

# THE USE OF THREE-DIMENSIONAL COLLABORATIVE VIRTUAL ENVIRONMENTS IN ENTREPRENEURSHIP EDUCATION FOR CHILDREN

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## ABSTRACT

Currently much importance is given to entrepreneurship in the economic development of the countries. Also, in the educational system (from primary school to college) value is given to the teaching of entrepreneurship concepts through many initiatives spread throughout the world. However, in primary school these initiatives are still rare, and this is a context where we consider the existence of potential for exploration. It is our aim to support entrepreneurship education at the primary levels through use of computer software, specifically Three-Dimensional Collaborative Virtual Environments.

In this article, we present the status of entrepreneurship teaching in primary education, and some cases of entrepreneurship teaching in the education of children, as well as some examples of Three-Dimensional Collaborative Virtual Environments employed in the education of children.

## KEYWORDS

Entrepreneurship, Entrepreneurship Education, Primary School, Three-Dimensional Collaborative Virtual Environments.

## 1. INTRODUCTION

Currently several bridges exist between the fields of education and entrepreneurship. The communication “Fostering entrepreneurial mindsets through education and learning” by the Commission of the European Communities (CCE, 2006), makes an approach to entrepreneurship education from the primary level up to college, deeming imperative the introduction of basic abilities of entrepreneurship in the curriculum of schools and universities. In the field of education, entrepreneurship allows “*helping young people to be more creative and self-confident in whatever they undertake and to act in a socially responsible way*” (*ibid.*).

This paper presents some cases of entrepreneurship education for children, makes a brief presentation of virtual environments and some related examples of the use of those environments by children to learn entrepreneurship concepts, and, finally, provides some contributions that Three-Dimensional Collaborative Virtual Environments (3DCVE) can offer to entrepreneurship education for children.

## 2. ENTREPRENEURSHIP IN PRIMARY EDUCATION

“Awareness should be raised of the benefits of basic entrepreneurship learning to society at large and to learners themselves, even at the early stages of education” (CCE, 2006).

In some state-members of the European Community, primary schools strive to lead children towards taking initiatives and assuming responsibilities (CCE, 2006), as stimuli for entrepreneurship.

In Portugal, only high school and college education incorporate entrepreneurship education (EE) in its programs. However, some initiatives on the part of the organizations JA-YE and GesEntrepreneur for EE in Portuguese primary schools are envisaged. In other countries (Finland, Luxemburg, Norway, and Spain), the entrepreneurial spirit is explicit included in the national programs for primary-school education, with the aim of stimulating active forms of learning and spurring the development of some personal qualities in children, such as creativity and initiative, as well as promoting innovation.

Some attempts to provide EE outside the Portuguese national program have been promoted by agents or other organizations external to the educational system, in cooperation with educational establishments.

### 2.1 Cases of EE for Children

Revisions of literature on EE can be found in Solomon *et al.* (2002), Kuratko (2003), and Katz (2003), among others. From them, we can see that initiatives aiming to promote the development of entrepreneurial spirit in children are rare; even so, several different examples can be found. By searching the Internet and several academic journals devoted to the field entrepreneurship (International Journal of Entrepreneurship Education, The International Journal of Entrepreneurship and Innovation, Journal of International Business and Economy and Journal of Business Venturing) we found some projects which aimed to promote the EE of children. Some of those were based on real activities, others in computer systems, developed to support EE (computer games, mostly).

Regarding EE for children based on real activities, we present the two following examples:

- **Boule et Bill créent une entreprise** - in all basic schools of Luxemburg the program of 6<sup>th</sup> grade French class entirely integrates a unit devoted to the creation of companies. This unit is based on the comic book of the same name (CE, 2001). That comic book explains as well-known personalities had success in the business world. This program was also adopted by schools in the French region of Nord-Pas-de-Calais.

- **Una empresa en mi escuela (EME)** – is a program of the Astúrias region (Spain) directed to basic education (5 to 12-year-olds). This program is managed by Valnalón, a public company of the Ministry of Labour and Industry, which works in cooperation with the Ministry of the Education for creation and implementation of programs in the area of the entrepreneurship for different grades. The learners carry out various tasks related to the creation and operation of a company, the aim being the creation of business skills and to establish relations between schools and companies (EME, 2007).

Regarding computer systems to EE for children (under 12 years of age), the existing computer systems don't provide the level of immersion of a virtual world, and require learners to imagine the operation of businesses. Some examples of this type of games are Lemonade Stand (AE4RV, 2006), illustrated in Figure 1, and Taller de Emprendedores (JTE, 2007), illustrated in Figure 2. The level of interaction with these games is also somewhat static. But some games do incorporate a few elements of three-dimensional virtual worlds to provide a simulation of the reality. An example of this kind of games, which we emphasize is not a real three-dimensional virtual environment, is Hot Shot Business (Disney Online, 2006) illustrated in Figure 3: in it, we find avatars, visible products and customers, and the actual space where the business operates, all attempting to provide a better approach to reality.



Figure 1. Lemonade Stand



Figure 2. Taller de Emprendedores screen describing the personality of an entrepreneur



Figure 3. Hot Shot Business

### 3. USE OF 3DCVE IN THE EDUCATION OF CHILDREN

Singhal & Zyda (1999) characterized 3DCVE as three-dimensional virtual spaces simultaneously shared by many users, each represented in those spaces as a geometric object, called avatar, the virtual environment supporting interaction in real time, and the communication between users being carried out through text, actions and – in some cases – through the actual voices of users.

Some 3D virtual environments are known as Massively Multiplayer Online Role Playing Games (MMORPG), for being games in which a great number of users (hundreds or thousand) participate simultaneously, through the Internet. In these games, the users play the role of a fictional character, within the scope of a specific system of game rules. Examples of such environments are World of Warcraft (Blizzard Entertainment, 2006), Everquest II (Sony Online Entertainment, 2006), Lineage II (NC Interactive, 2006) and The Lord of the Rings Online (Turbine, 2007).

Other 3D virtual environments are known as Massively Multiplayer Online Social Games (MMOSG). Possibly the name “games” is simply due to their graphical, game-like appearance, since there isn’t actually a plot or gameplay: rather, their emphasis is in socialization between users and to the personal expression or creation of elements inside the virtual world. MMOSG examples include Active Worlds (Activeworlds, 2006), Second Life (Linden Research, 2006), There (Makena Technologies, 2006) and HiPiHi (HiPiHi Co., 2007). Of these, Active Worlds is not one single virtual world but a network of networks of hundreds of individual worlds – universes – where users can create, explore and communicate (Dickey, 2000). In 1991, Activeworlds created the Active Worlds Educational Universe (AWEDU), which is an entire Active Worlds Universe devoted to the exploration and exploitation of the educational applications of Active Worlds Technology and was made available to educational institutions, teachers, students, and individual programs (AWEDU, 2007).

Besides those kinds of 3D virtual environments, one can also find both closed—ource and open-source software development environments that supports the creation and distribution of multi-user virtual 3D applications . These environments allow a fast and versatile way to create virtual worlds. Examples of these types of environments are OpenCroquet (OpenCroquet, 2007), Delta3D (Delta3D, 2007) and Virtual Worlds Platform (Virtual Worlds Platform, 2007).

Many educational projects were developed making use of virtual environments, such as Virtual Harlem (Virtual Harlem, 2007), Vertex (Vertex, 2007), Zora (Bers, 1999), Virtual Gorilla (Bowman *et al.*, 1998), Round Earth (Johnson *et al.*, 1999), among others. To illustrate this discussion, we present two of these projects that used 3DCVE in the education of children.

The Vertex Project (Bailey & Moar, 2002) aimed to involve young children and their teachers, from three primary schools, in the design and creation of their own imaginative virtual world, called Vertex, on the Internet, using Active Worlds (see above). Teachers and students at each school were then encouraged to explore and try out the Vertex virtual world. The children assisted in some activities, learned to navigate in the virtual world, interacted using avatars, constructed virtual structures, dialogued with the colleagues and explored the other existing worlds in the Active Worlds network. The aim of Vertex was to work with teachers and children to investigate the creative teaching and learning possibilities of shared 3D virtual worlds, and to develop and disseminate innovative yet practical strategies for their use across the primary curriculum.

The Zora Project (Bers, 2001), implemented in Virtual Worlds Platform, aimed to help children explore their identity by creating a virtual city and its social organization. In the Zora virtual environment, children were represented graphically by avatars and could move themselves through teleport between rooms; talk in real time through a chat system; develop public and private city spaces using the model’s “personal homes”, “community centres” and “temples” (shared public spaces representing groups of interests).

### 4. ADAPTING 3DCVE TO EE FOR CHILDREN

A 3DCVE can offer several contributions to EE for children, by allowing the creation of learning activities where children may simulate the creation and operation of a business. In these environments children will be able to conceive their virtual business and everything that it involves. For instance, a 3DCVE could allow children to simulate in various ways: create products and infrastructures (company headquarters, company

stores), make advertising, sell and purchase goods, and provide services. Also, people involved in the creation and operation of a business could be represented in the 3DCVE through the creation of diverse virtual characters, such as customers, suppliers, employees, and work colleagues. All this could help provide the sensation of being in a real-world situation.

An example of entrepreneurship activity in primary education that could be developed in a virtual environment is the creation of an art gallery from drawings made by children of a primary school. In a virtual environment, children could develop the selling location (a full store or just a counter) where they will exhibit the drawings that they intend to sell. Associated to each drawing could be information related to it, including a description and a price, but also the author name and age, or even a photograph and contact data. Children can define the name and logo of the gallery that will be represented in the virtual environment through signboard advertising.

Such a setting would also allow children to experience different entrepreneurial profiles, and get to know the tasks that each has in a business, *e.g.*, general manager, assistant manager, public relations manager, accountant and salespeople. Advertising could be made through pamphlets and business cards to be handed out to customers. These customers could be children from the same classroom or school, but also from other schools and even people from the local community.

## 5. FINAL THOUGHTS

Under the point of view of playfulness, 3DCVE can provide a playful version of the real world, rendering them attractive for both adults and children. These environments are adequate for the education of children because playing helps develops one's relation towards others, supports learning by doing, and allows children to participate in new personal experiences, collaborate and communicate with others, put in real form what they could only imagine, all things that would otherwise be almost impossible to try out and have fun with.

The above discussion supports our view that the use of 3DCVE could be a boon to EE for children.

## REFERENCES

- Activeworlds, 2006. Activeworlds – Home of the 3D Chat, Virtual Reality Building Platform. Retrieved on June 17<sup>th</sup>, 2006, from <http://www.activeworlds.com>
- AE4RV, 2006. Lemonade Stand. AE4RV. Retrieved from [http://www.ae4rv.com/store/lemonade\\_pc.htm](http://www.ae4rv.com/store/lemonade_pc.htm). on June 09<sup>th</sup>, 2006.
- AWEDU, 2007. Active Worlds Educational Universe. Retrieved on June 17<sup>th</sup>, 2007, from <http://www.activeworlds.com/edu/awedu.asp>
- Bailey F., Moar M., 2002. *The Vertex project: exploring the creative use of shared 3D virtual worlds in the primary (K-12) classroom*. ACM Press, Nova Iorque, EUA.
- Bers M. U., 2001. Identity construction environments: developing personal and moral values through the design of a virtual city. *The Journal of the Learning Sciences*, 10 (4), 365-415.
- Bers, M. U., 1999. Zora: a Graphical Multi-user Environment to Share Stories about the Self. In Proceedings of Computer Support for Collaborative Learning (CSCL'99), pp. 33-40.
- Blizzard Entertainment, 2006. *World of Warcraft Community Site*. Retrieved on June 17<sup>th</sup>, 2006, from <http://www.worldofwarcraft.com/>
- Bowman, D., Wineman, J., Hodges, L., and Allison, D, 1998. Designing Animal Habitats Within an Immersive VE. *IEEE Computer Graphics & Applications*, vol. 18, no. 5, pp. 9-13.
- CCE, 2006. Implementing the Community Lisbon Programme: Fostering entrepreneurial mindsets through education and learning. Commission of the European Communities. Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions. Retrieved from [http://eur-lex.europa.eu/LexUriServ/site/en/com/2006/com2006\\_0033en01.pdf](http://eur-lex.europa.eu/LexUriServ/site/en/com/2006/com2006_0033en01.pdf) on July 03<sup>rd</sup>, 2006.
- CE, 2001. *Éducation pour une société de l'entreprise et formation*. Répertoire des mesures pour la promotion de l'esprit d'entreprise et la compétitivité 2001. Commission européenne. Retrieved from [http://ec.europa.eu/enterprise/enterprise\\_policy/best-directory/fr/education/luxembourg.htm](http://ec.europa.eu/enterprise/enterprise_policy/best-directory/fr/education/luxembourg.htm). on March 10<sup>th</sup>, 2007.
- Delta3D, 2007. Delta3D - Open source gaming & simulation engine. Retrieved on July 11<sup>th</sup>, 2007, from <http://www.delta3d.org/>