#GOTTACATCHEMALL: EXPLORING POKEMON GO IN SEARCH OF LEARNING ENHANCEMENT OBJECTS

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ABSTRACT

The Augmented Reality Game, Pokemon Go, took the world by storm in the summer of 2016. City landscapes were decorated with amusing, colourful objects called Pokemon, and the holiday activities were enhanced by catching these wonderful creatures. In light of this, it is inevitable for mobile language learning researchers to reflect on the impact of this game on learning and how it may be leveraged to enhance the design of mobile and ubiquitous technologies for mobile and situated language learning. This paper analyses the game Pokemon Go and the players' experiences according to a framework developed for evaluating mobile language learning and discusses how Pokemon Go can help to meet some of the challenges faced by earlier research activities.

KEYWORDS

Pokemon Go, MALL, Learning, Augmented Reality, Gamification, Situated learning.

1. INTRODUCTION

During the early summer of 2016, you didn't need to be a Pokemon Go player to realize that world demography underwent a seismic shift with the introduction of Pokemon Go. Our surroundings have been augmented by the introduction of this colorful new species of not-fully-human-beings, the Pokemon, that many humans want to catch, train and somehow dominate. According to Wikipedia, the game has reportedly been downloaded by more than 130 million people worldwide since its launch (August 2016).

The successful reboot of the Pokemon into augmented reality – they existed before in the late 90's[1]– has sparked the interest of mobile learning researchers and learning technologists in general: what can we borrow from this phenomenon that has caught the interest of so many people of all ages, to improve the learning process? What are its more interesting features in terms of "learning enhancements"? Is Augmented Reality the actual trigger of this success or is there something else we should consider? Moreover, how can the main features of the game be incorporated into other environments specifically built for learning purposes?

In this paper we aim to analyse the Pokemon Go (henceforth PG) game within the learning/teaching perspective and, in particular, within the mobile learning and MALL paradigms. We will apply the evaluation framework for mobile language learning that we developed in (Cacchione et al. 2015), in order to identify key factors – especially those related to neuroscience – which influence its effect, impact and success. A comparison between PG and Geocashing will illustrate the evolution of the concept of location-based games – a concept that is very close to that of situated learning that we have explored in several previous works. Finally, we will summarize our findings, also trying to depict possible further scenarios integrating the elements that our analysis has shown to be particularly interesting and effective.

[1]According to the Independent in 2007 Pokemon was the 2nd highest selling game franchise, behind Mario, with 155 million games sold. https://web.archive.org/web/20070112150103/http://news.independent.co.uk/world/science_technology/article2141636.ece

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2. THE POKEMON GO EXPERIENCE

Pokémon Go is a free, location-based augmented reality game developed for mobile devices. Players use GPS on their mobile device to locate, capture, battle, and train virtual creatures (a.k.a. Pokémon), which appear on screen overlaying the image seen through the device's camera. This makes it seem like the Pokemon are in the same real-world location as the player.

(a) (b)

Figure 1. (a) A Pokestop corresponding to a piece of street art, a mural of a robot; (b) The robot on the wall of a school in Campobasso suburbs.

The basic playing mode is very easy: just search for a Pokemon and trying to catch it with the Pokeball, which you flick aiming at the circle that appears over its head. When you run out of Pokéballs, you can collect more from PokéStops, which are usually found in towns and cities or places of interest, see Figure 1. From level 5, you can access gyms and join teams to battle. If you want to be a PG expert player, you can study strategies and discuss moves with other users both on and offline. Moreover, there are many external (i.e. not directly linked to the game) support pages and tutorials on the Internet, both by Niantic (Pokemon Go company) and user generated groups. Many of them offer crowd-sourced tools, like maps, to help users find Pokemon in their area of interest. Similar to many other games, you don't have to be an expert player to enjoy PG and you can play it at several levels. You could open the app and enjoy the theme tune while following your avatar around in the real/virtual space and see which Pokemon appear in your surroundings. You might have fun by taking pictures of your friends with Pidgey on their shoulders while drinking beer in the pub. Or, of course, you could organize hunting expeditions with your Whatsapp PG group. The entry level is very easy and intuitive: just download the app, create your avatar and start exploring. It's a simple concept, but builds in complexity as you progress through the levels of the game.

In Figure 2, you see AnnaSibel encountering two Pokemon: Zubat (on the left) and Paras. Clicking on Zubat, it enters AnnaSibel's room and flies over the computer monitor (picture 2). Then Zubat is caught with the Pokeball (the white and red ball under AnnaSibel in the 1st picture).

The user-friendliness of the game is surely one of its success factors. But what are the others? First of all, the game is beautiful: the environments are colorful, detailed, graphically curate. The overall impression is almost that of a 3D space. The user identity is customizable and you can choose how you want to appear in the game (name, hair, eyes, outfit). The soundtrack is nice and there are good sound effects for commands too. Pages tracking your records – the Pokedex, i.e. the inventory of Pokemon you caught, the tools collected etc. – are easy to browse.

When you meet a Pokemon for the first time, it is astonishing: seeing a little screaming creature flying in your kitchen is amazing. Then you want to take a selfie with it before catching it – and sending it to your skeptical friends. Afterwards, when you are more familiar with the game, the surprise effect diminishes but never fades away, it is frequently reinforced by encountering new types of monsters.

Then, there is the "activity factor": you have to walk around instead of just standing there or lying on the sofa, and nobody else can catch a Pokemon for you - you have to take action. That gives you a reason for going out for a walk – there have been news reports of people losing a significant amount of weight by playing PG. It also gives you a reason to talk to other people who you might otherwise not meet: to give and receive hints, to know how to beat stronger ones, or to know where the nearest Pokestops are.

Pokestops are key points for socializing. They are special sites of interest – monuments, statues, portals etc. – where you can get Pokeballs and other useful tools. They are geo-localized like all the rest, but they open up and release their tools only when you get close enough to them. That's why you find groups of people hanging around Pokestops with their smartphones talking to each other about the game. Poke-stops also improve the knowledge of the sites, allowing (better: forcing) you to discover corners of your city you would have never seen otherwise.

(a) (b)

Figure 2. (a) The avatar AnnaSibel meets two Pokemon; (b) Zubat flies over AnnaSibel's computer monitor.

3. EXPERIENCES FROM MOBILE ASSISTED LANGUAGE LEARNING

Language learning and technologies to support language learning have been influenced in many ways though mobile and ubiquitous technologies; from electronic dictionaries to lists of pictures and words in our pockets (Joseph, Binstead, & Suthers, 2005); from capturing and sharing language content (Pemberton, Winter, & Fallahkair, 2010) to creative conversations with friends, teachers and other language learners (Petersen, Procter-Legg, & Cacchione, 2014). Perceptions of MALL have evolved from a focus on the device itself to the social and collaborative experiences of the learners. The affordances of mobile and ubiquitous technologies today have taken us beyond a single learner and her mobile phone to multiple learners interacting to experience unique and personalized learning experiences through a seamless blend of technologies and concepts such as mobile devices, social networks, cloud computing and gamification. In (Kukulska-Hulme, 2010), and (Kukulska-Hulme, 2009), Kukulska-Hulme provides an overview of interesting and game changing applications of technologies that have influenced MALL. One of the trends identified by Kukulska-Hulme is situated and immersive learning, where learners interact with their immediate surroundings and collaborate with people to create their own individualised learning experiences.

However, it was noted that the pervasiveness of the devices alone may not be enough to facilitate real interactions between people. This was confirmed through some of our own studies with LingoBee, a crowd-sourced, situated, mobile and collaborative language learning app (SIMOLA, 2012). It is indeed the creative use of the affordances of the technology and the devices that lead to a culture of learning where interactions play a central role.

LingoBee was designed to engage language learners to collect interesting and colloquial language content during their everyday activities and share them with other learners through a cloud-based repository. During the studies, the app was introduced to the learners as a part of their language courses, encouraging them to bridge the classroom learning with their daily activities (Procter-Legg, Petersen, & Cacchione, 2014). Learners captured and shared content using their mobile phones and other learners could annotate, edit and comment on them, often leading to a conversation among several learners.

We noticed that the learners needed prompting and careful design of learning-related activities to stimulate the use of the app. In addition, it was hard to sustain the use of it beyond the studies due to a number of reasons such as the sheer volume and influence of other social networks (Procter-Legg et al., 2014). Nevertheless, it was evident from the interviews with learners that while they liked the affordances of LingoBee, they still expected the app to include features to nudge or stimulate learners to use it. Some of the challenges that were identified from the evaluations can be summarised as below:

- Learners found it difficult to interact with native speakers or other learners in the real world as the technology was designed for collaboration and social interaction through LingoBee's cloud-based repository.
- Explicit features for motivating learners (e.g. such as gamification, rewards for contributions, etc.) to use the app were not included as it was assumed that social networking norms such as "like" or "flag" or the possibility to contribute and enhance an existing contribution (wiki functionality) would serve as intrinsic motivation to learners.
- As with other mobile learning applications, the context in which learning takes place or what triggered it continues to be a challenge. When a learner makes a contribution to the repository, referred to as a "LingoBee moment" (Adlard, Ottway, & Procter-Legg, 2012), we know the time, GPS location and whether the learner contributed multimedia or something about the environment. However, it was still inadequate to understand what may have triggered the learning and the best way to enhance deep learning and retention.

4. AUGMENTED REALITY AND MALL

“Put simply, augmented reality is a technology that overlays computer generated visuals over the real world through a device camera – bringing your surroundings to life and interacting with sensors such as location and heart rate to provide additional information” (Ramirez, 2014).

PG has brought Augmented Reality (AR) to our neighborhoods, schools and cities and both children and adults have been swept off their feet like never before. AR has existed for many years; in 1968, Ivan Sutherland developed the first head-mounted system using computer-generated graphics to show users wireframe drawings. In 1990, Boeing's Tim Caudell coined the term "Augmented Reality" to describe an electronic system that guides workers to install electrical cables and fuselage in aircrafts. AR has been a part of the entertainment industry since the 1990s and in 2000, Hirokazu Kato created ARToolkit, an open source software library to support the creation of AR applications. More recently, AR has become accessible for individual consumers and smaller scale development companies through Google Glass, Reckon Jet, Solos and similar products from other companies. PG has no doubt impacted the future of AR technology and its role in future mobile applications.

AR applications in language learning and education in general has, until now, been limited, perhaps due to the limitations of the technology (Jain, Manweiler, & Choudhury, 2015). Affordances of AR technology in classrooms were reported by Pemberton and Winter (Pemberton & Winter, 2009) where they identified the benefits of spatial 3D representations of molecules and atoms in learning biology. Examples of using AR with mobile devices include overlays of building in Oslo for urban design by Architecture students (Liestøl & Morrison, 2015). Cook has written about augmented reality and location-based field trips based on the CONTSENS project (Cook, 2010). In the EU MIRROR project focused on reflection and learning, mixed reality was used to provide a scenario or a situation as a problem that the user had to solve, to train civil protection workers to manage crisis situations (Di Loreto, Mora, & Divitini, 2013).

A possible reading of PG in terms of novelty and innovation potential, directly related to its impact on the audience, is that "it is the ultimate mash-up", having combined three key innovative technological components into one single highly attractive and engaging environment: games and gamification, virtual reality and the Internet of Things (IoT) (Buff, 2016). Pokémon Go takes IoT and lets you put virtual things into it and seamlessly combines them into a coherent story in an impressive way. Although PG does not use the concept of IoT in the traditional way where we imagine sensors, its power no doubt lies in the unique mash-up of technologies that have previously existed only separately, and put together in an irresistible packaging.

5. EVALUATION OF PG FROM A LEARNING PERSPECTIVE

In this section we try to evaluate the game to identify its potentialities from an educational perspective. In other words, we want to see if PG can be exploited as a good learning environment – or, better, which of its peculiar features can be identified as successful learning elements, to be "exported" to other learning environments too. We will apply the evaluation framework developed in 2015 for mobile learning applications (Cacchione, Procter-Legg, Petersen, & Winter, 2015). The framework is composed of a set of factors of different nature – neuroscientific, technological, organisational and pedagogical – and aims to provide a comprehensive account of what plays a major role in ensuring effective learning via mobile devices. Even if we are hereby comparing objects of a different nature – a game app and a possible learning app – the comparison is made possible by a couple of relevant factors: a) they are both mobile, context and situation-oriented; b) they both promote interactivity among users, and therefore are social-oriented. We of course cannot evaluate PG's pedagogical features because it was not built for learning purposes, but we will focus on the neuro-scientific aspects, by examining the set of criteria schematized in the diagram below and linking them to the technological features.

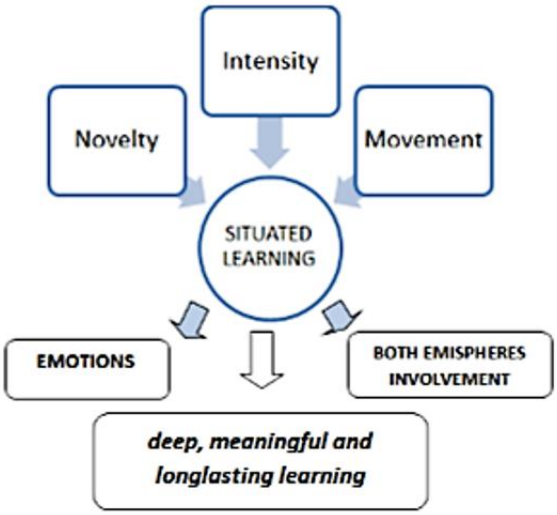

Figure 3. Evaluation framework for Mobile Language Learning.

At first glance, all the criteria included in the evaluation framework, presented in Figure 3, seem to be present in PG. Situated learning (in circle in the middle) is an instructional approach developed by Lave and Wenger (Lave & Wenger, 1991), following the work of Dewey, Vygotsky and others (Clancey, 1995), who claim that students are more inclined to learn by actively participating in the learning experience. Situated learning essentially is a matter of creating meaning from the real activities of daily living. It can obviously occur without any technological support, but the ICT revolution of the last decade caused its very explosion, essentially due to the advent of mobile devices and smartphones in particular. Technology development allowed situational learning to make a big step forward: when the user enters a new site/context/situation, new contents pop up from reality surrounding him/her. That is one of the main peculiar AR features: the real

life experience is enriched by new objects popping up from where we turn our attention to. This is PG's way of providing the user with game-object, i.e. Pokemon. Therefore, we can affirm PG to be strongly situated.

Situated learning is promoted by novelty, intensity and movement. PG is the game of the moment: no doubt about its novelty. If, on one side, all its components are not so innovative taken per se and individually, they do are as they are integrated into one single game. According to Phingbodhipakkiya, the game is one continuous playscape (Phingbodhipakkiya, 2016). Our brains love novelty, and the same dopaminergic reward pathway that's accessed when we talk about ourselves is also activated when we experience new things. Activation of this pathway directs individuals to repeat what they just did to get more rewards. In the case of Pokémon Go, you're experiencing new things every single time you play the game, and that drives you to go to new locations, so you can find new Pokemon.

Movement is constitutive of PG, because only very few Pokemon are available at your home. You have to search for them in the streets and in the squares, and that's why some news reported of many PG players having lost weight by playing every day; e.g. (Eastaugh, 2016). Getting out of the house to play stimulates real world communication and interaction, finding Pokemon collaboratively (Hirsh-Pasek & Golinkoff, 2016). An example of this is people at PokeStops talking to each other and the collaboration and play sessions across generations such as a mother and child catching Pokemon. PG has mobilised communities and brought local history to the forefront; people have learned new things about their geographical areas and their neighborhoods (Butcher, 2016).

Intensity is given by the environment structure and by its "furnishing". There are plenty of interesting stimuli such as PokeStops and gyms, besides, of course, Pokemon themselves. As said before, the environment is colorful and well designed so to offer an intense and entertaining experience. Nevertheless, intensity is more questionable than other characteristics. It is difficult to assess, as it is more linked to personal, subjective perception and, furthermore, tends to vary from user to user and from event to event.

As shown in the diagram above, all the considered features are put in relationship with deep, meaningful and long-lasting learning. The diagram shows in fact that novelty, intensity, movement are constitutive of situated learning and that situated learning is linked to/can generate emotions. Emotions are directly connected to good learning, where good means deep, meaningful and long-lasting – and this result can be obtained by involving both the brain hemispheres, like emotions can actually do.

Emotions is one of the factors that really affect learning through the release of the relevant chemicals such as dopamine in the brain, and activity and emotions can improve the synaptic connections, thus enhancing the learning (Zull, 2004) and (Bajaj, Bellotti, Berta, & de Gloria, 2016). The emotional impact is layered by the factors described above and by others, e.g. the personalized avatars, making the game more personal and more real. Research has shown that virtual responses activate the same neural networks as real experiences, in the same way that images of rewards and real rewards are perceived almost identically in the brain. PG takes cues from the actual environment and couples them with the virtual world for greater impact. For example, if you're near a body of water you might catch a Magikarp, and if you're in the subway you might catch a Rattata [*Magicarp is a carp-fish and Rattata a rat, AN*] — this water/land congruence increases your sense of delight and accomplishment. Bundling emotions strengthens the positive association with the game and keeps you hooked.

Furthermore, emotions are fed by the social and collaborative dimension: PG stimulates dialogue among users to find the best solutions. The social and collaborative dimension has been described as one that is important for learning, as seen in some multiplayer games (Bajaj et al., 2016). PG players exchange information about sites and Pokemon presence. PG players are a community; they have dedicated pages on social networks and informal groups of friends living and playing in the same area. This aspect is related to creative ways of problem solving, e.g. collaboratively. One of the first players to catch all the Pokemon was a Singaporian, who did not leave Singapore to achieve his goal. He asked friends who were abroad to help him catch some Pokemon that were only found in specific parts of the world, e.g. Australia or New Zealand, by using his account. However, when accused of cheating, his claimed he was just solving a problem in creative ways ("First Singaporean to catch all 145 Pokemon admits getting help from overseas friends," 2016).

All the elements composing the diagram are therefore included in PG, and can both explain its success and provide the basis for building a learning environment with similar features. Our evaluation can be defined as positive, and can offer suggestions to exploit PG-like objects for learning purposes.

6. CONCLUSION

This paper provides an analysis of PG according to an evaluation framework previously developed in order to identify key factors for language learning – especially neuroscience related – influencing its effect, impact and success. We draw from our previous experiences with LingoBee and other mobile language learning technologies and identify how the challenges that were experienced earlier by our learners may be resolved and how the learning experiences may be improved using AR technology. In this respect, PG and the playful experiences have no doubt provided new energy and stimulations to designers of learning technologies. PG also shows the maturity of AR technology, which will encourage more researchers and developers to work with AR applications.

Regarding the PG learning potential, its structural features make it very suitable to promote situated learning in users. Novelty, intensity and movement are core characteristics of PG and allow for the generation of emotions that can strongly favour the learning process. As already highlighted, PG players reported to have learnt a lot about places and monuments they have never noted before. This kind of learning occurs spontaneously, is totally embedded in the game and, as it is driven by the pleasure of discovery, it is expected to last and form stable knowledge. That corresponds to the ideal form of learning that AR and SL -based apps like PG could effectively promote.

It should be noted that the PG phenomenon is relatively new and therefore lacks detailed analytics and scientific evaluations as a support for learning. Our future work will include analyzing the features in PG in more detail from the perspective of the neuroscience of learning and involving more PG players for an in-depth understanding of their experiences.

In spite of the enormous success of PG during the summer of 2016, there have been reports of players getting bored and expressions of relief from players when they have reached a certain level or caught all the Pokemon (seen the last "Gotcha"). It is ironic that the game manages to engage the players so intensely for a while, yet it has not always managed to sustain that engagement in a lasting way. Perhaps the thrill of going up a level wears off after a while and the end state of the game is a natural end. If PG has had a lasting behaviour change on the players is to be seen. It would be interesting to see if the PG players that had been more active than usual continue their level of activity after completing the game. In language learning, we need learners to acquire good learning habits that last over a long time; i.e. a behaviour and attitude change. So, perhaps the aim and thus the design of the technology may be different for a game or an app to support situated language learning. A last observation can be made about a powerful side effect of PG, strictly related to its situationality. One of the main benefits of situated mobile language learning is the acquisition of colloquial vocabulary and immersion in the culture. Pokemon GO certainly provides an immersive environment for the players where they will at least enhance their vocabulary with "Gotcha"!

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