SIMULATION-BASED TRAINING FOR GREEK PRESERVICE TEACHERS: DEVELOPING A 3D CLASSROOM ENVIRONMENT FOR PROFESSIONAL DEVELOPMENT VIA PRACTICAL EXPERIENCE

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Abstract

The last few years, the evolution of technology allowed the development of new and innovative tools to train future teachers. Simulation games gave a new perspective in teacher training by providing an alternative method of gaining an authentic practical experience within a safe virtual environment similar to that of the real world. This paper presents a framework for the development of a 3D virtual classroom environment for the preparation of Greek pre-service teachers.

Key words: teacher training, simulations, pre-service teachers

Introduction

Pre-service teacher education curriculum has received much attention especially after the transformation and modernization of the educational systems due to the evolution of technology. In recent years, the technological advancements gave new perspectives to the traditional teaching and learning, reformed the curricula and increased the presence of technology in the classroom. In this digital classroom environment teachers are no longer the unique source of knowledge and as a result they must develop new and innovative ways of teaching in order to motivate the students and promote the skills the students need for a sustainable future in a constantly changing labor market.

Surveys and case studies indicate that teacher education curriculum does not adequately prepare pre-service teachers to face todays' new demands and changing needs (Ferry et al., 2004; Kervin, Ferry, & Carrington, 2006; Kirby McCombs, Barney, & Naftel., 2006; Mahon, Bryant, Brown, & Kim, 2010; Mavrou & Meletiou-Mavrotheris, 2013). Ferry et al. (2004) report that at the end of their university studies pre-service teachers feel unprepared to confront the challenges of the classroom including behavior management issues, classroom management, student motivation and evaluation. Additionally, Kirby et al. (2006) report several studies according to which graduate teachers do not have a deep understanding of their domain. As a result, new teachers entering the profession are unable to implement effectively their knowledge into their classroom, ignoring the fact that their teaching practice has an impact on student learning (Ferry et al., 2004; Kervin et al., 2006). Furthermore, there is a lack of support for beginning teachers that in combination with the large amount of responsibilities of the classroom leads

many teachers to leave their profession during the first five years of teaching (Kirby et al., 2006; Zibit & Gibson, 2005).

Another concern is that teacher training within the university is theoretical (Darling-Hammond , Hammerness, Grossman, Rust, & Shulman, 2005; Woolfolk, 2005), and there is a lack of practice and collaboration between schools and teacher preparation programs, depriving pre-service teachers from important resources and mentoring (Kirby et al., 2006). The acquisition of teaching skills for pre-service teachers cannot be achieved without their practice in real classroom settings (Ferry et al., 2004; Kervin et al., 2006). However, due to the cost of practicum experience most teacher education departments have only few hours of practice in schools that in most cases has the form of observation and not of actual practice (Katsarou & Dedouli, 2008; Woolfolk, 2005). According to Mahon et al. (2010), school availability problems make it difficult to find real classrooms and active teachers as mentors for all pre-service teachers, and, therefore, teacher preparation programs are disconnected from the school context. Moreover, Kirby et al. (2006) argue that active teachers do not like to be observed by teacher candidates in their classroom and as a result teacher candidates lack of feedback and mentoring that could prepare them deal with the challenges that they face in the early stage of their career.

In Greece, there is a lack of practice for student teachers in most of the departments with the exception of the departments of primary education, mainly because ministerial decisions have been issued for the cooperation of primary education departments with primary schools. Moreover, new teachers do not have a deep understanding of their domain, and in many cases they have limited knowledge in pedagogy using outdated teaching approaches and techniques (Katsarou & Dedouli, 2008). As a result, candidate teachers experience emotions of embarrassment and insecurity as they feel that their skills are insufficient to meet the needs of their profession. The Pedagogical Institute-PI (2009) of Greece and Karagianni (2012) also recognize that the basic undergraduate education of teachers does not correspond to the real challenges they face in today's classrooms due to the rapid evolution of science and technology. At the same time, another challenge that teachers face in today's classrooms is the diversity of the student population that is characterized by different cultural backgrounds and language, different levels of knowledge and different learning needs (Koutsothanasi, 2010). Undoubtedly, there is a lack of connection between theory and practice in teacher training, and the training programs do not adequately prepare pre-service teachers for their everyday teaching reality.

The last few years many efforts have been made to enrich teacher education programs with technology-based approaches because of their ability to provide future teachers a realistic educational experience that will contribute to the acquisition of cognitive, social and emotional skills that they will transfer and apply in their future classroom (Foley & McAllister, 2005; Gibson, 2011). The PI (2009) of Greece also suggests the use of active methods for teachers' training such as simulations and role-playing games that support the exchange of experiences, inquiry-based learning, active

participation and the development of critical reflection (Katsarou & Dedouli, 2008). Today, with the new technologies a new dimension can be given to the educational approaches proposed by the PI. Teachers can be trained with the use of computer digital games and simulations that create authentic learning experiences.

The main objective of this paper is to report the significance of using virtual classroom environments in the preparation of future teachers as identified within the literature and to present the idea for the development of a prototype virtual classroom environment to address the needs of Greek pre-service teachers. A classroom simulation adapted to the Greek educational system can support the professional development of Greek pre-service teachers preparing them to face today's dynamic and constantly changing classrooms.

Training Teachers via Simulated Virtual Classroom Environments

Over the last few years there is a growing demand for the use of virtual worlds and simulations to support teacher preparation due to their ability to provide realistic three-dimensional environments that offer advanced authentic, engaging, interactive and immersive learning experiences (Ferry et al., 2004; Kallonis & Sampson, 2010; Klinakis, 2012; Wedig, 2010). Nevertheless, research in the development and implementation of simulations in teacher training curriculum is still in its infancy (Ferry et al., 2004; Mahon et al., 2010). However, the limited research that has been conducted to evaluate the use of simulations in the preparation of future teachers demonstrates that they can be powerful pedagogical tools in pre-service teacher education (Ferry et al., 2004).

Classroom simulations can address the lack of practical skills in teacher training and can bridge the gap between schools and universities. They "provide opportunities for experiences that simulate those of the real world" (Kallonis & Sampson, 2010, p.37), allowing pre-service teachers to experience authentic real-life scenarios, most of which they would probably not encounter during their traditional classroom practice. Moreover, Sapre (2015, p. 56) argues that simulations are "safe and controlled" conditions that promote teaching skills through preplanned "artificial circumstances" that allow teacher trainees to experience possible problems that will arise in their real future classroom and search for the solution. Within the simulated environment, pre-service teachers will be forced to act under pressure, make decisions related to issues such as student behavior and classroom management issues and see the consequences of their decisions both from a teacher's and a student's perspective (Ferry et al., 2004).

For Foley and McAllister (2005) the use of simulations will be beneficial for pre-service teachers, as they provide them an engaging and immediate learning experience within a realistic school context. Simulations allow the users to learn by experimentation, reflect on the different situations, understand the impact of their actions and evaluate their teaching promoting their professional development (Danielson, 2011; Foley & McAllister, 2005; Jones, 1995). Moreover, classroom simulations can serve as a mentoring tool, allowing pre-service teachers to receive feedback, support, and advice that

they need in order to become effective practitioners (Ferry et al., 2004; Ming See, 2014).

Another significant advantage of classroom simulations in teacher preparation programs is that they allow mistakes. The users learn from their mistakes and they can re-play the simulation again in order to improve their performance. Additionally, the use of virtual classrooms addresses the issue of student safety as the consequences of the mistakes made by the teacher trainees within the simulated environment cannot harm real life students (Brown, 1999; Hunt & Brent, 1996). Furthermore, classroom simulations provide candidate teachers the ability to be trained at any time of the day, become familiar with students' various behavioral characteristics and different learning styles and re-play the simulation activities in order to explore alternative decisions (Ferry et al., 2004; Hunt & Brent, 1996; Sarpe, 2015). Simulations overcome the boundaries of the traditional classroom practice where it is not possible to repeat the lesson once is taught while there is always the possibility of affecting negatively the students.

Virtual classroom environments can also be used for the continuing professional development of experienced teachers; however, many of them are not yet familiar with the digital technologies (Kallonis & Sampson, 2010). Undoubtedly, teaching a generation of digital native students requires teachers to upgrade their skills and digital literacy in order to remain completive and guide their students to conquer knowledge and develop the 21st century skills.

One simulation game that has been used to enhance teacher's training is simSchool classroom simulation (www.simschool.org). SimSchool is a dynamic web-based classroom simulation that offers pre-service teachers the opportunity to experience real life classroom situations in a virtual environment. During the game, players can experience a variety of virtual students, they must analyze the student's needs, choose the tasks that match their needs and interact based on the student's response to the different tasks given. The player's decisions during the game affect student's academic and behavioral responses. Through the different scenarios teachers can be trained, experiment on the different teaching methods and approaches, evaluate themselves and reflect developing their teaching expertize.

Research in the use of simSchool reveals the potential of using classroom simulations in teacher training. The results by Mavrou and Meletiou-Mavrotheris (2013), report that for pre-service teachers virtual classroom simulations are a safe environment where they can practice and develop their teaching skills before entering a real classroom for the first time. Moreover, this safe environment provides pre-service teachers the room for error but without the risk of affecting negatively real students (Bush & Hall, 2013; Christensen et al., 2011; Mavrou & Meletiou-Mavrotheris, 2013). Additionally, research results indicate a positive impact of simSchool in pre-service teachers' self-efficacy, reflection skills and development of teacher identity (Bush & Hall, 2013; Christensen, Knezek, Tyler-Wood,& Gibson, 2011; Foley & McAllister, 2005).

Simulations do not aim to replace real classroom experience but to complement it, by allowing inexperienced teachers to spend more time in a safe environment that represents real-life situations. Technology can be used to empower the knowledge, skills and competencies of future teachers in classroom and behavior management but can also familiarize them with new technologies. Research so far indicates the potential of classroom simulations as effective teaching and learning tools that can provide future teachers valuable learning experiences.

Description of the Project

The purpose of the proposed project is to address the lack of practice in teacher training and improve the practical training of Greek pre-service teachers in behavior management issues by providing them real-life scenarios within the framework of a safe simulated classroom environment. The simulated environment aims to enhance the practical and professional skills of pre-service teachers via repeatedly active learning and experimentation. Through the simulation software future teachers will be able to experience various different behavior problems similar to those of a real classroom setting but with room for error and without the risk of harming real life students.

The classroom simulation is a first person simulation, and the user will take the role of a secondary education teacher. Throughout the simulation the users will confront various problematic student behaviors that active teachers often face within the classroom, including bullying behavior, hyperactivity, aggressive behavior and disrespect, to which they must respond. For each challenge users will have a selection of alternatives and will have to choose what they consider as the appropriate course of action each time.

It is essential that the proposed simulated classroom environment ensure that pre-service teachers will be trained in situations similar to those of a real-classroom setting. Therefore, an attempt will be made to develop the virtual students and the problematic behaviors based on the experiences of active teachers in order to offers pre-service teachers the opportunity to experience actual real life situations and gain knowledge that they will be able to transfer to their classroom tomorrow. It is important to involve active teachers during the development process, in order to explore and understand the real needs of teachers and simulate real incidents that have happened in their classroom. Moreover, active teachers will provide significant impact on how to confront unplanned events that occur during the lessons.

The scenario of the game and the selection of alternatives will be based on the literature review and on the guidance from active teachers. The implementation of active teachers' experiences within the simulated environment will provide pre-service teachers a valuable support and mentoring tool that will help them respond more flexibly to the challenges that they will confront in the classroom. Finally, it is important to develop a simulated environment that meets the needs of Greek teachers, as each educational system has its own curricula and strategies in order to respond to society's' demands. The implementation of a classroom simulation designed based on the needs of a different educational system might not ensure high quality learning experiences for Greek pre-service teachers.

Simulation Development

One important aspect that had to be taken into account for the design of the virtual classroom was that it had to be realistic and similar to a real Greek classroom, in order to create the users a strong sense of presence that is the illusion of being an active part of the computer-generated virtual environment. For this reason, the model of the virtual classroom was designed based on photographs that were taken from real classrooms (as shown in figure 1) and on the specifications of the company Buildings Infrastructures (http://www.ktyp.gr/en/) that is responsible for constructing Greek public buildings including schools. The models were developed with Maya Autodesk student version and were imported in Unity game engine (see Figures 2, 3 and 4 below).

Figure 1. Real classroom environment.

Figure 2. The virtual classroom environment in Unity.

Figure 3. The virtual classroom environment in Unity.

Figure 4. The model of the virtual teacher.

Conclusions and Future Directions

The proposed prototype classroom simulation aims to support the training of Greek pre-service teachers. Within this safe environment future teachers can be trained in different problematic behaviors, experiment, make decisions and explore the consequences without the fear of harming a real student, reflect and evaluate themselves developing their teaching expertize.

Practicing in a virtual classroom will reduces the time and cost needed in live training but will also help future teachers to understand todays' classrooms, their students and the impact of their decision making on their students' performance. Moreover, classroom simulations offer the users the ability to re-

play repeatedly, experience the same or different circumstances and experiment in the use of different strategies to solve the problem.

Additionally, with the various scenarios pre-service teachers can experience a large amount of problems that will arise in their future classroom, something that would be impossible in live training where the working hours are limited. But most importantly the skills and knowledge gained thought the simulation training could be transferred and implemented in the real classroom setting. Unfortunately, at this stage the classroom simulation is under development.

After the completion of the prototype, but also through the development process pilot, tests will take place in order to investigate the potential to train pre-service teachers in behavior management issues within a simulation-based environment.

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