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Gamifying French Language Learning: a case study examining a quest-based, augmented reality mobile learning-tool

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Abstract

Across the globe, over 3 billion hours a *week* are devoted to gaming, and with the ubiquitous presence of mobile technologies, gaming is now also mobile. A well-developed video game will keep a player enthralled for hours on end. What if educators could engage learners the way video games engage players? In fact, many educators are turning to gamification to do just that. Gamification uses game-based mechanics, and game thinking to engage people, motivate action, and promote learning. The principal goal of this research is to assess the potential of a new mobile learning tool *Explorez*. *Explorez* was created for first-year University French students in order to bridge the gap between gaming and education through quest-based learning and augmented reality. Using GPS, *Explorez* transforms the University of Victoria, B.C. campus into a virtual francophone world, where students interact with characters, items, and media as they improve their French language skills and discover their campus. This paper explores potential benefits and limitations to this prototype learning-tool, via a case study.

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Keywords: Second language acquisition; gamification; augmented reality; mobile games; quest-based learning

1. Introduction

According to statistics, 97% of teenagers play video games; however, the average age of gamers is 35, and 47% of gamers today are women (McGonigal, 2011). Globally, 3 billion hours a *week* are spent gaming (McGonigal, 2011). As the prior statistics attest, well-developed video games entail motivating and engaging elements to keep players enthralled for hours on end (Gee, 2003). How powerful would it be if we could transfer these gaming elements to learning environments? What if educators could engage learners the way video games engage players? Advances in technology offer a plethora of learning tools for instructors, yet for the most part many continue to use pedagogical methods from the industrial age (Robinson, 2006).

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Furthermore, engaging and motivating the digital generation continues to pose difficulties for educators everywhere (Kapp, 2012). This research takes an innovative approach to learning and teaching: gamification. Specifically, this paper explores the potential of gamifying French-language learning by means of quest-based learning and augmented realities. It addresses several benefits and limitations to the language learning-tool *Explorez*, via a case study.

2. Context

Gamification is described as “using game-based mechanics, aesthetics and game thinking to engage people, motivate action, and promote learning” (Kapp, 2012, 10). In a pedagogical context, researchers have analysed gamification as a didactic method, especially regarding the validity of its integration (Natkin, 2009; Sanchez et al, 2011; O’Donovan, 2012). Other studies examine methods to integrate such a system into specific learning contexts (Bustard et al, 2011; Charles et al, 2011; Kumar, 2012; Erenli, 2013). Research is also emerging regarding the impact of gamification in learning contexts. Haskell’s (2013) implementation of quest-based learning and game mechanics at the university level demonstrates encouraging results:

- Game-based feedback tools like experience points, progress bars, badges, and achievements are motivating and meaningful to students.
- Students in a quest-based course received higher grades overall when compared to the equivalent traditional course.
- Over 65% of students remain persistent in quest-based learning, continuing to quest beyond the minimum required to receive an “A” (3).

In regards to education, gamification has seen successful implementation in a range of subject matters, and age groups, from K-12 learners to university level courses (Kapp, 2012). However, studies specifically examining gamification and second language acquisition are not as prevalent. This research aims to partially fill this gap. Gamification is not simply a combination of game elements (such as points, badges and leaderboards), but must also be viewed as an *experience* for the player (Werbach & Hunter, 2012); it is a means to: “re-organize the critical constructs of learning from information and knowledge units that are sequenced for learners in curriculum formats, to *learning as experiences* and apprenticeships. This allows learning to be choreographed and re-sequenced according to the personalized and specific requirements of the learner” (Freitas, & Maharg, 2011, 18).

The concept of employing games in education, and more specifically in second language learning environments, is by no means a new idea. However, given technological advances in recent years, and the ubiquitous presence of mobile technologies, gamifying language learning by means of augmented reality technologies would seem an ideal way to create an immersive environment. When logistics limit instructors from taking students to authentic language environments, augmented reality allows us to virtually bring these environments to the students. This research builds on prior research regarding the educational potential of mobile and augmented reality (AG) technologies (Gagnon, 2010; Holden & Sykes, 2011; Roy & Frandy, 2013; Dunleavy & Dede, 2014). The study adds to the emerging body of knowledge regarding mobile technologies to help produce learning that is “personally customized, socially constructed, and which extends beyond the classroom” (Holden & Sykes, 2011, 4): specifically regarding a second-language (L2) learning context, which is not yet prevalent.

3. Methodology

3.1 Method

This research consists of the development and implementation of a prototype learning-tool, entitled *Explorez*, into a first year University French-language class. *Explorez* bridges the gap between gaming and education through quest-based learning and augmented reality: which allows us to integrate computer generated images and media in physical space. A design-based research, specifically the Analysis-Design-Development-Implementation-Evaluation (ADDIE) model was employed (Strickland, 2006; Colpaert, 2006). As Caws (2013)

states: “ADDIE is an instructional system design (ISD) that is particularly well suited to guide developers in the creation and evaluation of language software or other language-related computer systems” (89). Design-based research is an iterative process, and each stage of the ADDIE model produces output that the researcher employs as input for the next stage (Colpaert, 2006, 115).

The first step of this research required a literary review and a critical analysis of gamification in education, specifically regarding its potential role in second language learning: what resources are currently available; which methods and tools might successfully transfer to language learning; how gamification can be successfully incorporated into L2 learning, and in which learning contexts and what level of learner might benefit from this type pedagogy. Although gamification is an emerging area of study, interest in the pedagogical value has resulted in resources and online tools for instructors that aid in gamifying lessons or entire courses into gamified experiences (Kapp, 2012; Sheldon, 2012; Haskell, 2013). One such resource is the Augmented Reality and Interactive Storytelling platform: ARIS. ARIS is an “open-source platform for creating and playing mobile games, tours and interactive stories. Using GPS or QR Codes, ARIS players experience a hybrid world of virtual interactive characters, items, and media placed in physical space” (ARIS, 2014).

The design phase consisted, in part, of the verification of parallels between the learning objectives of the system, and those of a portion of the curriculum of a first-year University French language course. In addition to classes, students are also required to participate in language workshops, as an additional opportunity to ameliorate oral skills. These sessions often employ a different theme each week (such as food, travel, cinema, etc.), and these themes were used to design specific quests in the gamified tool.

Specifically, this research seeks answers to the following questions: Are the expected outcomes of this gamified system reached? What are the learners’ assessments of the learning tool? What are the participants’ perceptions of their learning experience?

3.2 *The language-learning tool: Explorez*

Critical to the development of the language-learning tool was the open-source platform ARIS, which consists of an authoring tool to create augmented reality games or interactive stories, as well as an application for IOS devices to play the said games/tours. This platform is user-friendly, and requires no programming knowledge on behalf of the developer. However, there is a steep learning curve to mastering the platform, and to learning the intricacies of the system. As Roy & Frandy (2013) attest “[a] challenge is learning the user interface and game logic. While the ARIS game team provides instructional videos and an online manual, runs a list serve for questions and offers regular game jams, many who admire the possibilities of this platform find creating and understanding the logic of requirements for objects in a game scenario challenging” (p. 74). Storyboarding the game or interactive tour before attempting to begin to create it in ARIS is highly recommended. Each action/requirement/quest builds on one of these prior elements, and this is time consuming and meticulous work, in order to make sure the game functions as one intends.

The gamified system *Explorez* is inspired by *Mentira*, a project from the University of New Mexico. The creators of *Mentira* describe it as “the first mobile, place-based, augmented reality game explicitly oriented towards the development of language skills in Spanish” (Holden & Sykes, 2011, 2). *Explorez* is the first such place-based game directed towards the acquisition of French language skills, and the decision to create the gamified learning-tool came about after extensive research seeking a system similar to *Mentira*, but for FL2, which yielded no results.

Using GPS, *Explorez* transforms the University of Victoria, B.C. campus into a virtual francophone world, where students interact with characters, items, and media as they improve their French language skills and discover their campus. *Explorez* is a virtual narrative treasure hunt wherein the player is hired as the personal assistant to a famous French celebrity. This individual could be a politician, musician, actor, or other celebrity based on the personal preference of the player. At each location players interact with virtual characters that direct them or give them quests with clues or options to further the storyline (see Fig. 1). These interactions take place either in the form of written text or audio and video recordings to which the student must respond. This permits students to ameliorate input and output language skills both written and orally. Quests also involve challenges ranging from taking pictures of specified objects, to collecting virtual objects, to exploring locations on the map. The challenges include a variety of options from which groups or individuals can select

their own learning path.

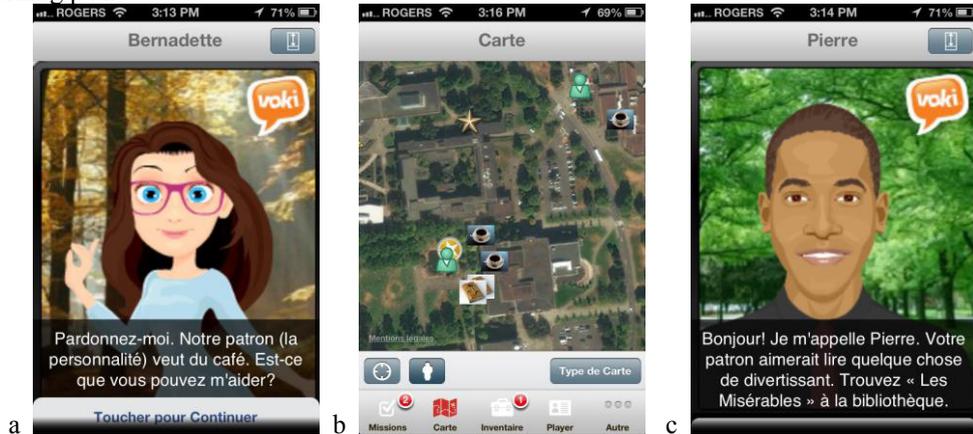


Fig. 1. (a) character in coffee quest; (b) map players see in the coffee and/or book quest (c) character in book quest

Explorez allows learning to take place outside of the classroom, with the goal of providing a contextual and immersive learning experience: one that is meaningful and more relevant for the learner. For example, ordering a coffee in French at the University coffee shop, finding a specific book at the library, discovering other resources, such as the French help center, and then using these real life environments to learn relevant vocabulary. The University of Victoria is not a francophone campus, but *Explorez* creates a virtual francophone environment.

To appeal to the largest demographic possible, *Explorez* includes a diverse range of elements. The extrinsic motivators of points and badges of accomplishment will appeal to certain players, while others will be drawn to intrinsic learning motivators. Research regarding the self-determination theory demonstrates that intrinsically motivating activities must include three elements: competence, autonomy, and relatedness (Kapp, 2012). Competence is the sense of accomplishment and overcoming obstacles: challenges within *Explorez* become more complex and therefore more rewarding once achieved. To experience autonomy, individuals need to feel they are in control, and making meaningful choices. *Explorez* allows learners to decide which quests and challenges to pursue, thereby accommodating a greater spectrum of learners than traditional pedagogical methods. Relatedness is the feeling that the activity is connected to something beyond you: being a team player, or doing activities with friends. These latter two elements are incorporated in *Explorez*; there are group quests as well as individual challenges. Students are also encouraged to share links to the media they record or discover through the game via social media sites.

3.3 Participants

Volunteers were sought from first year University level French-language classes. The researcher gave brief presentations regarding the new language tool and asked students to email if they were interesting in participating in the study. Two classes were visited in this manner, and a total of 11 students volunteered: 4 male students and 7 female students. First year French students at the University of Victoria attend mandatory weekly language workshops in addition to their class time. Volunteering in the present study (play-testing *Explorez*) replaced 3 of 10 mandatory language workshops: interestingly 6 of the 11 volunteers chose to play-test the new tool, and also continue to go to their weekly language workshops. Participants were given the freedom to choose when to participate, and in this manner 4 test groups were created: Group A (2 students; male/male), Group B (2 students female/male) Group C (2 students female/female) Group D (3 students female/female/female).

3.4. Data collected

A mixed method of data collection was employed in order to permit a comprehensive evaluation of the learner experience with the tool, as well as the analysis of the said tool's pedagogical potential (Nunan, 1992).

Both qualitative and quantitative data were gathered by means of questionnaires (pre and post), focus groups and audio recordings of the sessions for future analysis of the students' interactions with the system, as well as each other during play-testing. Data was also collected via the ARIS engine (badges collected, quests completed, voice recordings, photos) and the specific location of each of these actions documented.

3.5 Procedure

Play-testing *Explorez* took place during the winter session of 2014. This included 3 sessions of 50 minutes per week dedicated to participation in the present study. As stated previously, this is the allotted amount of time for language workshops. The week following play-testing completion, students were asked to complete a post-activity questionnaire, and two weeks following the completion of testing, participants were asked to participate in a focus group: 6 of the 11 students chose to do so.

During session 1, students met the researcher in the Digital Second-Language Learning Lab (DL2LLab). The research and tool were explained, consent forms signed, and participants then completed an online pre-questionnaire regarding their demographics and digital knowledge, use and habits. Prior to the mobile portion of the game, the first quest in *Explorez* consists of creating two avatars: one to represent the student, created individually and a second avatar created in collaboration to represent their team's chosen French celebrity. Students used laptops in the DL2LLab, and the Voki (Voki, 2014) platform for these first tasks. Voki is an online education tool that allows users to create talking avatars. Although the interface is in English, these tasks were performed in French: the Voki avatars can speak in multiple languages (when students type a text) or students can also record their own voice.

Session 2 began with students creating their ARIS login on IOS devices (iPhone or iPad), and the international language setting of the iPhone and iPads was changed to French, in order to facilitate learning new vocabulary. The mobile content is entirely in French, and at the beginning of the session the researcher indicated and then demonstrated on the devices, available online tools, such as dictionaries, that the students could employ if they encountered any difficulty with vocabulary. The researcher also briefly demonstrated to the participants how to navigate the game interface. Students then began the mobile portion of *Explorez*, and the researcher accompanied each group in order to monitor their interactions and have the participants involved in a talk-aloud protocol. This means that while students interacted with the system, they commented aloud on their decision-making, or they answered questions posed by the researcher. In addition, during their interactions, the students recorded their accomplishments directly in the app. Session 3 was a continuation of the prior session; the participants logged into *Explorez*, and resumed play-testing the mobile portion of the system.

4. Preliminary findings and discussion

The present analysis provides preliminary findings regarding the playability of *Explorez*, and a brief overview of participants' assessments of the tool and their learning experience.

4.1 Observation of game-play: playability of *Explorez*

Students engaged with the learning-tool and progressed through the system as intended; the students played *Explorez*. Although this may seem an obvious observation, Holden & Sykes (2011) address that the playability aspect of research-design game experiments is seldom included in relevant literature: "[l]earning to design and create better games would seem to be somewhat removed from the agenda of this writing, and so one wonders how educators might begin to improve their skills and reputations" (11). Therefore, the following examination of *Explorez* documents elements of game-play during testing.

Explorez consists of 3 levels with a minimum of two quests per level, and no two groups of students chose the same path through the quests. On average, the groups of 2 or 3 students completed two quests in the allotted 50 minutes. During session 1 and 2, Group B continued to play for an additional 10 and 12 minutes respectively, because they were determined to finish their current quest. The students' efforts and enthusiasm when interacting with the system and each other were encouraging. They made great efforts to speak in French,

as they maneuvered the interface of ARIS, exploring the quest log, their game inventory, and the game map, collaborating to decide their next step in the game. At times this resulted in a sign language form of communication when they lacked a vocabulary word in French. Rarely did the students employ the available online tools to look up vocabulary. What did result however was a sociocultural learning effect; a more advanced student helped the lesser-advanced one navigate the system or quest, and supplied the necessary word or information. This supports prior research in L2 learning that demonstrates when second-language learners interact, they may in fact correct each other's language errors (Chapelle, 2000). However, the researcher accompanying students during play-testing possibly influenced the students language efforts; therefore a limitation in this type of mobile system is that instructors cannot gauge to what extent students employ the target language or in fact revert to their first language.

When creating this type of system for language-learning, instructors/developers must keep in mind to not only provide sufficient language-learning scaffolding, but also include adequate game-play scaffolding. Well-developed video games sufficiently guide new players at the beginning, and then appropriately increase in level of difficulty for more advanced players (Gee, 2003). The participants in the present study with little prior gaming experience found the option of multiple quests to be confusing at times; however those with gaming experience accepted these multiple options, and also maneuvered the gaming interface with greater ease than their counterparts. This type of system can quickly become quite complex, and in order to appeal to a larger demographic of learners this will be addressed in the next iteration of *Explorez*. At a first glance, three levels of 2-4 quests each, does not appear to be a very complex system. However, when each quest includes an element to also later trigger the quest that the learner did not pick as first choice, the options grow exponentially. This highlights the importance of many iterations of play-testing and the effectiveness of the ADDIE model; once the learning-tool is evaluated the data and information is then analyzed, and the researcher returns and applies this knowledge to a prior stage (such as design or development) and the cycle continues.

Sufficient and effective game-based feedback is another important element; whether or not the players have gaming experience. Game-based feedback is instantaneous, and lets the player know whether they are engaging with the system as intended (Gee, 2003). For example, the requirements of each quest in *Explorez* are visible in the quest log; once these are fulfilled the learner is aware that they have successfully completed the task when the system responds "quest complete". In this system, a badge of completion also then rewards the player for quest completion. Sykes et al. (2010) state that "[e]specially relevant to language learning is the task-based approach to quest completion. . . and the importance of failure states to provide meaningful, relevant feedback" (123). There are many types of game-based feedback, and an effective gamified system will incorporate those which best suit the design, as well as motivate their players/learners.

Other challenges encountered during testing were minor technical difficulties. The ARIS platform is under construction, and at times the system freezes and states "cannot connect." Sometimes this issue resolves itself in a minute or two, or a player simply needs to logout of the current game, and then log back in. Despite minor technical difficulties with the ARIS platform, the ARIS team, researchers, and instructors have been successfully creating and playing games for years; those who choose to use ARIS simply need to be aware of the issue. A second challenge was lack of the data feature on some of the devices used in the study. The DL2LLab had access to 2 devices with data, but the remaining iPads did not have this feature. When using iPads with Wi-Fi only, certain quests during testing could not be completed due to inadequate Wi-Fi connection or inadequate GPS signals within buildings. Students overcame this by sharing devices or employing their own iPhone. Therefore, BYOD (bring your own device) or working in teams overcomes this challenge. It is also possible to create ARIS games without specific GPS requirements; this should be a consideration when access to devices providing data is limited.

4.2 The participants' assessments of the tool and their learning experience

In the post-questionnaire and focus group, participants were asked to provide feedback regarding their experience with the tool and assess certain gamified elements. When asked to describe their experience with the gamified-tool *Explorez*, the top descriptors were: "fun", "useful", "motivating" and "relevant". In the survey, 9 out of 11 students (88%) described the experience as "fun," 7 out of 11 students (63.6%) responded "useful", and 6 out of 11 participants (54.5%) described the experience as "motivating." As mentioned previously, in order to appeal to the largest demographic possible, *Explorez* includes a diverse range of game-elements.

The students were asked to rate four such elements as learning motivators in regards to their experience with *Explorez*: creating avatars, completing quests, collecting badges and collaborating with teammates. Students were asked to choose a response on a 5-point Likert scale; 5 indicated the element was “positive-it motivated me in my learning” whereas 1 indicated, “negative-it was de-motivating”. On the 5-point Likert scale the participants mean rating of creating avatars was 3.5, the mean rating of collecting badges was 4.4, completing quests, and collaborating with teammates were both ranked with a mean of 4.5. These results illustrate that on average the test group found the intrinsic learning motivators of quest completion and collaborating with teammates, *Explorez*'s more relevant game mechanics. This correlates with the three elements comprised within the self-determination theory: competence, autonomy, and relatedness. This is of course a small test group and these results do not represent FL2 learners as a whole. However, this does support prior studies, which demonstrate game-based mechanics can be positive motivators for learners.

A potential of augmented realities in L2 is the creation of an immersive environment with the goal of creating a more relevant learning experience. The concept of cognitive apprenticeship suggests learning is naturally tied to authentic activity, context and culture (Brown, Collins & Duguid 1989). However, in the second language classroom, this may be a challenging task for the instructor. Holden & Sykes (2011) attest that “[i]n the foreign language classroom, place is an especially abstract concept where language is often isolated from communities, cultures, and places in which it is spoken” (5). In order to overcome this challenge, Sykes & Holden (2011) incorporated augmented realities into an authentic Hispanic neighborhood for their research, and the students engaged in local authentic contexts. However, the present analysis broached augmented realities as a means to create *virtual* language learning environments and attempt to gauge if learners find this a relevant experience. This study aimed to see if speaking French in real world locations (although only virtually French) could help students to see how they could apply their French or potentially aid in making their learning more meaningful. The following student excerpts support that although virtual, the use of augmented reality did in fact create a learning environment that the participants found to be relevant:

185: Uhm, I liked the book one, having to use vocab in a situation that I haven't necessarily had to use it before. So that was good. And then also, I had more or less forgotten how to find books in the library. It's been about a year since I've had to do that. So that was good because like beyond just French, it was learning other things too. So that was cool.

421: I liked getting out of the classroom; I feel I'm more engaged when I'm actually doing something. Sitting in the classroom, and repeating what we're told to- like vocab-isn't very engaging. You can learn, but it's not the most engaging way to learn. Where with this we were actually going out and doing things. It makes it more exciting to learn.

994: One thing I liked about it was just the...applying the vocab and being able to be out of the classroom, which I really *really* like because it's just so tiring sitting in a class every day. So it was nice to actually get out and apply things in a way that you wouldn't be able to in a classroom.

These focus group excerpts attest that the students engaged in meaningful activities during their interaction with the learning-tool and that through the use of *Explorez* they ascertained real-world applications for their FL2 learning. The analysis of this data as a whole has only begun; however the preliminary findings regarding playability of *Explorez*, participants' assessment of the tool, and certain learning motivators are encouraging and demonstrate the potential of quest-based learning and augmented reality in the gamification of French as a second language.

5. Conclusion

This paper explores the potential of gamifying French-language learning by means of quest-based learning and augmented realities. It addresses several benefits and limitations to the learning tool *Explorez*, via a case study. This research offers theoretical and practical implications, and aims to add to the body of knowledge regarding mobile technologies and the quest to produce learning that is customized, social and takes place outside of the classroom. Analysis of game-play data in correlation with focus group feedback will provide information for improvements; future research involves a new iteration of *Explorez*, as well as implementing the tool in first-year University French courses. As mentioned previously, the analysis of the data as a whole (triangulating the data from the surveys, focus groups, research observation and the ARIS system) has only begun. The further analysis of student interactions and their interactions with the tool will provide a comprehensive analysis of the

learning-tool; this is the next step in this research, to be disseminated as a master's thesis.

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