Entrepreneurship Knowledge Transfer Through a Serious Games Platform

The Venture Creation Game Case

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Abstract. One of the challenges for productivity is how to improve the experiential and impact of learning in education, The research aims to evaluate the creation of a serious game using Nonakas SECI model to transfer experiential knowledge related to entrepreneurial practices to an experiential simulation game, the game was name "venture creation game", the application and use of the serious game was evaluated in higher education students.

The empirical results indicates that games have a very positive impact in the learning process off students and is a very efficient way to enhance the teaching of entrepreneurship in Higher education. Also trough the SECI model, aspects of entrepreneurship theory were developed.

Keywords: Edutainment · Entrepreneurship · Serious games · Game learning · Gaming base learning · Startup education · Venture creation game

1 Introduction

We have been talking about the importance of Knowledge Management since at least 1959, when Peter Drucker in his book "Landmarks of Tomorrow" first described the rise of the "knowledge worker" (Drucker 1959). Forty years later Drucker declared that increasing the productivity of knowledge workers was "the most important contribution management needs to make in the 21st century." (Drucker 1999).

Since education is one of the key elements to productivity of the Knowledge Worker, one of the challenges is how to improve the experiential and impact of learning in this "knowledge Workers". Knowledge and education are the pillars of competitiveness in the framework of international competition (World Economic forum 2012). Therefore and important part of the role of education in universities is related to help students to become better knowledge workers. How can we innovate in teaching methods so we can achieve this fundamental goal?, this paper is related to an experience of using serious games to teach entrepreneurial concepts, in particular those related to developing

startups in emerging economies, In order to give a more experiential aspect to the acquisition of knowledge by students.

The research group develop a serious game denominated "venture creation game" in order to review the process of developing a learning game and its effect in the learning experience of higher education students.

2 About Serious Games

The 21st century is characterized by the digital era, the evolution of technology leads to constant change, progression and development. People talking about Internet of things (IOT), Big Data analysis, mobile applications and entertainment, the world is changing and so is the way people are learning. The problem emerges from the educational systems and teaching technics that are basically the same in the last 20 years or more, there is a huge disconnection between technology and education and it's only getting wider (Brian Solis 2014). Learning technologies (LT) are an opportunity to share and learn knowledge and abilities on different fields around the world. When you hear about learning technologies the first think that comes into your mind is online courses such as E-Learning platforms or video tutorials, never the less there is an LT ecosystem where you can find alternatives to learning methods such as serious games. (Ulicsak 2010).

"Serious games are games designed in which education (in its various forms) is the primary goal, rather than entertainment." (Gross 2016)

There are multiple appliances for serious games, on the fields of education, military, politics, and healthcare or corporate, all for purposes of training, skill development, and learning or complementary tools, this doesn't mean that serious games are not entertaining or fun, it's just not the main objective. (Sloetjes 2014)

The field of edutainment, serious games or learning game design fields, have made big improvements in the past decade, but there is still a long way to go before we can explode the full potential of educational games. In this area there are some recurrent questions that are rather reiterative such as,

If learning games are beneficial why aren't they integrated more in classrooms?

What learning is really happening and achieve in games?

How can learning games be designed or implemented to have even deeper and more meaningful impact on the learner?

Moving to the next level will require much more thoughtful and strategic mapping of the learning experiences and outputs in games. It is clear that games can improve the learning experience, but there is much learning to be done from the methodology and for the relevance of content implemented, in the case of business learning there has been a long tradition of market simulation tools, financial models simulators, and digital exercises like entrepreneurial games, but we are at the verge of new experiences. The millennials and most of the workers and executives under forty five years old have had great exposition to digital games, more than ever.

3   Educational Games (Edutainment)

Educational games, can be traced back to the 1970's where "non digital" games where used in schools for math-related or social science understanding. The digital application comes on the 1990's with the first multimedia computers, evolving the term to edutainment, but because of the poor quality and lack of understanding the interest decreased. Never the less, serious games gain attention again during the 21th century with a situational and constructionist approach in games. Research has shown a positive effect of games as educational tools in various skills such as: strategic thinking, planning, communication, collaboration, group decision making, and negotiating skills (Kirriemuir and McFarlane 2004; Squire and Jenkins 2003).

Edutainment, comes from "education" & "entertainment" it is designed to generate motivation, interest and a better understanding throw technology using games, music, internet or television to help both students and teachers in the process of learning. The market of business simulation for education are mainly centered on marketing, finance, strategy and optimization. The market for entrepreneurial games is very limited, our related findings are shown in the next table:

Serious games did not come into wide use until the 1990s with multimedia PCs, even though such games were created and used long before. At the time, educational games and other software evolved into "edutainment". However, interest in edutainment soon decreased, partly because of the (poor) quality of the games themselves, and partly because of a growing interest in the Internet (Michael and Chen 2006). The problems encountered in edutainment are reflected in phrases such as "edutainment, an awkward combination of educational software lightly sprinkled with game like interfaces and cute dialog" (Zyda 2005), or "most existing edutainment products combine the entertainment value of a bad lecture with the educational value of a bad game" (Squire and Jenkins 2003).

With the general renewed interest in serious games, game developers have moved from "skilland-drill interactive learning paradigms towards situational and constructionist approaches" (ELSPA 2006). Games in education is gaining acceptance, but their use is not widespread, and it is a controversial issue (ELSPA 2006; Michael and Chen 2006).

Educational games is also faced with the challenge of providing research evidence of the acclaimed benefits, which currently is "complex and thinly spread", possibly because the study of games and gaming relates to several different disciplines; "as a result of the diversity and complexity of games themselves, and the range of perspectives taken by researchers, there are few hard and fast findings in the literature" (Kirriemuir and McFarlane 2004, p.2).

Despite the "few hard and fast findings", research is showing positive effects of games as educational tools. Games can support development of a number of various skills: strategic thinking, planning, communication, collaboration, group decision making, and negotiating skills (Kirriemuir and McFarlane 2004; Squire and Jenkins 2003; see also Gee, unpublished manuscript). However, "hard facts and evidence" is for future research to provide. There is also a number of concerns to consider in order to realize the full potential of games as educational tools: resources (many schools have

computers that are too old for new games, technical support, time for teachers to familiarize themselves with the game, etc.), how to identify the relevance of a game to statutory curricula, difficulty in persuading school stakeholders to the potential benefits of computer games, etc. (ELSPA 2006).

4   The Venture Creation Game

During 2016, the Federico Santa Maria University developed a project devoted to analyze the Latin-American entrepreneur's practices for improving the chances of surviving the Death Valley of Startups and improving the success rate.

The experience of the project was to learn about entrepreneurial practices that contributed to the success of Startups (Fig. 1).
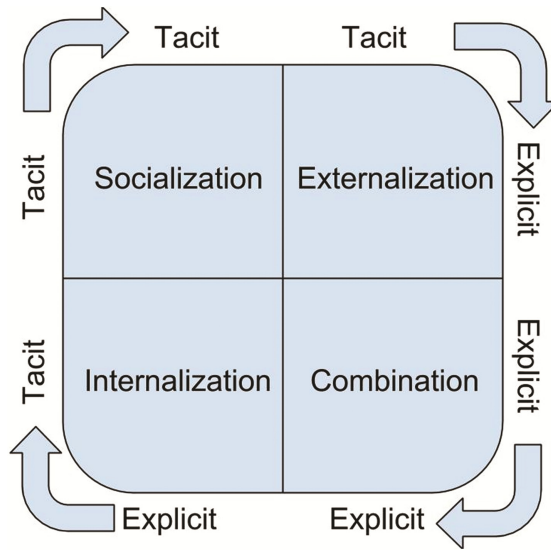
Fig. 1. The SECI model (Nonaka and Takeuchi)

Basically a SECI model approach was applied, (Nonaka 1994; Xu 2013), consisting in processes of socialization, externalization, combination, and internalization. The first one, socialization, is about an informal sharing of experience (e.g. between master and apprentice), for this interviews were conducted personal interviews with around 60 successful technological and innovative entrepreneurs in Chile. The second one, externalization, is about the formalization of tacit knowledge, the interviews helped to identify and document a series of practices and the general process of developing and startup journey theory model. The third one, combination, is about the construction of explicit knowledge from tacit knowledge, a series of practices were identify, and a series of surveys with the participation of more than a thousand founders of startups in Chile permitted to validate and weighted the practices. The fourth one, internalization, is the

transformation of explicit knowledge into tacit knowledge through appropriation and akin to learning by doing, this is where the "Venture Creation Game" was developed. There was also a review of existing related games in the world. (Table 1).

Table 1. Serious games related to entrepreneurship (own)

Name	Company	Country	Description
Entrepreneur simulation	GoVenture, MediaSpark Inc.	Canada	Online Simulation based on the operational phase. Include decisions on: marketing product mix finance team construction
Terra NovUP	Terra NovUp	Chile	Board game based on the construction of the business model throw the theory of Alex Osterwalter.
The start up game	Wharton Business School	EE.UU.	Roleplay: investor employee founder focused on: development management raise capital Wage compensation vs equity
CleanStart	Learning edge, MIT	EE.UU.	Online simulation. Based on the launching and operation of the business includes decisions on: product price team work raise capital
Venture blocks	Venture blocks	EE.UU.	Online simulation. Based on finding a need and creating a business idea.

With the analysis of gaming experts and a group of developers, designers the contents of the game were review, this acknowledging that a single game will not be able to hold of the concepts and practices of a startup journey. The conclusion was that there was a minimum need of at least three games in order to have a serious game related to entrepreneurship, one for the idea, business model or for the "preparation stage" (Fig. 2), another for the venture start and initial running, and one of the operation (breakeven point) and scaling or exiting the venture.

Studding the so call "Startup journey" with different experts, there are four phases that can be identified as common on most of the Startup, they are:

(1) Preparation for the Business: Identification of the problem/opportunity: Motivation of the founders, concept of an idea, problem that needs to be solved. This is the stage of preparation and the general practices identify are related to anticipate, market projections, competitors reaction, try to identify the opportunity.

(2) Starting The Business: Is the stage where the Business model is define, and the company starts to operate, and the general practices identified are related to activate a serious of processes like recruiting, networking, getting financial and other resources.

(3) Running the Business through the Death Valley: Launching of the business, starting operations and passing through the surviving period where good management and orchestration are fundamental to survive and achieve the Break-even point.
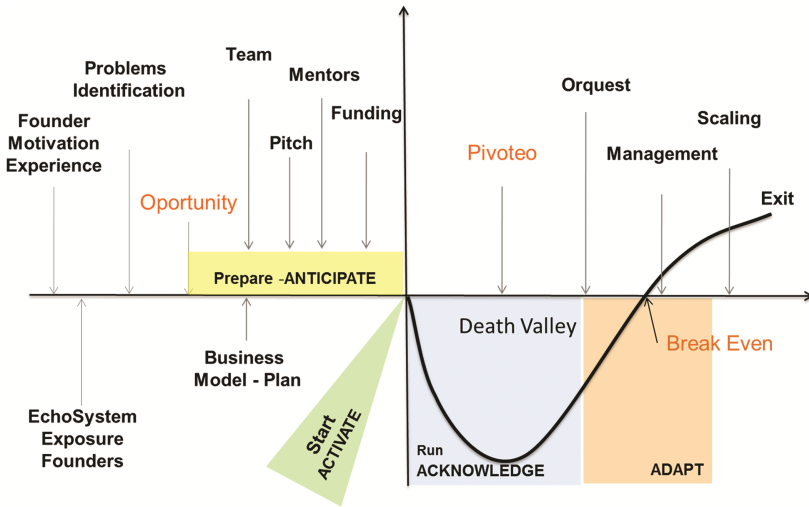
Fig. 2. The startup journey, stages. (own elaboration)

(4) Scaling or Exiting the Business: Once the company is stabilized you must look at ways to continue the journey, how to grow bigger or sell it to the market (profitability). It is essential to adapt, sometimes pivot and improve processes and customer satisfaction.

The Venture Creation game is based on the second phase (business model), this is because it is one of the critical moments of a Startup and there is a huge gap of knowledge and understanding of the practices or decisions entrepreneurs have to make to create a solid base for the implementation and correct identification of the problem/opportunity.

The Game answers to this three basic questions:

(1) What is the Value proposition?

Answer: Correct Segmentation for a customized product, clear definition of the problem, and a proposal of the characteristics of the product.

(2) How Profitable is the business?

Answer: Market size, and cash flow understanding

(3) Is the correct team for the business? (high performance team)

Answer: Identify the right teammates, their abilities needed to increase the probabilities of success in the business.

Based on our research there is no game specifically dedicated to the understanding the startup business process. This serious game is an online simulation game which doesn't need multiple players to play, is purely focused on the modeling of the business plan and it will incorporate some operational aspects of the business idea, ending with the round to raise of capital that involves a simulated panel of investors (Fig. 3).

Fig. 3. Venture creation game market place.

The venture creation game is set on a City landscape, where you are the leader of a Startup. The primary rules have been settled. First the Startup is about creating an App related to sports activity, specifically about creating a healthy gym routine for a determined type of client. The Entrepreneur has to walk through the city taking decisions about his startup. Going to the University, gather information at home, recruit the team at the event center, the players (students) should find out more about the segments at the

Fig. 4. Venture creation game – home practices option example.

gym or park. Strengthen the team at the cowork building and create the company at the lawyer office are part of the activities (Fig. 4).

Some of the decisions taking place at the simulation, are based on the four categories at the bottom (Team, network, segment, competitors and cash flow). Here we are at the house, where the first decisions take place, knowing about the segments, webpage and gathering information (Fig. 5).
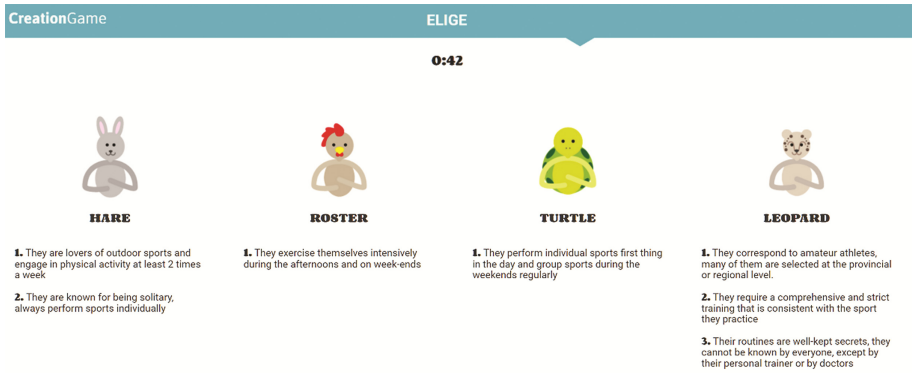

Fig. 5. Venture creation game customer segments characteristics.

4.1 Clients Profiles

There are four types of client profiles among which the player has to choose which segment will approach his Startup App (Fig. 6).
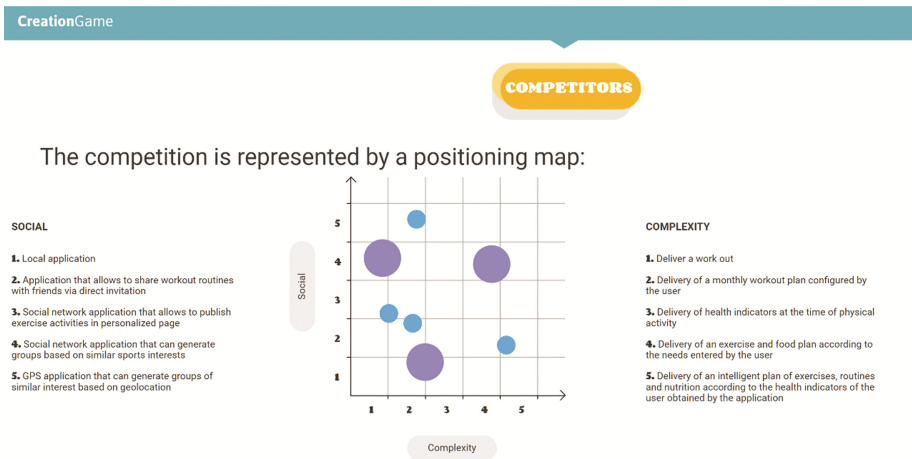

Fig. 6. Venture creation game, competitive map.

In this section, the entrepreneur can see where the competitors are positioned, and what are the better opportunities of making a profitable startup over the years. At the end of the game the entrepreneur has to decide the qualities of the App that are based on Social and Complexity attributes (Fig. 7).
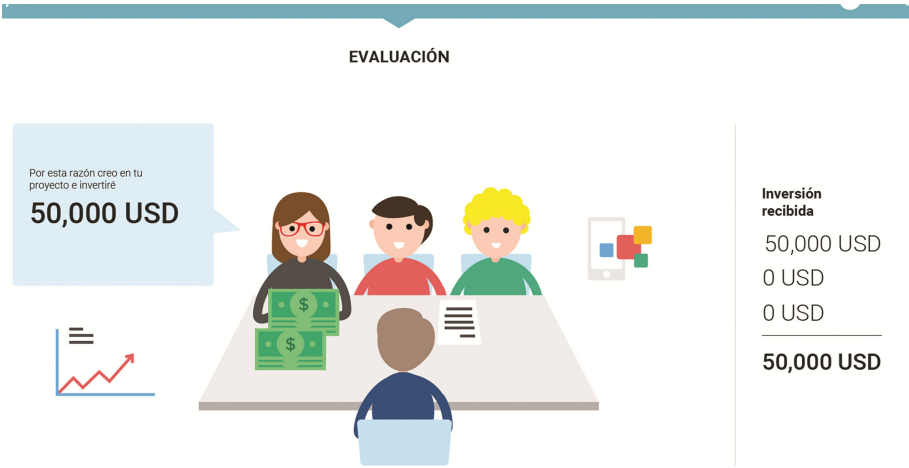

Fig. 7. Venture creation final round of investment.

At the end of the game, there is an evaluation of the decisions taken during the game. And evaluation of the attributes selected and the information gathered in all five categories. There are three investors that are willing to pay 500.000 USD each and give a resourceful feedback.

The process of creating the game is very complex.

5   Results

The game was use in four different classes, two engineering classes (fifth and sixth year) in two different universities, and international exchange students Business class (from 8 different European countries) and one MBA program class in entrepreneurship.

The total number of participant students was 86 and the ones that participated in the survey were 77.

The classes were pilot classes and the game was used has part of an entrepreneurial module in Management and Strategic Management classes.

A survey was conducted among student, with the following results (Tables 2, 3, 4 and 5):

Table 2. Level of knowledge and experience related to entrepreneurship

Exposure to entrepreneurship	
Little knowledge	16,9%
Some studies	51,9%
I have collaborated in startups	19,5%
I have studied extensively	9,1%
I have been a founder member	2,6%
	100,0%

Table 3. Survey answers to general evaluation of serious games

What is the contribution of the game to learning	
Very low	0,0%
Low	1,6%
Medium	28,6%
High	36,5%
Very high	33,3%

Table 4. Evaluation of the venture creation game

How would you evaluate the venture creation game for learning	
Bad	0,0%
Regular	15,9%
Good	14,3%
Very good	44,4%
Excellent	25,4%

Table 5. How was the level of contribution to learning with the serious games

Did the game contibuted to learning about entrepreneurship	
No contribution at all	0%
Learned some new concepts	33%
It made learning easier and fun	24%
A much better understanding of the concepts	29%
Really helped to clarify and learn entrepreneurship concepts	14%

If educating the player should be the primary goal of serious games like Michael and Chen (2006) proposed, the results on the learning process was achieved, the students got better results than just preparing their classes and learned and discusses about reasons and concepts of failure and learning. Class attendance also increased in classes that involved the game simulation (Fig. 8).

Fig. 8. Class experience of the game

6   Conclusions

Now a days, it has become difficult to gain students attention and collaboration, there has been several learning technologies for education that are being deployed at classrooms, such as the use of interactive education, the use of online and e-learning platforms, the cellular use of technologies for labs, the use of sophisticated simulators (Enterprise games), active classrooms, and the use of gaming has a way to attract students.

Certainly there has been a change in the culture of young students, all millennials are used to play games, some of them role playing, this kind of learning technologies, have a lot of applications in terms of Business and modeling studies, the University has embrace the use of the game in different educational games, being very appropriate for professional graduate students.

The students give a lot of credit to the venture creation game, they were eager to play it a few times, and it was an easier way to understand key entrepreneurial concepts, in a rapid and very applicable fashion.

From the universe of surveyed students 52% agree they have taken entrepreneurship courses before and 23% have participated in Startups as founders or collaborators, and from the analysis 67% declared they have a better understanding of the concepts after playing the game and no one on the survey declared that the game was not a contribution in learning about entrepreneurship concepts.

After playing the game for the first time, students showed interest and wanted to know why they failed and what should they do better next time to be a better entrepreneur and raise more capital, and they prepared for the next game session class. 71% of the students actually rated the game as excellent or very good.

Students, the industrial world, they are always complaining that University is all about gaining knowledge and studying, but they are not preparing professional for the real world. Serious games is a way to simulate and experience a more realistic approach to real life decisions that finally are going to shape and give value to your professional profile

The future of research will be to work on another game related like a balanced score card, in order to have a serious games program that will allow the development and analysis of differences in the learning experience of courses.

One of the challenges is for game designers to better align the learning goals with game mechanics to produce more deeply engaging and effective learning game experiences, this is very difficult since you need Knowledge experts and the ability to transmit and to agree with the game developers, designers and programmers who must collaborate to produce an educational tool that is innovative and an engaging learning experiences. In the past 10 years, the field of learning games has been growing a lot.

There are several opportunities for the use of games as a way to transfer knowledge in a more experiential way to teach graduate students to take better decisions while they develop startups or use and practice some management tools.

The process of creating a learning game is indeed very complex if like in this case new knowledge has to be identify and created regarding a topic, using the Nonaka model is very helpful, but in this case it prove to be a long and laborious project, and large discussions were part of it, the experience of transferring an already existing program to a game should be a lot easier.

There are several challenges to be met, the experience of using knowledge transfer to create an educational game that could transmit the experience of tacit knowledge was very successful but deeper analysis will be conducted.

The knowledge transfer in learning games is Learning games seems to be a new and emerging field that operates at the intersection of a lot of professionals such as game researchers, educators, programmers, designers, learning designers, and topics experts, who have to collaborate to produce and innovative way to engage students in a powerful way and generating new classroom dynamics.

There is a challenge in how this experiences could be better evaluated and the development of the teaching experience general guidelines will be done during the present year.

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