, the possibility to virtually “manipulate” significant 3D objects has been provided, as well as a range of different tools has been integrated via a single user interface (i.e. texts, images, audios, videos, pictures, and animations) (Giglio et al., 2015). Hence, users have been actively enabled to explore and identify, learn about and evaluate, on the basis of specific provided paths of learning or following their own interests. Also touch-screen technologies, which constitute a technological revolution and are experiencing a popularity boom, can be seen as an important challenge of contemporary educational field (McKnight & Fitton, 2010; McKnight & Cassidy, 2010; Nacher, Jaen, Navarro, Catala, & González, 2015; Olmedo et al., 2014). Although many studies flourished since the inception of these technologies, the investigations regards especially children, who represent an important target user group, for the developing of products (Nor Azah, 2013) or the content features of apps (Falloon, 2013; Hutchison, Beschorner, & Schmidt-Crawford, 2012; Kucirkova, Messer, Sheehy, & Panadero, 2014; Shuler, 2012). Investigations on the design of age-appropriate educational applications endowed with characteristics kids like to explore, have been linked to the benefits of using children’s electronic books in classrooms (Parish-Morris, Mahajan, Hirsh-Pasek, Golinkoff, & Collins, 2013).

On the other side, regarding teachers, numerous researches have showed that preservice and inservice elementary school teachers have a general low level of technological knowledge (Palmer, 2004; Kallery & Psillos, 2001). Moreover, this level of knowledge is firmly related to the perception of self-efficacy in teaching (Eick & Stewart, 2010; Hechter, 2011), that is the teacher’s assessment to obtain students’ results of engagement and learning, even among those students with difficulties (Savran Gencera & Cakiroglub, 2007). However, an integrated approach incorporating new tools into the learning process in classroom could help teachers to focus on the catching of students’ attention and engagement (Bayraktar, 2002; Pai & Borba, 2012). In particular, research has demonstrated that both the providing of an effective training to teachers, and the opportunity to redesign learning through the incorporation of ICT in teaching (Rienties, Brouwer, Lygo-Baker, 2013; Lawless & Pellegrino, 2007), lead to a high impact on education. In fact, students pay higher attention if the facilitator use a variety of multimedia teaching tools (Firmin & Genesi, 2013; Bertacchini, Gabriele, & Tavernise, 2011, 2013; Bilotta, Bertacchini, Gabriele, & Tavernise, 2011). In this context, lessons are judged as more interesting, the information more “real”, and students feel that media provide them an advantage with respect to the learners who attend the same lesson in a traditional setting (Zhang & Deng, 2004).

1.2. Purpose of the Research

Towards the goal of providing guidelines for the realization of a computer-based educational setting, this research aims at detecting all the elements that can contribute to the development of an approach based on the integration among different instructional technologies for teachers’ education. In particular, fundamental questions have been the following: is there a grounded theoretical approach regarding the integration of technologies? What are the elements and technologies to integrate in an advanced laboratorial course at school? Are the technology devices
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