EXPLORING THE POTENTIAL OF SERIOUS GAMES' ONLINE COMMUNITIES IN LEVERAGING COLLECTIVE INTELLIGENCE

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Abstract. *One of the major challenges of the academic training based on educational technologies is to detect and explore the high potential of Internet-enabled serious games to leverage collective intelligence for sharing ideas and knowledge regarding how to develop them. The paper studies specific issues of online collaborative resources embedded in serious games' online communities. We highlight the role of the serious games' communities in the process of skill sets development and knowledge sharing, as a result of players' practical experiences. In this way, the efforts of Collective Intelligence are driven by the challenges to upgrade the knowledge base of the serious games, through online targeted communication in their own communities as well as in social networks. We are also interested in outlining how various Collective Intelligence tools support the serious games community development in order to deliver learning content online, by integrating players' preferences expressed in social interactions.*

Keywords: *serious games; collective intelligence; online community; knowledge sharing.*

Introduction

Collective intelligence (CI) is the capacity of people to engage in intellectual cooperation in order to create, innovate and invent (Levy, 1997). The experiential learning, or learning by doing approach, proposes the use of serious games as relevant tools to enhance Collective Intelligence of the students. Three examples can be given in this way: Guess the Score, a serious game implemented by means of an online platform, created to foster the development, interaction, collaboration and engagement of students with the educational activity (Monguet & Meza, 2014); "I Love Bees" experiment in creating a game-based digital learning environment, in which players can experience the challenges of becoming part of a massively collaborative knowledge network, by reconstructing and making sense of the fragmented fiction of Halo (Microsoft's science-fiction video game) universe in a low-risk setting (McGonigal, 2008); World of Warcraft - a massively multiplayer online role-playing game, in which both players and raiding guilds are in fierce competition against each other; in this case, the willingness to share information may seem surprising; the explanation lies in the difference between having information and knowing how to use it – players with the best information available must also be able to transfer this into practical playing in order to develop this community knowledge base (Karlsen, 2011).

Learning Digital Marketing with the serious game Simbound allows students to experience how to initiate and track an online marketing campaign in a high fidelity environment, characterized by no potential brand damage or financial risk when trying out new ideas (Havriliuc et al., 2013).

The goal of this paper is to outline the practical ways in which Simbound online community of players could develop the knowledge base through their practical experiences, leading finally to the design of innovative features that will be certainly embedded into this serious game.

Detecting opportunities for Collaborative Intelligence in a serious game using Mechanics-Dynamics-Aesthetics (MDA) framework

Mechanics-Dynamics-Aesthetics (MDA) framework (Hunicke et al., 2004) is considered a relevant tool to design serious games. Mechanics reveals the basic elements of a serious game: rules, decisions to be adopted, algorithm and database structure embedded into the application. Dynamics outlines the cooperation between mechanics and users' actions, while Aesthetics represents the emotional feedbacks of the users after using the serious games.

Gamification consists of an ongoing process, which involves permanent upgrades in order to provide new challenges to the players. In this context, Collaborative Intelligence represents, in our opinion, the optimal solution to offer the experiences that the players are expecting. Being aware of the necessity to connect the gamification process with Collaborative Intelligence outcomes, we designed the following links between the system of levels, system of challenges and the social system, all of them being integrated in a serious game architecture.

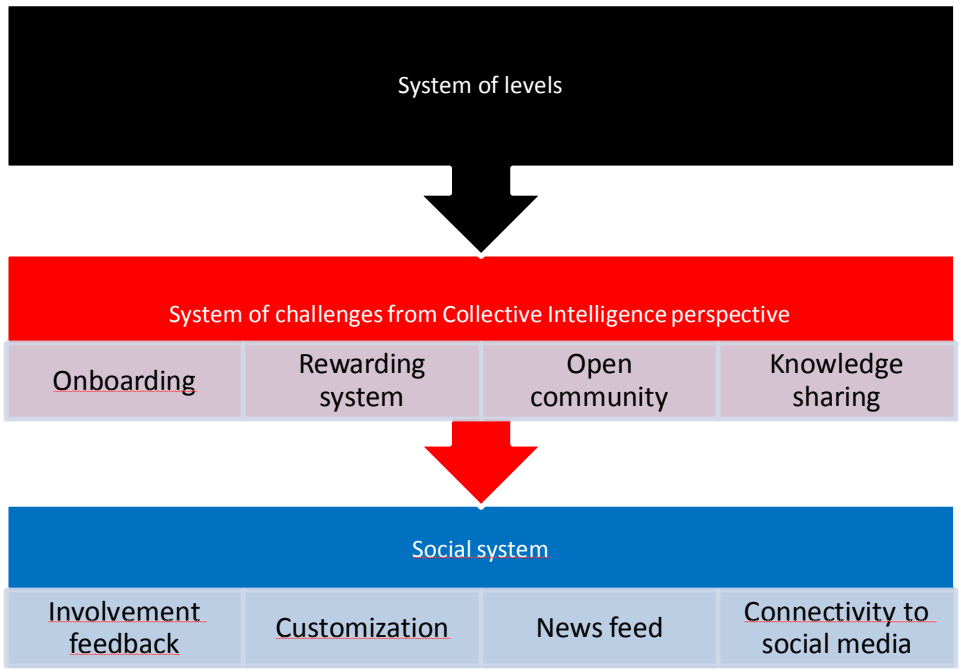

Figure 1. The steps of the gamification system from Collective Intelligence perspective, based on MDA framework

The system of levels assesses the level of involvement of the players in a serious game, measuring their level of expertise in the field of the game. In order to keep the players engaged, the game conceptual framework must be flexible.

The system of challenges from Collective Intelligence perspective assures the players' focus on their mobile targets, on the one hand, and facilitates the sharing process of their experiences within the open community developed by them, on the other hand. Moreover, taking into consideration the online availability of most part of serious game, the online community of players, as well as their activities in social media, provides a lot of opportunities to be exploited by the designers.

The ***onboarding system*** plays a significant role in the process of drawing attention of the potential users of a serious game. The gamification is characterized by a linear approach of the potential players – once they are trying the game features, they are unconsciously following a checklist that deepen their experience, leading to their loyalty. The main goal of this system is to educate the players

through their engagement, but also to make them its fans, which will promote it in the open community, as well as in social networks.
The ***rewarding system*** puts the players in a highly competitive environment, by comparing their performances through different criteria, which are known in advance by all of them. We consider it a source of Collective Intelligence, as there are numerous cases in which the players are sharing their successful strategies with their peers from the games' communities.

The ***open community*** related to a serious game is certainly a major source of innovation. It allows to capture players' knowledge and to expose their thinking so that any other player can build on and learn from it. The online communities related to the serious games aim at filtering the best ideas among a pool of information posted on different channels.

Knowledge sharing is a particular feature of the serious game communities. Players' reflections can be perceived as a return to experience; the outcome of the reflection may be new knowledge that can be used in the future rounds of the game, as well as readiness to behave differently in a similar situation next time. Moreover, sharing of content to provide better experiences primarily connects players already using the game.

Prediction, training, entertainment, education and discovery of innovative ideas are all potential applications of simulation in serious games, revealing their **social system** functionalities.

Involvement feedback is compulsory in the architecture of a serious game, as it outlines the response of the player to the experience he encountered on the game platform. A positive feedback can be virally shared in social networks, leading to a high awareness of the serious game.

Customization of a serious game can have diverse approaches, from a simple avatar to personalized profile pages. Highly individualized content aims at encouraging exploration of a large body of knowledge.

News feeds play an important role in their attempt to keep the players informed about the gamification system updates and upgrades. The players also receive information about their status in the game, as well as the messages posted by the other members of the online community.

Connectivity to social media must not just be interpreted on the level of serious game platform's mechanics and content, but also on the level of players' dynamics, expressed by their connectedness and collectivity, strongly emphasising the belief that social media enhance the community knowledge base through the inputs of individuals.

Simbound online community – source of innovative ideas to upgrade this serious game knowledge base

Simbound is the world first business simulation that addresses the digital marketing subject in such a functional way. Aspiring e-marketers can use this serious game to enable and improve comprehension of a multitude of digital marketing skills, including decision reasoning, cost/benefit analysis, budget administration, audience targeting, and much more (Walsh, 2012).

The complex, discrete-event simulation model uses real-world data to offer learners practice of operational concepts such as managing Search Engine Marketing campaigns, sending out E-mail newsletters to a virtual list of subscribers and also the process of managing website landing pages. Considering the level of interaction of the users that participate in a virtual market, Simbound makes sense to put the entire online environment in a simulation game, where different teams compete for the biggest market share with limited resources (Havriliuc et al., 2013).

According to the founder of Simbound serious game - Louis Doru Havriliuc, the true value in simulation-based learning is the link between the building blocks of different interrelated campaign elements (keyword bid-ad performance-landing page-checkout process-newsletter follow-up), which initially could appear as being distinct for the novice marketer. By highlighting the relationship between what it takes to succeed (e.g. more accurate targeting) and the desired results (better response), simulations can significantly reduce the time needed for a novice to reach expert status (Havriliuc, 2014).

The main reasons to adopt Simbound serious game in experiential learning are synthesised in a blog post (Capatina, 2015): the instructors are able to set their students' learning objectives in advance, while the students can test alternative e-Marketing strategies in a free-risk environment. In the context of a high level of interaction between students' teams, students' tasks are clearly emphasized by the user-friendly interface of this serious game. Simbound also provides rigorous results tracking capabilities**;** at the end of each round of the game, the overall activity of the students' teams is evaluated through a golden triangle (Engagement-Reach-Profitability).

Engagement module reveals total time spent on Simbound platform, as well as the number of decisions and community activity (Figure 2) – we consider it the most relevant part of the golden triangle, from Collective Intelligence perspective, as it streams into insights that guide smarter decisions. The founder and developers of Simbound platform are facing with the challenge of finding patterns in user profiles, as well as in their collective behaviors, in order to upgrade its functionalities.

Rank	Team	Total Time Spent	No. of Decisions	Community Activity
	AdPurple	10 hours, 15 minutes, 15 seconds	28 decisions	1 posts
	SMARTKETERS	9 hours, 34 minutes, 45 seconds	27 decisions	0 posts
	2 D	7 hours, 48 minutes, 25 seconds	33 decisions	0 posts
4th	Blue Instinct	5 hours, 51 minutes, 35 seconds	32 decisions	1 posts
5th	The Black Orange	4 hours, 58 minutes, 10 seconds	24 decisions	0 posts

Figure 2. Performances assessment through Engagement module on Simbound platform

Reach module highlights on the one hand the number of impressions and on the other hand the number of conversions – one of the most relevant indicators in online marketing campaigns (Figure 3). Teamwork plays the main role in designing competitive strategies which enable a high conversion rate.

Rank	Team	Conversions	Total Impressions
	AdPurple	442	298787
	2 D	216	196524
	Blue Instinct	162	157058
4th	SMARTKETERS	161	197000
5th	The Black Orange	113	174687

Figure 3. Performances assessment through Reach module on Simbound platform

Profitability module outlines the financial indicators related to digital marketing: overall profit, Return on Advertising Spending (ROAS), Cost per Acquisition (CPA), total budget spent (Figure 4).

After each round, the teams involved in a Simbound competition receive financial reports which guide them in performing better in the next rounds.

Rank	Team	Overall Profit	ROAS	CPA	Total Budget Spent
	AdPurple	10139.64 €	2.93	11.86 €	5240.36 €
	2 D	3405.24 €	1.88	17.99 €	3884.76 €
	Blue Instinct	2912.9 €	2.04	17.33 €	2807.1 €
4th	SMARTKETERS	2431.61 €	1.84	18 €	2898.39 €
5th	The Black Orange	724.57 €	1.27	24.16 €	2730.43 €

Figure 4. Performances assessment through Profitability module on Simbound platform

After registering and logging on Simbound website, any instructor or student can contribute to this serious game community, by adding information about his experiences, but also asking questions or requesting tips and practical solutions for the problems that he encountered (http://game.simbound.com/modules/community/index.php). By analysing the posts on Simbound community, we discovered useful information for better experiencing this serious game. The opinion expressed by instructors, students and Simbound developers are crucial for gaining new insights into the unknown areas of this digital marketing courseware.

In addition to Simbound community, available only for those registered on the website, Simbound blog is able to capture the attention of potential users, being conceived as a thought leading discussion on e-Marketing active learning and simulation games.

A good example of knowledge sharing process related to Simbound is the blog post published by Yang (2013) - How to Make a Killer PPC Landing Page – where he realizes an excellent overview on how to improve the decision making skills in this serious game. Other online platforms and social networks for collaborative issues are represented by Simbound presence on Facebook, Youtube, LinkedIn, Twitter, Google+, Research Gate etc.

All the relevant information for both prospective and current instructors and players is updated on Simbound's pages on Facebook, LinkedIn, Twitter and Google+. For example, excellent content regarding Simbound presence at European Marketing Academy conference, in May 2015 in Leuven, Belgium was shared through these social networks.

On Youtube, an excellent resource to discover Simbound capabilities is the Webinar for Instructors (https://www.youtube.com/watch?v=h9K_yG1eWiU), presented by the founder of this serious game; the players can also find valuable videos regarding how to improve the decision making process within Simbound training framework.

On Research Gate, a download link to a paper focused on Simbound benefits as active learning method is available on the account of the founder of this platform. We consider it an appropriate promotion method of Simbound in academic environment.

Analysis of Simbound players' strategic behavior through Bartle model

The application of Bartle's typology of players' typology within Simbound serious game allowed us to identify which profiles fit to Collaborative Intelligence actions, but also to assess the strategic behavior of 30 students which attended a Simbound competition, according to the four profiles mentioned in Figure 5.

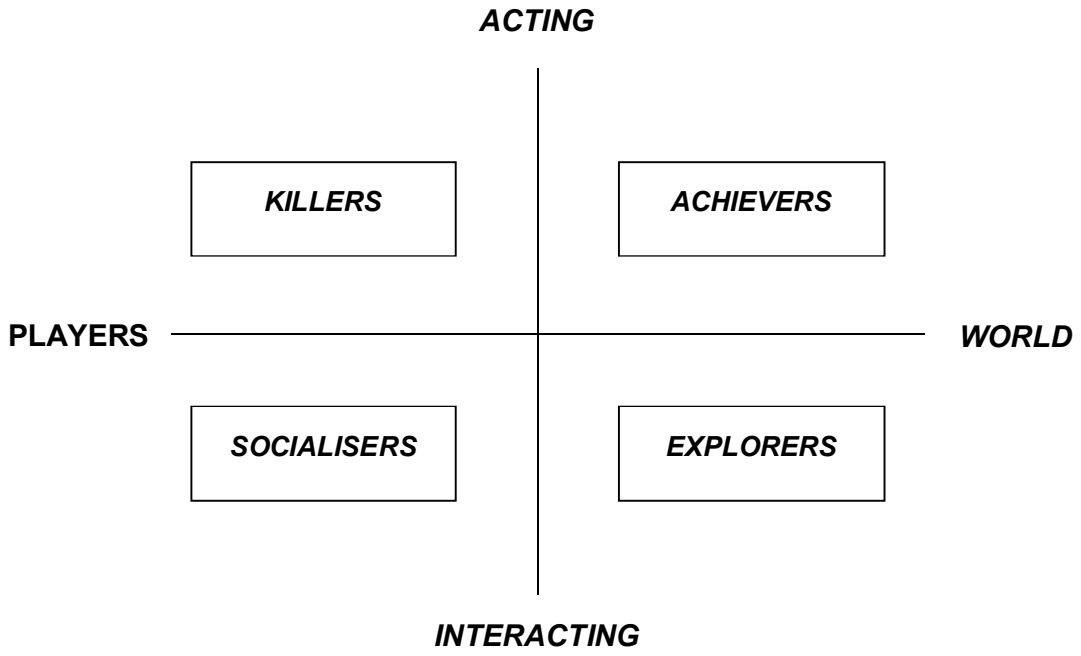

Figure 5. Typology of players in a serious game (adapted after Bartle, 1996, 19).

The ***killers*** could be defined through their focus on direct fight with their competitors, in their quest to win the competition; they wish only to demonstrate their superiority over their peers. Their accumulated knowledge is mainly used to "destroy" the competitors, the killers being proud of their reputation and of their practiced fighting skills.

The ***achievers*** are looking for achieving the excellence in the shortest time, being proud of their formal status in the game's level hierarchy. Their efforts are driven to accomplish their goals, by mastering the game. Being positioned on the same side of the axis focused on acting, as the killers, they cannot be considered sources of Collective Intelligence, because the collaborative issues are not envisaged by the achievers.

The ***socialisers*** are aware of the necessity to build a network of friends and to develop the game community. Their behaviour highlights the propensity to share knowledge regarding the winning strategies tested within the competition, being a powerful resource of Collective Intelligence. Thus, they are proud of their friendships developed in the open community, their contacts and their influence on the new players.

The ***explorers*** are motivated by the discovery of the winning strategies, by interpreting the knowledge shared within the game community. Explorers are proud of their knowledge of the game's finer points, especially if new players treat them as trusted source of relevant sources of information on how to conduct the activities in the game. From Collaborative Intelligence point of view, the knowledge contents are created and maintained collaboratively by the explorers.

Having in mind this profiling tool, we carried out a survey on 20 students which were engaged in a Simbound competition. We carefully analyzed their behavior through direct observation during seven rounds and at the end of the game, we were able to integrate their profiles within Bartle matrix, as it can be seen in Figure 6.

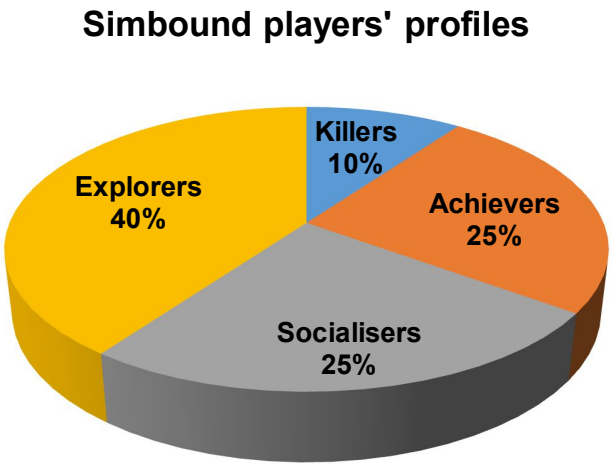

Figure 6. Simbound players' profiles, according to Bartle model

We remark a higher weight of profiles reflecting the high appetite for Collaborative Intelligence (socialisers, who enjoy the interaction of gaming with others and explorers, who are passionate to find and discover new challenges in a serious game like Simbound). The biggest challenge for any serious game, in its attempt to benefit from Collective Intelligence resources, is to transform explorers into socializers, as the layers included in this last cluster are predisposed to build communities that could be carried outside the game.

In order to break the game boundary through Social Status, the winning gamified solutions dedicated to business simulations, such as Simbound, are designed and developed with the Socializer in mind. This feature makes sure that a serious game is able to provide Social Status to its players.

The development of Simbound players' hard and soft skills is mainly related to the performance of the Collective Intelligence of the teams, manifested through the shared and collaborative development of creative tasks related to the actions to be done in order to achieve the teams' goals.

Preliminary conclusions and future research agenda

The highly interactive experiences related to active learning methods can be adapted to meet the creative needs and interests of the players involved in serious games communities, by inspiring them to discover solutions and responses to the challenges determined by the necessity to upgrade the knowledge base, through their collective consciousness.

Considering the amount of knowledge needed to learn a given content, serious games' players are aware of the necessity to solve collaboratively specific issues. It seems obvious that the slower evolution of knowledge acquisition from theoretical framework on the one hand and the increasing capacity of interactive interaction to accommodate actionable knowledge from another hand could jeopardise the leveraging role of collective intelligence. A whole list of unfitting consequences can be envisaged: low capability to address mobile targets, low propensity to discover patterns of collective intelligence, lack of agreements between players to setup a new sources of knowledge (new players) on base of collective value added capability. The risk of contra intuitive behaviour due to the lack of collective intelligence procedures is the most envisaged threat. The missing models of upgrading the knowledge base through capturing actionable knowledge from interactive experience is the main challenge for researchers and practitioners of the domain, who are expected to explore the process of collective sense making and coherently capture it as new knowledge.

Its main role of Simbound community is to improve players' understanding on how knowledge related to managing digital marketing campaigns is generated, shared by other experienced players, under both collaborative and competitive learning conditions.

Connecting with other players who are experiencing the same problem, sharing testimonials, confidence and tips about how to better perform in the game and to obtain insights that would not be otherwise obvious, are just few examples of the need for Collaborative Intelligence in serious games' communities. The availability of a growing number of collaborative tools dedicated to serious games can support a diversity of collaboration activities, such as teambuilding and networking. Thus, the players have a unique chance to develop collective sensing and meaning within their communities of practice.

Considering that Simbound community quickly evolves, the players – represented by students from a wide range of universities could be considered as potential targets for future academic researches, focused on leveraging Collective Intelligence in specific contexts related to this serious games, such as Socially Connected Augmented Reality model (SCAR), which is based on a clear layer of gamification of a realistic setting that facilitates players interconnections through social networks. A challenging objective in the future research agenda is to explore the role of experiential learning mechanisms, embedded in serious games, in the training of future web entrepreneurs from all parts of the world.

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