

VIRTUAL REALITY IN AGRICULTURE: AN INNOVATIVE FRAMEWORK FOR LEARNING ENTREPRENEURSHIP

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Abstract

In recent years, entrepreneurship has been highlighted as an important mean to boost employment, provide social capital and enhance the countries' economies. The impact that entrepreneurship has on the society and the economy is crucial and it can also have a substantial impact on countries around the globe. In this context, entrepreneurship education is important more than ever before. Entrepreneurship is considered a learning activity which aims to formulate participants' entrepreneurial intention and many factors that affect the intention for entrepreneurship, such as knowledge, desirability, and feasibility of the entrepreneurial activity. In this paper, we present a virtual world platform to promote entrepreneurship education. It is designed for assisting learners in studying aspects of entrepreneurship education in the agricultural domain. Several courses and learning activities have been created in the 3D virtual world, engaging students in innovating activities and procedures that stimulate their knowledge and require them to put theoretical knowledge into practice. The platform is quite suitable for both formal and informal learning and the results are quite encouraging.

Keywords: Virtual reality, learning technologies, agriculture, entrepreneurship, entrepreneurship education, gamification.

1 INTRODUCTION

In recent years, entrepreneurship has been highlighted as an important mean to provide prosperity, social capital and employment. Its impact on the society and the economy is crucial and can have a substantial impact on countries around the globe. In this context, entrepreneurship education is important more than ever before [8]. Entrepreneurship is a learning activity that aims to formulate participants' entrepreneurial intention and many factors that affect the intention for entrepreneurship, such as knowledge, desirability, and feasibility of the entrepreneurial activity [1].

In general, entrepreneurship education (EE) can be described as a collective of suitable initiatives operating in universities, community, vocational centers, high and primary schools that are there with the aim to develop in students a greater capacity for entrepreneurial agency [6]. During the last decade, the design and creation of efficient entrepreneurship education frameworks has attracted the interest of the researchers. Research studies in school and higher education have found that entrepreneurial education is very close related to career choice and to personal skills. Entrepreneurship education can increase student's entrepreneurial skills and intention; and entrepreneurship activities stimulate economic growth. The emergence of entrepreneurial intentions and the stimulation of proper behaviour are of the most importance as they are in the first phase of formulating a business. In general, intentionality represents a state that can turn actions into actual behaviours and so, the entrepreneurial behaviours and intention determinants have attracted great attention from the research community [5]. It is highlighted that innovative learning technologies and virtual reality tools can greatly assist in the formulation of novel entrepreneurship education frameworks that will be able to engage learners and assist them to learn more efficiently [2] [3].

In this paper, we present a virtual world platform to promote entrepreneurship education. It is designed for assisting learners in studying aspects of entrepreneurship education in the agricultural domain. Several courses and learning activities have been created in the 3D virtual world, engaging students in innovating activities and procedures that stimulate their knowledge and require them to put theoretical knowledge into practice. The platform is quite suitable for both formal and informal learning and has great potential.

The rest of the paper is structured as follows. Section 2 presents related works on entrepreneurship education. Section 3 presents the innovative educational platform that has been formulated to assist learners in studying entrepreneurship. Finally, Section 4 presents the main findings and concludes the paper.

2 RELATED WORK

In the literature, several works study the domain of entrepreneurship education and the learning outcomes that entrepreneurial educational frameworks have. Entrepreneurial education is considered mainly a practical course that involves several aspects. The entrepreneurial intentions are considered important aspects and many works focus on individual personality traits, proposing that personality traits influence the decision to start a business.

Principles of active learning that rely on learning by doing are widely acknowledged to be a key in which entrepreneurs develop understanding. In the context of serious games, much learning occurs through doing as well as via simulations and so games can provide realistic entrepreneurial experiences [9]. Indeed, games and game-based learning can engage learners in interaction, problem-solving, decision making and synthetic, real world scenarios and can be considered to model learning-by-doing in the entrepreneurial domain [9]. The authors in [9] present a study on the use of serious games for entrepreneurship. The results of the study point out that game-based learning is a quite interesting and potent approach for entrepreneurship education, that has yet to improve its effectiveness in terms of engagement and fidelity. In [10], authors developed and present a blended learning approach that is based on the use of serious games in the context of the PNPV project. In the e-platform, learners can play the PNPV serious game [11], a business game possessing contextual help and various learning resources. Finally, in the work presented in [12], authors examine the capabilities of a gamified learning environment in promoting entrepreneurship education. The results indicate that the environment offers efficient gamified learning activities that increase students' motivation and assist in the formulation of entrepreneurship mentality, skills and competencies.

3 THE 3D VIRTUAL WORLD

The 3D virtual world is developed with the aim to offer courses and training activities and promote entrepreneurship education. The courses aim to provide students the theoretical knowledge about various aspects of entrepreneurship. They cover topics like the formulation of the economic framework, the opportunities of entrepreneur in agriculture, the special characteristics and opportunities of agriculture. In the platform the learning activities that are developed, are based on the principles of active learning and gamification. They aim to assist students to study and put theoretical knowledge in practice.



Figure 1. Virtual plants in the 3D virtual world.

In this regard, various non-playable conversational agents are designed as a mean to guide students and provide quizzes and learning activities. Conversational agents [15] aim to guide students and provide feedback in a similar way that a teacher could do in order to enhance students' learning experience and comprehension [7] [13].

Students involved in educational games and simulations interpret, analyse, discover, evaluate, act, and solve problems. This approach of learning is more consistent with constructive learning.

Students can visit virtual constructions, machineries and farms and examine the way that they operate. They can participate in various learning activities that are based on gamification and game-based learning principles and that engage them and promote their active learning.

In the 3D virtual world, several courses and learning activities have been designed and created. Students can register to the virtual world, and after login, they can access the 3D virtual world and start their study. They can access the courses as well as participate in the learning activities that are available in the virtual world. As an example, the students while studying the functionality of agriculture procedures and the production of various crops, have the opportunity to study in the virtual world, the theoretical parts via text-based presentations and in addition can examine the functionality of the corresponding virtual farms, crops and agriculture procedures [14]. In Figure 2, an example farm and crop production is presented. It represents a corn production farm and aims to illustrate the process such as the need of regular and proper watering, cultivation and harvest.



Figure 2. A farm in the 3D virtual world.

Furthermore, it is important to point out that the virtual world can also scaffold educators in conducting their courses on the domain of agriculture and entrepreneurship education. The virtual world platform is formulated with the aim to replicate the real world and allow students to study in an environment that is very close to the reality. So, in the virtual world there are many constructions, farms agents that are created to resemble the relevant constructions and machineries of the real-world as well as mimic their operations.

Finally, training centres, VETs, schools and colleges can utilize easily the 3D virtual world and use it in their training programs for the best benefit of their students and teachers. The virtual world can be easily installed, integrated and used in any desired context. Also, learning instructors can easily extend, modify and adapt the training courses and the learning activities so that they fit to the particular aims of the modules and the programs offered by the training centers. The adaptability, reuse and extension of the virtual world to any desired scenario is another capability of the developed environment that was set in mind since the early stages of its formulation.

4 CONCLUSIONS

In this paper, we present a virtual world platform to promote entrepreneurship education. It is designed for assisting learners in studying aspects of entrepreneurship education in the agricultural domain. Several courses and learning activities have been created in the 3D virtual world, engaging students in innovating activities and procedures that enhance their knowledge and require them to put theoretical knowledge into practice. The platform is quite suitable for both formal and informal learning with quite encouraging findings.

There are many directions for future work. First, various piloting studies will be performed in several European countries and the collected data will assist in assessing the learning capabilities of the 3D virtual world. Second, another direction that future work will examine concerns the integration of various game-based learning activities, quizzes and gamified scenarios as well as the evaluation of

their effect on students' learning. Finally, the virtual world will be also extended with the capabilities to offer personalized learning activities that are tailored to students' particular characteristics, knowledge and preferences.

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