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PLAYER – a European Project and a Game to Foster Entrepreneurship Education for Young People

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Abstract: Entrepreneurship is widely recognized as one of the basic skills to be acquired through a life-long learning. The European Union, under the guidance of the Oslo Agenda, promotes several initiatives to develop entrepreneurship culture in Europe. Education can make a significant contribution to entrepreneurship, encouraging the development of entrepreneurial attitudes and skills in young people. Serious Games are presently recognised as having an important role and potential in education and social networks emerged in the last years as the platform preferred by many, especially young people, to socialize, play games and even learn. This paper presents the PLAYER project, in which a game was developed and implemented as a Facebook application, to enable learning entrepreneurial skills progressively, by guiding users to develop a business idea in the form of a business plan.

Keywords: Computers in Education, Technology Enhanced Learning, Entrepreneurship, Entrepreneurship Education, Business Education, Serious Games, Facebook, Game based Learning, EU Project
Categories: K.3.1, K.3.2, J.4, L.3.5, L.5.1, L.6.2

1 Introduction

The last decades witnessed the birth and immediate success of technological companies such as Microsoft, Youtube, Google and Facebook that grew exponentially from a small team of young entrepreneurs into the world giants they are today. However, without any knowledge of Marketing or Business Economics, the average entrepreneur is likely to fail. Entrepreneurship is presently a hot topic in Europe and several European schools and universities (almost all of the Business schools and universities and many of the Technical ones) introduced it in their curricula. Under the current economical and financial context when countries are facing the need to reduce the weight of the public sector in their economy, entrepreneurial skills can play a crucial role in giving a challenging professional perspective to young people.

Combining the two current trends of increasing the importance of private entrepreneurship and high success potential in technological companies the focus of PLAYER project was to provide all young would-be entrepreneurs with essential knowledge and skills in game-like environment at the time and place best suited for them to grasp and accept it.

The choice of a game-like environment was based on the fact that games are a usual environment for the target group of young would-be entrepreneurs and by using them the learning would have a different more profound effect.

Games assume nowadays a paramount importance in the software industry, because of their growing adoption by successive generations over the last 25 years. In the last decade, besides the proliferation of console games, web-based games have also assumed an important role, because of their high availability and ad-supported distribution model, which means they are free to play. More recently, the emergence of social networks such as Facebook and Twitter, changed the way young people interact; they now rely on social network platforms to communicate with friends, family and professionals, to share their media with them and to play games selected from a variety available for free and fully integrated with the social network environment. Another important development in the use of games was that their potential for learning was recognized, which lead to the emergence of serious games for learning and training purposes.

PLAYER[1] – Play and Learn As Young EntrepreneuR – is an European Union (EU) project funded by the EU's Directorate General for Enterprise and Industry (Project ID: ENTR/CIP/09/E/N02S001; Grant Agreement nº 216) that aimed to develop a serious game for motivating and educating young people to become capable entrepreneurs. The game was integrated with Facebook to benefit from a wide community of young people and enabled them to develop their ideas inside an environment they are well accustomed to and provides the ability to follow the required steps while playing and getting feedback from friends and competitors. The game itself implemented a competition that awarded the best business plans for each of the consortium partner's countries as well as the best European business plan.

The project was developed by a consortium of 8 European partners from 7 different countries (Portugal, Spain, Italy, Slovenia, Serbia, United Kingdom and Belgium). The consortium included the European Business Network (EBN), a Brussels based European association of Business & Innovation Centres (BIC), as well as 4 BIC – CIEBI[2], from Covilhã (Portugal); IRP[3], from Maribor (Slovenia); Innova BIC, from Messina (Italy); and Knowledge Dock Centre, from London (United Kingdom)[4] – and 3 universities – EADA[5], from Barcelona (Spain); University of Novi Sad (Serbia); and UTAD[6], from Vila Real (Portugal). UTAD was the partner responsible for programming the game and also took part in the game specification. The other partners were in charge of the game specification and the management and assessment of several steps in the game and European wide contest. All partners were responsible for game dissemination, by spreading the word in social networks and promoting local sessions with students.

The remainder of this paper is organized as follows: section 2 presents some related work, namely some considerations concerning entrepreneurship education, as well as serious games and social networks applied to entrepreneurship education; section 3 describes the PLAYER project; section 4 specifies the PLAYER game requirements and section 5 gives an overview of its main implementation details; section 6 discusses the results obtained with the use of the game in the contest and section 7 presents some conclusions.

2 Entrepreneurship education

Entrepreneurship is widely recognized as one of the basic skills to be acquired through life-long learning. Education can make a significant contribution to entrepreneurship, encouraging the development of entrepreneurial attitudes and skills, starting with youths and with school [Kirby, 2002; Child et al., 2001].

In June 2000 at the Feira European Council, the leaders of the European Union approved the European Charter for Small Enterprises, which urges the member states to support and encourage enterprises in ten key areas [ECSE, 2000]. The recognition

[1] http://player.utad.pt
[2] Centro de Inovação Empresarial da Beira Interior
[3] University Incubator Maribor Venture Factory - IRP
[4] Knowledge Dock Centre, BIC of the University of East London
[5] Escuela de Alta Dirección y Administración
[6] Universidade de Trás-os-Montes e Alto Douro

of the importance of entrepreneurship education led to the European Union agreeing on a common definition of "entrepreneurship teaching" which specifies the objectives of this type of education for different levels of education, from primary school to university. The definition includes two different concepts [PETE, 2002]: "a broader concept of education for entrepreneurial attitudes and skills, which involves developing certain personal qualities (...); and, a more specific concept of training on how to create a business."

Entrepreneurship is considered a basic competency, and in some countries is included explicitly in the curriculum promoted by national and other agents or organizations outside the education system, in cooperation with the schools. However, the integration of entrepreneurship education in the curriculum requires incentives and support, given that schools and teachers have a wide degree of autonomy. It is important for managers and teachers to adhere strongly to these activities, and that the school environment is conducive to education for entrepreneurship [EPSE, 2004].

Entrepreneurship is an important element of development. Therefore, a lot of effort is put into fostering entrepreneurship through supporting newly established companies by educating young people and improving their capability for self-employment. This is even more important for developing countries and countries in transition. For e.g., in Serbia there have been 687 entrepreneurship courses held from 2007, with more than 10000 attendants[7]. The Serbian experience shows that although many business courses and trainings have been organized, some of them in cooperation with developed European countries; the methods used for entrepreneurship education are mainly the traditional ones, not exploiting the full potential of contemporary learning. An example of this is the "Business Innovation and Development Zone" project in Zrenjanin developed under the framework of the project "Strengthening the Dialog between the Serbian Civil Society and the European Union", where experts from Great Britain educate entrepreneurs and managers from Serbia to innovate and develop their businesses conforming to the European BID model, as all nine BID zones in Serbia were built after the American BID model [BID, 2011]. Another example is the "Business Innovation Program", implemented thanks to Norwegian support to entrepreneurship in Serbia, in which 28 trainers and approximately 700 entrepreneurs were trained through the programme. Additionally, Norway has been supporting student entrepreneurship in secondary schools since 2003. Thus far the programme has been implemented in 45 secondary schools with 4.000 students as part of extracurricular activity [BIP, 2011].

[Greene, 2011] highlights a portfolio of four complementary techniques for teaching entrepreneurship as a method rather than a process at Babson school:

1. Starting businesses.
2. Serious games and simulations.
3. Design-based learning.
4. Reflective practice.

She emphasizes that in a process, inputs and outputs are assumed to be known, resulting in a quite predictability. Entrepreneurship, however, is not predictable and therefore students are required "to reach beyond primarily prediction-focused ways of knowing, analyzing, and talking - thus positioning them instead to create, apply, and

[7] http://www.novineokrug.rs/?p=509, on July 12th 2011 (in Serbian language)

act". Serious games were used to allow students a different environment to practice entrepreneurship.

Babson school investigated and experimented with the use of serious games in entrepreneurship curriculum. They developed and tested a social media alternative reality game for teaching social media to faculty members in order to "understand what is available, how it can be helpful to entrepreneurs, and how it can be useful in teaching entrepreneurship."

Another game experiment was the use of an off-the-shelf computer game: 'The Sims', and the expansion package, 'Open for Business', with the purpose of condensing the creation of organizational culture as a resource, particularly through the way the student/entrepreneur/player used his or her time and his or her money in relation to the business, the employees, and the community.

Babson school also developed a video game to support learning about how entrepreneurs think under conditions of risk, uncertainty, and unknowability. The game is designed to replace a case study for an in-class discussion on entrepreneurial thinking. According to Patricia G. Greene, serious games are "a playful approach for creating serious results".

Another evidence of the importance of serious games in entrepreneurial training is an effort of Micro-Enterprise Acceleration Institute (MEA-I), sponsored mainly by Hewlett-Packard. MEA-I develops and implements worldwide innovative immersive training programs to improve IT and business skills to create job opportunities. "Their online strategy is to create an engaging immersive learning program to foster entrepreneurship. The focus is to use IT technology in a business context, which combines rich and interactive media content (videos, simulations, serious games, exercises, assessments) with a face-to-face approach in order to engage young audiences around the world" [Godjevac, 2010]. HP and its partner MEA-I have created a web portal GET-IT City, where any potential young entrepreneur can log on for training and advice. The online Serious Game called Blossom enriches the portal and looks at management role-playing[8]. In this case, online training courses have reached more than 100,000 young people in over 100 centres in 30 countries in Europe, the Middle East and Africa. Serious games and simulations allow students to play in virtual worlds that mirror reality.

On February the 19th 2009, IBM announced INNOV8 v.2, a new version of its "serious game" that helps students and professionals hone their business and technology skills in a compelling, familiar video game format. Standard case studies for mastering skills of leadership, project management, innovation and entrepreneurship were supplemented by simulations to build new skills and retain knowledge. Sandy Carter, IBM Vice-President of SOA, BPM and WebSphere said: "Business simulations allow companies to optimize costs, mitigate risks and remain agile in a rapidly changing environment. The new features in INNOV8 v.2 provide a powerful tool for businesses to simulate challenges and explore the range of solutions offered by a Service Oriented Architecture approach before committing resources."[9] INNOV8 v.2 was designed to supplement courses such as Business Process Management, Corporate Strategy, and Operations and IT Management.

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[8] http://www.ktm-advance.com/serious_games/viewArticle.php?id=83

[9] http://www-03.ibm.com/press/us/en/pressrelease/26734.wss

In order to explain how serious games can affect the development of entrepreneurship, in [Hobbs et al, 2009] the authors described the rationale behind using serious games as follows: "Entrepreneurs must take calculated risks in pursuit of uncertain outcomes. Developing these complex capabilities in the workplace can be a costly and lengthy process, but serious games provide unique opportunities to encourage systems thinking through feedback and reinforcement. Emerging leaders can benefit from practicing complex, nuanced problem-solving in a time-compressed simulation of real-world challenges."

Nowadays, the issue of education of entrepreneurs by means of serious games becomes a very attractive one; thanks to the improvements and benefits this approach brings to learners and society as a whole. In favour of this statement speaks the organization of the 2nd International Conference on Serious Games Development and Applications, which will be held in Lisbon, Portugal, in September 2011, where one of the conference topics will be: Serious games in economics, marketing, business, management, and entrepreneurship[10].

Business games tend to stand as restricted, non-inclusive classroom-only offers in education tools and to be directed to students already enrolled at undergraduate university courses in business, management or marketing [Bassler & Litterer, 1959]. Usage of digital business games will tend to occur in very rigid controlled situations, after commercial agreements between the provider or distributor of the business game software and the learning institution. This means that the business game can be designed and implemented to maximize a highly constrained, very well defined space for usage, with a set, authorized playtime. In this, Business Games don't have to compensate for lack of business knowledge on the end-user or that the user might not be able to give undivided attention to the game. Play sessions are formal, according to a plan and at least partially under tutelage of business instructors or even the game company's own specialists in some cases. This can be seen in how use of business games requires "substantial interaction with the instructor, both in and out of the classroom [Teach & Schwartz, 2004]. Furthermore, business games are generally not expected to provide students with necessary tools to do business all on their own; they are supplemental pedagogical aids in the context of a school curriculum. Lastly, business games have largely tended to feature static, pre-prepared rules: the end-user's chances of winning remain fixed from the software's release, with the end-user merely needing to adapt to this fixed paradigm to win the game.

In 2006, following the European Conference in Oslo [FEMEL, 2006], the European Commission published the Oslo Agenda for Entrepreneurship Education in Europe with the aim "to step up progress in promoting entrepreneurial mind-sets in society, systematically and with effective actions" [OSLO, 2006]. Concerning the actions of the Oslo Agenda, the Enterprise and Industry Commission promotes several initiatives to develop a more entrepreneurial culture, starting with young people and from school education. A forthcoming initiative is the Erasmus for Young Entrepreneurs which aims helping new entrepreneurs to acquire relevant management skills and contributes for improving their know-how and foster cross-border transfers of knowledge and experience.

[10] http://groups.ist.utl.pt/sgda11/?page_id=7

Moreover, the Commission also published a call for proposals on "Entrepreneurial culture of young people and Entrepreneurship education" from which nine projects received financial support [ECYPEE, 2009], that enabled a cross-European summer academy for entrepreneurship professors; the creation of an online platform for practitioners; the development of innovative and practice-based teaching materials; and the fostering the entrepreneurial mind-sets of young people through games, competitions and campaigns.

3 The PLAYER project

Young European people often see the role of the entrepreneur and the entrepreneurship subject as very far from their world, even though entrepreneurship competences and skills are developed in both formal and non-formal settings.

In the educational environment, the development of generic attributes and skills that are the foundations of entrepreneurship is complemented by imparting more specific knowledge about business according to the level of education. While not all youngsters who develop entrepreneurial competence will become entrepreneurs, some evidence [MCSE, 2005] shows that around 20% of participants in mini-company activities in Secondary school go on to create their own company after their studies. Education in entrepreneurship increases the chances of start-ups and self-employment and enhances individuals' economic reward and satisfaction. Moreover, any dynamic SME that wants to grow will benefit from young people with entrepreneurial mind-sets and skills.

In the context of vocational secondary education (initial vocational training), specific training on how to start a company and how to run a company can be particularly effective, as students are close to entering working life and self-employment may be a valuable option for them. However, with exceptions in some countries where there is a well-developed apprenticeship system (such as Ireland, Estonia, Germany, Finland and Sweden) [MAP, 2004], a real focus on entrepreneurship is missing in most cases. There is a perception that secondary school curricula do not provide teachers and students with sufficient motivation to develop entrepreneurship education and so it is crucial to offer them support and incentives. Therefore, innovative tools for the recognition and validation of entrepreneurship-related skills acquired in non-formal learning should be further developed.

In university studies, entrepreneurship education provides specific training on how to start and run a business, and encourages and supports students' business ideas. However, entrepreneurship teaching concentrates mostly on students following economics and business courses, while teaching available to those studying other subjects is limited. Entrepreneurship remains primarily elective and tends to be offered as a stand-alone subject.

An additional, but not less relevant, need is related to the youngsters who are not attending school or universities that are often excluded from entrepreneurship education as this kind of training is usually delivered through formal education institutions.

The young people need a model to emulate it. In other words, providing a success model that will relate to young people is needed to develop the entrepreneurial mind-set in people of this age. Moreover, in all European Commission reports about

entrepreneurial culture the conclusion is that innovative and interactive teaching methods as well as the involvement of business people in the learning process are under-utilized, so, in order to encourage entrepreneurial behaviour, a supportive environment is needed.

With all these issues under consideration, the aim of the PLAYER project was to foster the entrepreneurial mind-set of the young player/user. To reach this goal, the PLAYER consortium decided to use a playful approach thanks to the development of an online game. This game was intended to involve at least 3.500 players from several countries throughout Europe and was the means through which a European wide contest was carried out. The choice of a game was due to its strict link with the idea of competition. It was decided to opt in particular for an online game because young people are more familiar with and more attracted by playful instruments.

The structure of the activities carried out for the PLAYER project was the outcome of a combined strategy made up by five elements: a game developed inside the consortium, promotional events, an European contest based on the game, the contest side events and dissemination. All these elements were deeply inter-related and each of them would be much less significant if any of the others was missing.

According to this methodology, the first step was the development of a game, whose details and rules were drawn by a committee within the consortium made up by professionals of entrepreneurship education and technology experts. The game was available to the general public of youngsters outside educational environment throughout Europe as well as to high school and university students of the seven countries involved in the consortium of the project.

In order to reach these targets the game was linked to three kinds of specific promotional events: one info day, carried out in Brussels on October 2010, local events promoted by the consortium partners and the online animation activities covering the whole duration of the project.

4 Game requirements

The rules and storylines of the game were purposefully created to promote the image of entrepreneurs and to develop the entrepreneurial skills of the participants. The choice to base the contest on a game and to develop it on the web would allow the project to target also some subjects who are hardly involved in entrepreneurship education (e.g. young people living in areas with a high rate of school dropouts, disadvantaged groups or young isolated people). The game was meant to be structured so as to be usable also in high schools and universities involved in the project in the form of experiential learning with a European dimension.

The contest was open to every European young people including those from countries outside the partnership, and equal opportunities were granted to any participants regardless of their nationality.

The three lessons PLAYER project took away from the existing paradigm in business games presented in section 2 were: contemplate young people outside of the context of formal education, which means having to compensate for users with no theoretical grounding in business, marketing or finance; do not rely on rigid, controlled terms and context for usage, and allow end-users to incrementally cumulate

mental work; include collaborative and competitive valences, and evolving challenges.

Digital game elements would empower contestants within the larger context of the competition. Furthermore, PLAYER project would not be a standalone software product with a closed-system of interaction: users should be able to access the system informally. Moreover, PLAYER project's inclusiveness goals – addressing young people outside the context of formal education – should be reflected in the PLAYER game. PLAYER would strive for collaborative participation, with individual contestants being aware of each other throughout the entire install base of PLAYER.

PLAYER would guide users in increasing the market relevance and financial feasibility of what ideas they come up with themselves: just the required knowledge, as required, when required, for each user. Formal education is by definition wholly upfront and transparent about the level of skill to be attained. In planning the PLAYER contest and designing the game to support it, there were options for compromise: not stifling creativity of contestant entries while still obtaining from users the kind of hard market data and financial planning that goes into more serious and formal approaches to creating businesses. However, this kind of compromise would have been contrary to a portion of PLAYER's mandate. PLAYER was after all meant to feature adaptive knowledge that is imparted to the user to a large extent through personal initiative, drive and creativity as conditions of self-directed study. The point was that knowledge be attained informally, in the precise, organic measure of the user's needs.

Facebook is presently the most widely used online social network. Of its more than 750 million currently active users half can be found online on any given day [Facebook, 2011]. Social networks achieve significant demographics among teenagers and young adult users. Research indicates that these young people use social networks in such a way that brings about psychological and physical well-being (Ellison et al., 2007). Surveys seem to indicate Facebook is the social network, which sees the most use by students [Cheung et al., 2010; Golder et al., 2007; Stutzman, 2006]. Moreover, social networks such as Facebook are thought to have a positive correlation with the acculturation of college students [Yu et al., 2010]. Social networks can also contribute to healthy peer relationships and fosters the acceptance by peers of individuals. Healthy peer relationships and peer acceptance have a positive correlation with learning ability [Yu et al., 2010]. Social networks are therefore not only attractive to students, but also to learning institutions and learning initiatives. Facebook may hold potential for being applied to learning situations such as practical guidance. Benefits might include greater interplay among students and a healthy environment for socialization being created [Yu et al., 2010]. In addition to Facebook's potential in empowering socialization aspects of learning situations, there is also commercial and developmental potential. Entrepreneurs from more than 190 countries develop and maintain Facebook applications, and Facebook's user base installs 20 million applications everyday [Facebook, 2011].

The consortium that organized the PLAYER contest was made up of partners from 7 countries, which account for more than 73 million Facebook users. These numbers, along with the reasons exposed in the previous paragraph, motivated us to implement the game as a Facebook application.

5 Implementation

User progression in PLAYER, both as a digitally enabled semi-collaborative contest and as a learning experience, had to spell out a gradient, going from creativity to business rigor. The contest would start out with just the clear goal of asking the user to fill-out as many aspects of an idea for a start-up business as possible. Encouraging creativity in this stage is important, but even more crucial is to impart upon the user the mental model of documenting a business initiative. The climactic stages of PLAYER are about the executive summary and the detailed business plan. These stages are about showing the contestant/user that there are standards to documenting a business and that the investors have expectations of these standards. Before introducing the contestant to the standards for documenting a business initiative, PLAYER has to first introduce the user to the notion of having to document a business initiative at all. This means getting the user excited and motivated about documenting the business, before introducing the weight and importance of an executive summary or business plan.

The game is divided into four stages of growing difficulty, gradually introducing entrepreneurial concepts, and aims to leave participants better prepared to start their own business. In the first two stages, participants create their own profile and compile a portfolio that seeks to explain the idea at a conceptual level, using multimedia documents alone. It's also possible to compile an additional portfolio, which will not be publicly exhibited, where sensitive critical points of a user's strategy may be revealed to a jury of professionals, or simply used for including links to additional web documents. In portraying market conditions, the user is faced with uncertainty of the number and the score of votes he/she will attract. This is the phase where lobbying and networking takes place to introduce general public with the business idea.

The user documents his or her business idea across multiple media, and it is more important at this stage that the user understands that the point is to illustrate and argue for there being a point – a well-defined sense of market-relevance – to his or her idea than it is for the user to already find him or herself contending with advanced, rigorous notions of studying and understanding the market and planning out financing for a start-up business. The starting stages of PLAYER focus less on ensuring that users develop business acumen – though accurate business education content is already being provided at this stage – and more about getting the users to gain enthusiasm about their idea. This ranges from rehearsing an elevator pitch for seeking out financiers to building mental models of business promotion. This is an achievement onto its own of PLAYER as an educational instrument, and a worthwhile goal of development.

While the user waits for his portfolio to be voted by other users, he may entertain himself by voting on other portfolios or exploring business strategies and gauging their success with the Sink-or-Swim game. In this game, as one fits together pieces to describe one's strategy, and connects them with verbs that may indicate one's mind-set, the whole conceptual map will float or drown in a waving water animation to indicate the likelihood of the company's success.

PLAYER is about easing the users out of what they think they know about business, and making users aware of what they still need to learn and seek out in self-directed study. Sink-or-Swim is about emphasizing the interrelatedness and long-term

consequences of difficult choices that users must make about the way they want to do business. Sink-or-Swim is meant to impress upon users that an idea for a business is made up of definite choices, that making one choice might make other options unobtainable, and that each choice carries risks to the way a business proposes to operate. Risks incurred in one choice need to be mitigated by other choices. A business plan presented to investors can therefore be bold and aggressive while safeguarding return of investment, knowing its limits, and catering to a well-defined market.

Soon thereafter a funding quiz must be taken to assess the level of investment required to start their company up, the user's self-confidence and attitude towards risk. Based on the funding quiz answers, a recommendation will be made saying which type of investor to contact, or, eventually, advising the user to rethink his answers. This is to represent financial consultations that would happen in this phase of business planning in real life situation. An Executive Summary is then compiled based on information provided in the previous stages, and displayed for the user to complete it with more details on his SWOT analysis and submit it for evaluation by a jury of experts. The left side of Figure 1 shows an example of the Sink-or-Swim game and the right side shows the page seen by the user when reaching the end of the Executive Summary stage.

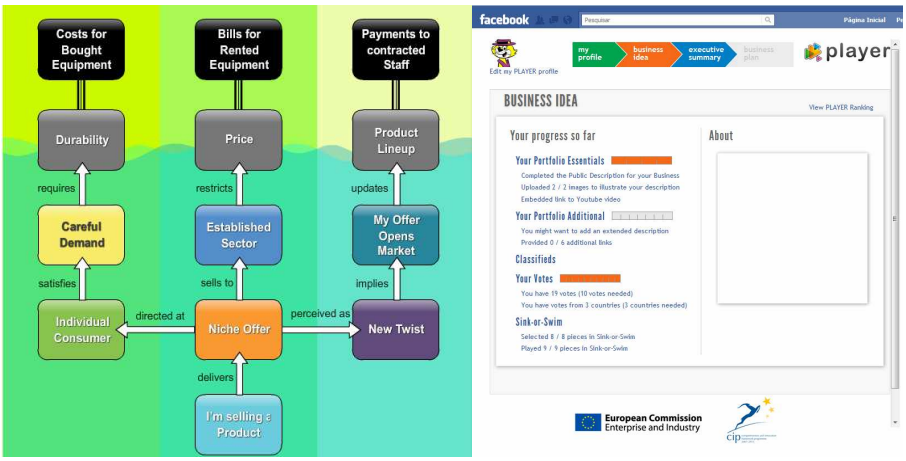

Figure 1: Sink-or-Swim game and PLAYER navigation page

While waiting for evaluation, a user may try to get the jury's attention faster by completing weekly challenges, proving he/she is more skilful or more eager to get the attention of evaluators. The user then continues to the last stage, which will require downloading a Business Plan Tool, completing a formal business plan, and uploading it for review. Keeping in mind the 15 to 30 years old target users' age and their inexperience with sometimes-complicated business details required in business plans, the game offers them a thorough guidance in the form of Business Plan Tool. The final score is based on a very complex formula that weighs every goal achieved, and

PLAYER users can see how they rank compared to other people at any time, draw inspiration from other people's portfolios, or even talk to them via Facebook.

If PLAYER had attempted to force excellence in creating start-ups too soon, it would've failed at delivering a play-experience. Instead, PLAYER enforces business as play more consistently and at a far deeper level than by classroom-ready business games. PLAYER goes directly to imparting high-level mental models, without first going through low-level variables to be understood as facts of business making by the end-user. PLAYER gradually introduces these realities of doing business, more and more of them until the user finds him or herself having already put a lot of mental work and brain-time towards considering the issues and challenges of doing business in real-life. Since these myriad small victories are informal, playful and immediately and easily shared with other contestants and friends, the user barely notices just how far he or she has come, and how much profound knowledge was gained. By the time the user faces down a professional-grade business plan, he or she is already confident in their abilities. They are well accustomed to questioning their assumptions and able to recognize where they might be naïve about business as instinct rather than factual knowledge learned in a classroom. They are aware of the size of the task of creating a start-up and acknowledging of the hard work in establishing hard data about the marketplace and financial viability. More crucially, users understand the need for there being a point to their business – a distinguishing factor for relevance – and have already gained a pulse for the flow of business, as only a play-experience can impart.

5.1 Game scoring

The scoring algorithm in PLAYER was designed to reward effort and progression, bearing in mind the goal of actually reaching the end and being able to develop a formal business plan. It is not revealed to the user so as to prevent cheating. For every level of the game, there is a minimum and maximum score, always a positive integer, where the level's maximum score is twice as much as the accumulated maximum of all previous levels. As such, for every level N, a perfect player that consistently gets maximum score all the way up to level N - 1 but does not enter level N, will be able to match a player that achieves the exact median score on all levels up to N. Therefore, on a scale from 0 to 10 where the median is 5, where there are two players with grades A and B, if A > B, then A is excused from (A-B)/N levels. Figure 2 shows this behaviour. The maximum score is always the same as the accumulated minimum, therefore they overlap and only one can be displayed. This is what we used to achieve some level of fairness.

Ranking user scores is by far the largest and most complex part of the system, having taken three weeks of game design and development iterations to refine and balance. Every little thing the players do is factored in - starting with order of arrival. To reward early adopters, the first 3000 players get a bonus score from 2999 to 1 simply for developing a portfolio and submitting it for evaluation. This is a very small, symbolic sum that is intended to randomize the final score digits and serve as a tiebreaker. Still in the Portfolio stage, we seek to reward effort and completeness - a good portfolio must clearly explain the business concept. Portfolio elements contributing to the score include, in decreasing order of importance, a textual description of the concept, a link to Second Life or YouTube, one or two images, and

a non-public section with further details for the panel of juries which may include the trade secrets behind the player's innovative business concept.

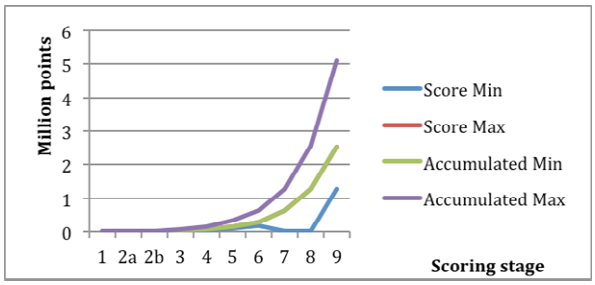

Figure 2: Progression of possible points trhoughout scoring stages. The maximum score is always the same as the accumulated minimum, therefore they overlap and only one can be displayed.

The most important contribution to the score at this stage is the average rating given by other players. This contributes with approximately half of the level's score, but again, for the sake of fairness, a very detailed portfolio will trump a highly rated one - keeping people from artificially inflating their score.

As it turned out, a brief statistical analysis of the database concluded that people were being honest, and even though the exact average changed a little from day to day, it always hovered around 6, reasonably close to the median of 5. PLAYER further takes into account collaborative problem-solving and helpful contributions to the community. Users start with 10,000 entrepreneuros (a virtual currency specific for this game), can earn more, or invest. Naturally, in order to prevent this part of the score to severely interfere with other factors, only a maximum of 50,000 entrepreneuros can be counted.

Scoring stage 4 is based on the user's performance with the Sink-or-Swim flash game, the most popular part of PLAYER. The game seeks to teach and evaluate many different factors in conceptual business models and risk management, and as such its internal score is very difficult to predict. Therefore, we only evaluate whether the user attained a positive or negative score, which fits in nicely with the concept of a business "sinking" or "swimming".

Stages 5 and 6 are also very simple – respectively, whether or not the user completed the Funding Quiz and at least one Challenge. After that, the user must complete an automatically generated Executive Summary with parts of a SWOT analysis. This is submitted to a panel of experts, and its score is a minimum of 320,000 points, with an additional 32,000 for every grading point received (1 to 10). However, unlike in earlier stages, the jury can select "FAIL", which attributes a score of zero grading points. It is not possible to achieve a fractional grade between 1 and 0.

In the final two stages, the user is rewarded simply by submitting a valid, formal business plan, developed with a separate, downloadable tool. This is quite an achievement, and entails significantly more work than the entirety of PLAYER so far. A mathematical formula is then applied, which consists of three factors: the total score achieved so far, the player's business plan grade, and a small bonus for

achieving a particularly good score in the final stage, since it's really the goal of PLAYER.

5.2 Sink-or-Swim Scoring System

In the Sink-or-Swim game the user retains a mental model of the care and complexity that goes into proofing and organizing a business idea given factors of market and finance, as opposed to going straight to the pragmatics of the factors themselves. The game mechanics furthermore reflected the mandate of inclusiveness and staying power for PLAYER project.

The variable set in a more simulation-like business game would have applied only to a specific point in time and to the space of specific market, likely at a set level in a nation-wide market. PLAYER could very hardly be limited by a set of static low-level variables. After all, PLAYER is a transnational contest with a European mandate, aimed at young people, and with a pedigree of innovation and next-business from the consortium partners. PLAYER would have to prove equally useful as a knowledge tool to a contestant in the UK, in Serbia, Slovenia, Italy or Spain. With the need to feature concepts rather than data in PLAYER, Sink-or-Swim was more about the relative weights and dynamics between pieces than the values attributed to the pieces themselves. Sink-or-Swim could not afford to feature overly detailed business concepts in for its playable pieces: what is a crucial factor for business start-ups to take into consideration in Italy might be comparatively irrelevant in Serbia. PLAYER's departure from the classroom – in that the contest was first and foremost for people outside the context of formal education – posed an interesting game design challenge to Sink-or-Swim. After the cast of business and finance factors to appear as actors on the stage of gameplay was decided upon, university-level educators on the consortium were asked to come up with a grading sheet much like the grading sheet for a classroom written test. Each playable piece was assigned a score in how prudent of a business decision it represented, and how much awareness of the pitfalls of planning a business it might account for. Next was the design challenge of removing the classroom from Sink-or-Swim's business discourse. This business discourse of Sink-or-Swim was expressed through its gameplay mechanics, in what the game had to say about business and what knowledge was it able to impart from being played. The classroom mind-set had to be removed from Sink-or-Swim all the while retaining the proven and necessary domain-expertise of the university professors asked to come up with the grading system. This was achieved by focusing on the comparative weights of scores for user choices and abstracting away from the concrete variables, as shown in the left side of Table 1, where the columns in yellow show an abstraction of comparative weights of user choices as graded by the domain-expert.

Sink-or-Swim gameplay is literally about the user constructing the phrases of his or her business discourse by joining verbs and tokens. The tokens are the gameplay pieces dragged onto the stage. The verbs are common speech verbs, which abruptly modify the flow of score, to the point of suddenly changing a successful or 'swimming' business to a failure 'sinking' in the marketplace. This makes for extremely delicate, perilous gameplay, ever-changing and frequently with violent reversals of fortune. This is about as high-level concept about business making that can be imparted to a user by a digital artefact. Rather than continually addressing business statistics and variables with their actions, in minute increments of agency,

like a classroom-ready business game, the user in Sink-or-Swim is left to have to carefully ponder what each token (game piece) means in the context of his or her proposed way of doing business. Gameplay in Sink-or-Swim is always on the verge of both success and disaster. This is due to the dire consequences that the meaning of the common speech verbs – often with extremely subtle differences in motivation or mood in them – carries in way they build and weave into the business factors on the stage.

Question	weight	points			
1. Product/service	0.25		250		
- is unique because	0.25		250		
a) we came up with the idea	0	0	0	0	500
b) never been seen	0.1	1	100	100	600
c) innovated	0.15	3	150	450	950
2. Demographics	0.25		250		
- business/general	0.04	1	40	40	290
- sector	0.05	1	50	50	300
- users	0.08	1	80	80	330
- buyers	0.08	1	80	80	330
3. interest	0.3		300		
- all buyers	0.15	1	150	150	
- frequency	0.15		150		
a) don't have a clue	0	0	0	0	600
b) one time buy	0.05	1	50	50	650
c) month	0.05	3	50	150	750
d) day	0.05	5	50	250	850
4. competition	0.2		200		
- similar	0.1		100		
a) no way	0	0	0		300
b) not sure	0.05	1	50	50	350
c) yes	0.05	3	50	150	450
- future comp	0.1		100		300
a) will be created	0.05	1	50	50	350
b) will not be created	0.05	3	50	150	450
SUM	1				

a1	Me The Seller	#00FFFF	-300			f1		j21
j21	delivers				a1	f1		
f1	High-End offer		-850		a1	d3	j21	j22
j22	Perceived as				f1	d3		
d3	unique target		700		f1		j22	

a1	Me The Seller	#00FFFF	-300			f2		j21
j21	delivers				a1	f2		
f2	niche offer		-750		a1	d1	j21	j22
j22	Perceived as				f2	d1		
d1	unique offer		250		f2		j22	

a1	Me The Seller	#00FFFF	-300			f2		j21
j21	delivers				a1	f2		
f2	niche offer		-750		a1	d3	j21	j22
j22	Perceived as				f2	d3		
d3	unique target		700		f2		j22	

a1	Me The Seller	#00FFFF	-300			f3		j21
j21	delivers				a1	f3		
f3	Broad-Appeal offer		-650		a1	d1	j21	j22
j22	Perceived as				f3	d1		
d1	unique offer		250		f3		j22	

Table 1: Sink-or-Swim scoring system and a few interplays between verbs and tokens

As a closing comment, it should be noted that all Sink-or-Swim play sessions start with a negative score as to spur the user to mental action in thinking through the next step. The message is that any business which hasn't had any thought and balancing of factors going into it is doomed to failure from the get-go. This almost philosophical and unforgiving appraisal of the task of dreaming up a start-up typifies Sink-or-Swim's pedagogic approach. There is only a single game piece on the stage at the beginning, and it reduces the user's business discourse to "I'm selling a product" or "I'm offering a service". This is precisely the kind of overly superficial and even naïve discourse Sink-or-Swim and, to an extent, many aspects of the PLAYER contest are meant to counteract. The user needs to put his or her brain to work, needs to confront the empty stage and draw out the intricacies of the way he or she proposes to do business. There were a relatively large number of possible combinations between 48 gameplay tokens and 16 gameplay verbs. The right side of Table 1 shows a subset of the game mechanics breakdown that illustrates these possibilities.

6 Results

The PLAYER game was launched on October 25th 2010 in Brussels (Belgium), in the Portuguese Permanent Representation to the European Union, in an initiative integrated in the EBN Smart Entrepreneurship Festival and with a live video

connection to the Business-Pitch Workshop that was taking place in the University of East London. The competition took place over 6 months and a Final Seminar & Award Ceremony was held in Covilhã (Portugal) on the March 25th 2011. In this ceremony the PLAYER Consortium reflected and discussed about the project and National and European Awards were given out to winning contestants.

The game had 2706 users registered, who completed Stage 1 by just filling their profile. Figure 3 presents on the left graph the distribution of users by country, showing that 74% were from the 3 smallest countries population-wise: Serbia, Portugal and Slovenia. Another interesting result is that 4% of users (108) were from other or unspecified countries, which may mean that there were players from outside Europe, as well as that some of them did not specify their countries. The graph on the right side presents the distribution of users by level of education. In this case, 33% of the users did not respond and half of the respondents had secondary or post-secondary school, while the number of users with at least post-graduate education corresponded to 36% of the total respondents. These results show that we reached mostly the target population of 15-30 years old – an aggregate of 86%.

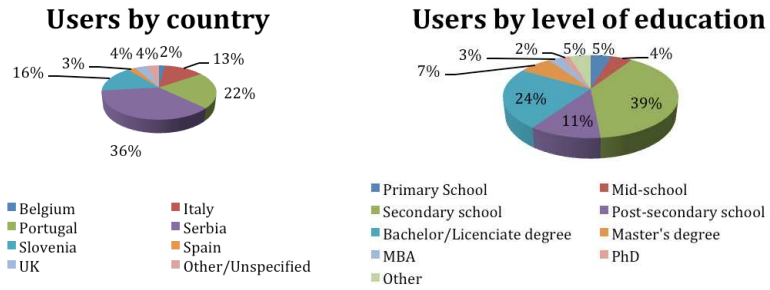

Figure 3: PLAYER users by country and by level of education

The profile form also asked users on how they found the PLAYER game. Figure 4 shows the results of this question, only for the respondents – this question was not mandatory and 905 users did not answer. It can be seen that almost half the respondents said that they had found PLAYER by a mean that was not on the list ("Other"). This result may induce that friends, colleagues and classroom sessions were the main source for having contact with PLAYER. Another important source was Facebook, which is an expected result due to its own nature. All other means were residual or with low significance, especially printed material such as brochures, posters or leaflets. Electronic means represented 40% of the total users. Nevertheless, these results show that the questionnaire should have specifically asked for social means like "Through a friend/colleague" or "In the classroom".

The users that started effectively using the application by giving a name to the business idea were 2009, a 26% drop over registered users. Among these, 1446 created business portfolios and only 128 submitted it for voting, completing Stage 2 (5% of the initial users). These portfolios received votes from 368 users, meaning that a significant number of the users that didn't submit their portfolios for voting still participated and voted in other users' portfolios. There were a total of 2521 votes, with an average of nearly 20 votes per portfolio (it was required 10 votes from 3

different countries to pass to Stage 3) and an average grading of 6.09 (scale 1-10). 43 users, who submitted their executive summaries, completed stage 3 and only 21 submitted their Business Plan, thus completing Stage 4 and the competition (0.4% of the total users).

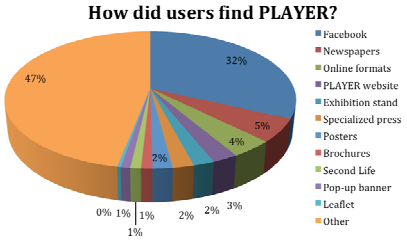

Figure 4: How users found PLAYER

7 Conclusions

From the results obtained with the PLAYER project and after a SWOT analysis made internally by the partners, it was possible to learn some lessons for the future and draw some conclusions. PLAYER had a positive impact on the social tissue and a propensity toward self-employment by the young pupils was visible. It has been an innovative project focused on stimulating creativity. The project inspired potential young European Entrepreneurs to think about business concepts for their ideas.

Fostering the entrepreneurial spirit of young people through a contest based on a game was pioneering and allowed them to communicate with other competitors, using a social network. Future application should improve this communication aspect. Speaking about entrepreneurship, ideas and businesses should make the players look for the potential realization of their idea.

Although the considerable participation did not correspond to a number of completed business plans, the overall impression is positive. The reason for not reaching the expected number of business plans might be that the players needed a tutor, to help them in the writing and implementation of management, the short time period of the competition (six months) was an important constrain while some more tangible awards could be a stimulus for the participants to work to a detailed business plan.

Nonetheless, the high number of entrants to the contest proves people interest and a significant need for entrepreneurial education. PLAYER demonstrated that the concept of business entrepreneurship can be fostered in a short time period (6 months) across several European countries, and gather the attention of thousands of young people, supporting them to rationalize some business concepts.

There is a need for entrepreneurial education and an interest in innovative tools to deal with business ideas. The number of entrants to the contest proves peoples´ interest. The great interest in the contest showed for example by the Serbian players suggests a will for self-employment in the young population of that country. Player project developed a tool that should be used in a lecturing process as an additional

motivator for students to accomplish the requirements needed for business oriented courses. Furthermore, the tool should be applied to the engineering classes that offer wide area of ideas and lack economic background. Working in this direction, the current game could be expanded to further sets of economic, marketing and business management concepts.

The rationale behind playing the game showed to be twofold: 1) the PLAYER game can help to acquire useful knowledge on business plan development and entrepreneurship in general; 2) by playing the game, one can test his/her business idea and develop an actionable business plan. Consequently, the target group should have been divided to two narrower subgroups, which should be treated differently in the European contest.

Europe-wide activities will not ensue without a Europe-wide manager and social animator/evangelist, capable of creating a cohesive and transnational community. Having people in charge of specific competition sections is not enough: it is necessary to have a competition-wide oversight, to detect early on when competitors/players are "stuck" at some point. A trainer or facilitator that has the role to support/help the development of the business idea must monitor the challenges. An online technical assistance is not enough and some specialized tutor/expert that coaches the player could be an advantage. Moreover, developing a creative tool on a European scale with the participation from different countries and different professional/scientific background is a challenge regarding the management of knowledge and communication.

PLAYER stimulates creativity (presentation of ideas) more than organized, planned business development (few completed business plans). This confirms previous experience with projects related to open communities. The development of individual ideas to concrete opportunities requires mentoring. Some PLAYER's partners experience with this contest is that young students are hardly capable of working on their own. Pupils enjoyed the opportunity to use Facebook as an educational tool but they like to work in groups and they could have some good proficiency if assisted by teachers during classes. Players/learners must see the value to them of the learning and they must strongly believe that they are able to play the game with some challenging goals. In order to make the PLAYER game more attractive to players, the questionnaires and the forms should be made more game-like, providing incentives for players, with instant and transparent achievement scores. Also, explanations why some decisions in the game were proper/improper or why some additional game elements suddenly appeared during the play would improve the serious part of the game – the individual learning process. Player/learner need feedback and dialogue on their process and need time and opportunities for repetition (such as in the Sink-or-Swim game, where player could improve their score following the suggestions provided by the system).

The web-based learning tools as serious games merit further research. As demonstrated by PLAYER there is an important demand of online learning tools for the development of entrepreneurial behaviour. Registered players also demonstrate this demand with non-European nationality or residents in overseas countries. Moreover the growing interest and access to massively multiplayer online role-playing games (MMORPG) has opened up significant new scope for educational

methodologies, from standard language teaching options through formalizing the skills that a 'player' develops through their quests and other activities.

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References

[Bassler & Litterer, 1959] Bassler, L. E., & Litterer, J. A.: Business Games at the Undergraduate Level. The Journal of the Academy of Management, 2(2), 127. 1959.

[BID, 2011] Business Innovation and Development Zone. http://www.zrenjanin.rs/3-45-45-1529/Obuka-za-preduzetnike-iz-zrenjaninske-BID-zone (in Serbian language). July 12th 2011.

[BIP, 2011] Business Innovation Program. http://www.bips.no/balkans/serbia/articles.html. July 2011.

[Cheung et al., 2010] Cheung, C. M. K., Chiu, P.-Y., & Lee, M. K. O.: Online social networks: Why do students use facebook? Computers in Human Behavior, In Press. Elsevier Ltd. 2010.

[Child et al.] Child, J., & Mcgrath, R. G.: Organizations Unfettered: Organizational Form in an Information-Intensive Economy. The Academy of Management Journal, 44(6), 1135-1148. 2001.

[Kirby, 2002] Kirby, D.: Entrepreneurship. London: McGraw-Hill Education. 2002.

[ECSE, 2000] European Charter for Small Enterprises. European Commission. http://ec.europa.eu/enterprise/policies/sme/files/charter/docs/charter_en.pdf. 2000. Accessed July 2011.

[ECYPEE, 2009] European Commission, 2009. Short description of awarded proposals: Entrepreneurial culture of young people, and entrepreneurship education. http://ec.europa.eu/enterprise/policies/sme/promoting-entrepreneurship/education-training-entrepreneurship/call-for-proposal/files/call_edu_list_en.pdf. Accessed in July 2011.

[Ellison et al., 2007] Ellison, N. B., Steinfield, C., & Lampe, C.: The Benefits of Facebook "Friends:" Social Capital and College Students' Use of Online Social network Sites. Journal of Computer-Mediated Communication, 12(4), 1143-1168. 2007.

[EPSE, 2004] Final Report of the Expert Group "Education For Entrepreneurship" Making progress in promoting entrepreneurial attitudes and skills through Primary and Secondary education. Brussels: European Commission.

http://ec.europa.eu/enterprise/policies/sme/files/support_measures/training_education/doc/entrepreneurship_education_final_en.pdf. 2004. Accessed July 2011.

[Facebook, 2011]. Facebook Press Room. http://www.facebook.com/press/info.php?statistics. Accessed July 2011.

[Golder et al., 2006] Golder, S., Wilkinson, D. M., & Huberman, B. A.: Rhythms of social interaction: messaging within a massive online network. 3rd International Conference on Communities and Technologies, 30, 1-16. HP Labs. 2006.

[FEMEL, 2006] European Commission, 2006. Entrepreneurship Education in Europe: Fostering Entrepreneurial Mindsets through Education and Learning. http://ec.europa.eu/enterprise/policies/sme/promoting-entrepreneurship/education-training-entrepreneurship/policy-framework/2006-conference/. Accessed in July 2011.

[Godjevac, 2010] Jelena Godjevac: "Blossom - Immersive Entrepreneurship Training Game", Developers Conference 2010 - Serious Games Summit.2010.

[Greene, 2011] Patricia G. Greene: Four Approaches to Teaching Entrepreneurship as a Method. Available in Babson College at http://www3.babson.edu/ESHIP/outreach-events/symposia/babson-insight/four-approaches.cfm. July 2011.

[Hobbs et al., 2009] Joel Hobbs, Laura James: Developing Entrepreneurship with Serious Games. Online Forums 2009. http://www.elearningguild.com/olf/olfarchives/index.cfm?id=517&action=viewonly. 2009.

[MAP, 2004] European Commission, 2004. MAP project Education for Entrepreneurship, Final Report. http://ec.europa.eu/enterprise/policies/sme/files/support_measures/training_education/doc/oslo_agenda_final_en.pdf. Accessed in July 2011.

[MCSE, 2005] European Commission, 2005. Mini-companies in Secondary Education, Best Procedure Project: Final Report of the Expert Group. http://ec.europa.eu/enterprise/policies/sme/files/support_measures/training_education/doc/oslo_agenda_final_en.pdf. Accessed in July 2011.

[Norris, 1986] Norris, D.: External validity of business games. Simulation & Gaming, 13, 126-129. 1986.

[OSLO, 2006] European Commission, 2006. Oslo Agenda for Entrepreneurship Education in Europe. http://ec.europa.eu/enterprise/policies/sme/files/support_measures/training_education/doc/oslo_agenda_final_en.pdf. Accessed in July 2011.

[PETE, 2002] Final Report of the Expert Group "Best Procedure" Project on Education and Training for Entrepreneurship. Brussels: European Commission. http://ec.europa.eu/enterprise/policies/sme/files/support_measures/training_education/education_final_en.pdf. 2002. Accessed July 2011.

[Strutzman, 2006] Stutzman, F.: An Evaluation of Identity-Sharing Behavior in Social network Communities. International Digital and Media Arts Journal, 3(1), 1-7.2006.

[Teach & Schwartz, 2004] Teach, R., & Schwartz, R.: Are business games really delivering what students are led to believe? Developments in Business Simulation and Experiential Learning, 31, 264-272. 2004.

[Yu et al.] Yu, A. Y., Tian, S. W., Vogel, D., & Chi-Wai Kwok, R.: Can learning be virtually boosted? An investigation of online social networking impacts. Computers & Education, 55(4), 1494-1503. Elsevier Ltd. 2010.