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STRATEGIES TO INVOLVE STUDENTS OF TEACHING EDUCATION CAREERS

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Novice teachers confront several obstacles while trying to implement activities involving educational technologies in the classroom. Not only they are learning how to manage the school environment, but also they face the problem of lacking enough practice in the school setting with these pedagogical innovations. In this paper, an experience in a course of a teaching education program is described. A different approach to the development of class activities was implemented with the objective of getting preservice teachers actively involved in their learning while at the same time to get them acquainted with real school practices. The results of the different activities are summarized and discussed, and directions for further research are indicated.

Keywords: Teaching strategies, Educational technologies, Computer science teachers, Preservice teachers.

Introduction

Almost every teaching education program includes courses related to digital literacy and technologies in education. Preservice teachers will have to master methodologies and strategies to help their future students to be proficient in an information society in which interactions are becoming more and more based on digital devices. Novice teachers may feel intimidated while trying to implement activities involving educational technologies in the classroom. Not only they are learning how to manage the school environment, but also they face the problem of lacking enough practice in the school setting with these pedagogical innovations.

In this paper, an experience in a course of a teaching education program is described. This was an elective course in a career of computer science teachers. A different approach to the development of class activities was implemented. The objective of the new implementation was to get preservice teachers actively involved in their learning while at the same time to get them acquainted with real school experiences. The course was designed with the purpose of using the preservice teachers previous knowledge related to application software and pedagogical practices in a real school situation. Also, there were planned activities to introduce them into educational inquiry methods and procedures. It was a strong intention of getting future teachers to realize the connection between theory and practice while at the same time to summarize and cross-cut previous course curriculum, as a way to integrate knowledge and skills.

The strategies implemented to achieve the objective included: the development of events for primary and high school students (one-day visit to the University Computer Lab), where educational software was

tested, the collaborative creation of a survey for children related to videogame use, and an exploratory search of digital educational resources for teaching among others. The results of the different activities are summarized and discussed, and directions for further research are indicated. This work can be helpful for those interested in student motivation and involvement in learning, especially if they are in teaching education careers.

Related Work and Motivation

Preservice teachers have courses where they get aquainted with theories and pedagogical methods, and usually they would have on-the-field class observations and a short supervised practice period with children. In most cases, there is no room to experiment with educational innovations in these practices, as they are generally busy trying to learn how to manage the grup dynamic, class guidance, administrative tasks, institutional culture, and leadership issues among others. Research of innovative approaches or novel educational technologies are thus relegated and left as a secondary issue. If preservice teachers are not faced with field experiences where they can observe firsthand the way innovative pedagogical approaches using technologies are implemented in the classroom, they would probably be proeficient as users of technology tools, but is very unlikely that they would know how to effectively put them to work in their classes (Polly, Mims, Shepherd & Inan, 2010; Andersson, 2006).

In order to provide these future teachers with an experience with research methods in education while at the same time practicing in a real class situation, this alternative approach was implemented. The topic of the educational games was chosen as appropriate because of the instrinsecal motivation it produces not only in the children that use it, but also in the preservice teachers, as they also are part of the "game generation".

Students in today classrooms are part of a "screen game generation" which is characterized by constant multimedia and multisensory stimuli, the permanent need for novelty to avoid boredorm, the ubicuity of the screens, the instant reply to accions and reaction-like answers, and the disponibility of a variety of movile digital devices for social networking among other features (Prensky, 2007; Aldrich, 2009).

According to a report about use and habits of Spanish videogame players, 23% of Spanish people are active players, 71.5% of homes have a computer, and 34.7% have at least one game console (GfK Emer, 2009). Children start using computer and game consoles before they get into the school system, mainly for entertainment. Along with the Internet and the TV, the videogames, movile and computer games are the preferred sources of entertainment of the young society. They expend long hours in front of screens everyday.

Entertainment in the 21st century involves a mixture of virtual and real interactions (through devices like the Wii[1]), imaginary worlds, and fantasy. In some cases, entertaining could convey educational contents or motivate scientific inquiry. The combination of education and entertainment as been termed as "edutainment", and today: "learning and entertainment are not separated activities" (Burbules, 2009). Research has sown that science-fiction stories motivates students to pursue scientific careers. As science-fiction stories, games also promise to stimulate imagination, raise curiosity, promote discussion and debate, and allow experimentation and inquiry (Squire & Jenkins, 2004).

Games can be used as an educational strategy, based on the motivation induced on children and their natural interest on playing (Morfi & Minetti, 2010). Game based learning has been listed as one of the educational technologies to be adopted in the next couple of years (Johnson, Smith, Willis, Levine, & Haywood, 2011). Researchers affirm that playing games can improve: visual attention, understanding of rules, concentration, reasoning, problem solving, social skills, and intelectual development (Gee, 2003).

Despite the fact that research shows that educational technologies like hypermedia or games can improve student learning, and that many efforts have been made to prepare preservice teachers to

[1] Wii is a videogame console produced by the company Nintendo.

integrate technologies into their daily practices, still teachers are not able to produce class experiences where technology is used successfully (Angeli &Valanides, 2005). This may be due to the fact that the implementation of technologies as pedagogical tools involves a change in teacher´s role, moving from the traditional teacher-centered role to a learner-centered learning model (Jonassen, 2000; Hannafin & Land, 1997). This paradigm change does not happen spontaneously, and thus teacher programs should incorporate training opportunities to enhance teaching skills in technology-based contexts (Kramarski & Michalsky, 2010). If preservice teachers participate in technology integration in field experiences during their career, they would gain a much more positive attitude towards the use of innovation in the classroom (Bahr, Shaha, Farnsworth, Lewis, & Benson, 2004).

Methods and Procedures

Students taking the course "Optativa: Computación" (Elective Course in Computing) are usually advanced preservice teachers of the Faculty of Natural and Exact Sciences at the University of La Pampa (Argentina). These students are enrolled in a bachelor degree of teacher education with major in computer sciences. These students, when graduated, will teach computer sciences at primary and high school institutions (most of the times they will became also the tech support, advisor and guide to colleagues, administrative and directive staff in all matters related to information and communication technologies). When the preservice teachers started this elective course, they already had experience with educational software, web applications, and also pedagogical theories through previous courses.

As part of the required course activities, preservice teachers were asked several activities of inquiry. First, a search for available games was conducted. The search was limited to digital games that could have an educational use. Second, an evaluation rubric was created by the students with the help of the instructor to classify the results of the search. The evaluation criteria included items related to functionality, design, usability, audience, complexity, etc.

Each participant in the class was required to choose one of the resources founded in the search and classified as meritorious by the evaluation tool and present it to the classmates, describing features and pedagogical potential.

Another instrument was developed to get data from the end users of the educational games in the schools. It was a survey with check-boxes and open ended questions to be filled by the students in a short interview. The survey asked about computer and videogames use, brands, time expended playing with them, whether they play alone or in groups, and some other questions.

To test the educational games found during the course with a real-life class situation, schools of the community were invited to participate in a one-day-visit to the computer lab of the Faculty for a recreational-educational activity. Since the lab was available for two sessions, there were two schools that participated in the event: a primary school send 27 children (9-10 year olds), and a high school send a group of 22 students (14-15 year olds). The sessions with each group where held on different days, lasting 2 hours each one, during which the groups played and experimented with the games and conducted a few tasks guided by the preservice teachers of the Faculty enrolled in the elective course, whom played the instructor role. Participants in these recreational activities were the main source of data to evaluate the educational games as pedagogical resources. There were also additional "testers" of the games, as the preservice teachers tried the results of their search with friends and relatives in order to generate the evaluation report.

Findings and Discussion

A diversity of games was found during the search conducted during the course. They were classified according to the evaluation rubric created to this end. To illustrate the list of resources indicated as worthwhile by the preservice teacher, two of them are described here: Gcompris and Kokori.

Gcompris (http://gcompris.net) is free educational software under the GNU General Public Licence (Free Software Foundation, 2007) available in more than 50 languages with an interface designed to facilitate its use by young children. It has many educational activities in a variety of topics including the explanation of how computers work, the use of the mouse and keyboard, reading and writing lessons, foreign language learning, algebra and geometry exercises, memory games, simulation of scientific experiments, puzzles, and geography and history quizzes. The intended audience is 2-10 year old children. Instructors can personalice the way students get access to the different activities. The technical requirements of equipment needed to get this software running are very basic. The development of the activities can be chosen by level or topic.

The second resource to be described is Kokori (http://www.kokori.cl/~kk/), a videogame 3D that allows players to get into an animal cell. The objective of the game is to solve problems or damage inside the cell. Each player would have three different kinds of "nanobots" that would help to solve the problems. There are seven stages; each one corresponds to a diffent mission, which difficulty increases with the level. This software is distributed under the Creative Commons licence, and because the high quality of the images, it requires a good amount of memory in the computer. Even though this game is still in a stage of testing and development, it could be an excellent tool to motivate high school students in biology courses.

Other resources that deserve a look are: Villa Girondo (http://www.villagirondo.com/), CSI: Aventuras Web (http://forensics.rice.edu/spanish/), PhysicsGamesNet (http://www.physicsgames.net/), Squeakland (http://www.squeakland.org/), and National Geographic Expedition Game(http://channel.nationalgeographic.com/channel/expedition-week/expedition-game/). Some of these can be used to motivate the class to start new investigations about a topic that is part of the curricula, or just to practice or reinforce concepts developed in the course.

Regarding the results of the surveys for students, which were completed during the visit of the students to the Computer Lab of the Faculty, it was found that the games most cited were: Mortal Kombat, GTA, CityVille, Need4Speed, PES 2011, Counter, and Barbie (the denomination of the games could be slightly different). There were clear gender differences in the preferences of the games: boys would use mainly war, soccer, and car games, while girls would mention Barbie and Sims games more frequently.

The data obtained in these surveys confirmed the information gathered in a more informal way with the friends and relatives of the preservice teachers, with whom the survey was pilot-tested. Although the sample is not big enough to make generalizations, it is close to what can be seen in the list of most popular games in the selling list of the videogame industry.

Conclusion

In this paper, a different approach to preservice teacher instruction has been presented. One of the distinguishing features of this approach was the creation of technology-rich fiel experiences, which are believed to be associated with learning improvements. This course for preservice teachers can be easily replicated by colleagues in other educational institutions. As possible adaptations for future implementations of this course, robots controlled by programming languages or immersive virtual worlds are tools likely to be tried.

It was a real joy to withness the excitement and enthusiasm of the children and high school students that participated in the sessions prepared for them to experiment with the educational games. Games can make possible that students ask: "We want to stay a little more!" after 2 hours of experimentation with a simulation of a virus attaking the nucleous of a cell. Preservice teachers had the opportunity of participating in an experience where technological innovations are put to work in order to motivate students while learning subject matters of their curricula. These future teachers not only had a real experience with a class situation, but they also were able to enjoy seeing how the result of their

investigation work was placed in the classroom. This should help them to build their confidence as creators and developers of innovative class experiences.

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