

Increasing Student Engagement through Gamification

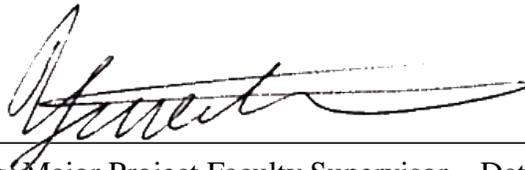
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Abstract

Despite the fact that much literature heralds student engagement as an essential component to improve learning and increase course completion rates, confusion persists on how to accomplish this in an e-learning environment. In recent years, gamification has emerged as a potential strategy to achieve these goals, yet its application in educational contexts, to date, has remained limited. This paper seeks to examine how gamification principles could be incorporated into online contexts to engage learners, build independence and increase student academic success. This was done through the creation of a French gamified learning environment (GLE) at the A1 level as outlined in the Common European Framework Reference. The GLE consisted of a series of learning activities presented as quests woven together by a single narrative and was presented to peer reviewers for feedback. This project was intended as a practical application of educational theory rather than as a formal research project. Peer review feedback was largely positive and supported the notion that this was a successful application of gamification principles and would increase engagement. Gamification should be considered as a serious strategy to increase engagement and student success.

Major Project URL: Engagement by Gamification <http://engagementbygamification.weebly.com/>

Keywords: gamification, engagement, distributed learning, e-learning

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If I have seen further than others, it is by standing upon the shoulders of giants. ~ Sir Isaac Newton

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Chapter 1 – Introduction

Purpose of the Major Project

The overall purpose of this project was to create a gamified French unit that would deeply engage students and could be implemented in an online, blended, or face-to-face environment. My observation had been that engaged students appeared to learn more, perform better, and have higher course completion rates. The question then becomes: What exactly is engagement and how can one best create it in the academic setting? In my search to better understand student engagement and the elements necessary to create a rich learning environment, gamification kept emerging as a potential strategy. It was in this context that I decided to take a closer look at gamification's potential in the classroom through the creation of a French gamified learning environment (GLE) at the A1 level as outlined in the Common European Framework Reference (CEFR). This project was conceived and created in partnership with Corina Summerfelt, a colleague in the Online Learning and Teaching Graduate Diploma (OLTD) program through Vancouver Island University (VIU).

Justification of Project

Researchers and institutions regularly point to engagement as a means to improve student learning and increase course completion and graduation rates. Chen, Gonyea, and Kuh (2008) state that one can positively link engagement to a number of desired outcomes, among them, higher grades, student satisfaction, and perseverance. Korkmaz (2007) further suggests that engagement results in reduced drop-out rates and higher educational attainment. Unfortunately, the research of Willms, Friesen & Milton (2009) theorizes that at present, less than one-half of Canadian students are deeply engaged in their school subjects. It is in this context that many

researchers and educators are looking for effective ways to better engage students. One emerging strategy to address engagement in the area of education is gamification.

In simple terms, “gamification” describes the embedding of game mechanics, aesthetics and thinking within activities to engage people, motivate action, promote learning and solve problems (Kapp 2013). Aspects of gamification have been used extensively and successfully in both military and corporate training. In fact, Donato and Link (2013) suggest that gamification plays an essential and often crucial role in many companies’ business strategies and has proven itself to be a powerful motivational tool in marketing. They even go so far as to suggest that gamification’s success in these areas lies in its ability to engage traditionally hard-to-engage groups. Fitz-Walter (2011) further argues that gamification techniques have proven themselves most productive in circumstances where engagement is perceived to have declined or is in need of improvement, such as educational settings.

Despite gamification’s recognized potential in some fields, its application in educational contexts has, to date, remained limited. Confusion persists among both educators and academics over what exactly constitutes gamification and whether it is a fad or a credible pedagogy. Tulloch (2014) posits that this dichotomy exists because many game-studies academics and game designers have become so entrenched in their debate over what core game mechanics are and whether gamification actually encompasses these core mechanics. As a result, many academics have overlooked the fact that gamification, as a practice, places a strong emphasis on entertainment and that players learn through this entertainment. I would take this argument further and suggest that it is this aspect of entertainment in gamification that helps foster engagement and makes the learner more receptive to interacting with the learning content. Gamification does not presume engagement and interest, but rather aspires to produce it.

Gamified learning environments, however, do more than simply provide entertainment to engage. James Paul Gee, a respected expert on how video games and gamified environments fit within the overall theory of learning and literacy, strongly suggests that they incorporate sound learning principles supported by current research in Cognitive Science (2003). Gee (2009) even goes so far as to suggest that applying these learning principles could deepen engagement and transform learning in schools. It is precisely the goal of deepening my students' engagement by enhancing their learning environment that makes gamification a worthwhile consideration.

Critical Challenge

The purpose of this project was to examine how gamification principles could be used to engage learners, build independence and increase student academic success. This was accomplished through the creation of a French gamified learning environment (GLE) targeted at an A1 level as outlined in the Common European Framework of Reference (CEFR).

Brief Overview of Project

Our project build was a gamified learning environment (GLE) designed as a series of French units correlated to the 2011 British Columbia draft curriculum at the A1 level. Our hope was that the GLE would deeply engage students and could be used in a blended or online environment. The learning activities within our GLE are presented as quests, which when completed translate into experience points (XP) for the student. The accumulation of XP and completion of quests signify mastery of specific learning outcomes and unlocks new quests following Gee's (2013) gaming principle of releasing information "just in time." Not overwhelming the student with too much information at once serves two purposes: it allows the student to focus on a specific skill and better integrate it into his/her learning before moving on, and it helps keep the student in what Csikszentmihalyi (1990) defines as "a state of flow" or

what Gee (2013) describes as the “pleasantly frustrating” principle. This state exists when a task is neither too easy nor too difficult. These conditions are thought to help manifest deep learning.

A notable aspect of our GLE is our choice to embed all of our quests into a single narrative. We felt the inclusion of narrative was important to provide relevance and meaning to the students’ experience as well as create a purpose for completing the quests. We chose a mystery plot for our theme hoping to build suspense, increase engagement and motivate students to complete quests in anticipation of the storyline being further revealed.

In both the planning and building of our project, we used a variety of Web 2.0 tools. Web 2.0 refers to certain Internet and World Wide Web applications, including wikis, blogs, video sharing services, social media websites, etc. which center around interactive sharing and collaboration rather than simple content delivery. What follows is a list of some of the web 2.0 tools that we use and how they contributed to our build:

3D GameLab. 3D GameLab is a content creation and student tracking platform, or what is sometimes known as a learning management system (LMS). Although we considered other platforms, we chose 3D GameLab because it is designed with gamification principles in mind. For example, it allows the designer to control when quests are released, automatically assigns XP and other rewards when certain criteria are met, and has the overall feel of a game as students “level up” while mastering learning outcomes. Students also have some choice of which quests they will complete and when. The built in game mechanics in 3D GameLab help to encourage increased engagement.

Voki. Voki is an educational tool that allows users to create personalized talking avatars using text to voice technology. Each Voki was saved as a video which we were then able to embed in our content pages in 3D GameLab. Rather than simply delivering content and

explanations in text form, we wanted to appeal to various learning styles. Voki allowed us to offer a visual and auditory experience for our students. We also took advantage of the opportunity Voki afforded by creating reoccurring characters with developed personalities. These characters furthered our goal of building an engaging narrative.

OneNote. OneNote is a digital note taking and information management application available both on and off-line that allows for both synchronous and asynchronous collaboration. OneNote allowed Summerfelt and me to collaborate, plan, and keep all our notes in a central location despite working at a distance from each other. A secondary purpose for using this application was to document our planning and share the link with other educators interested in pursuing similar projects.

Google Sheets. Google Sheets is a Web-based application that allows users to create, update and modify spreadsheets and share the data live online. Before embarking on our build, we mapped out our quests using a google spreadsheet. This helped us keep track of quest names, type of quest, details, quest prerequisites, XP, etc. for each quest. We used our Google Sheet as a dynamic working document. As our build is quite elaborate and there are many components to each quest, the spreadsheet allowed us to keep track of what components had been completed and what still needed to be done. We made our Google Sheet public to allow other educators the opportunity to see how they might approach a similar project.

Weebly. Weebly is a web-hosting service featuring a drag-and-drop website builder often used for blogging. To make our project more relevant to other educators, we documented our progress and learning using Weebly.

Conclusion

The overall goal of the project was to create a learning environment that would enhance student engagement and lead to increased student success in learning. We had decided to create a French gamified learning environment (GLE) at the A1 level. During our research and planning stages, we paid careful attention to the research of experts in this field, most notably James Paul Gee and his 36 principles of learning. Before embarking on our build, my colleague and I collaborated using Web 2.0 tools such as OneNote and Google Sheets. We also documented our progress and experiences on our respective Weebly blogs. These tools served not only as a learning artifact of our journey, but were shared out to other educators so that they might learn from our experiences. We completed our project build in 3D GameLab. Because of the comprehensiveness of our project and the time it took to create, we understood that the creation of a full GLE may not be feasible for all educators, we, therefore, licensed our project under a share-alike Creative Commons license allowing other to benefit and build upon our work.

Definition of Terms

The definitions in this paper were created collaboratively from a working list of terms that were identified by the needs of the project. They will assist the reader in understanding its scope and sequence. While some of the terms were unique to our particular critical questions, Summerfelt and I found that working from an agreed upon list of definitions helped to remove ambiguity and confusion. As gamification is still a relatively new concept for most educators, the list of terms was substantial. It was therefore decided that it should be included as an Appendix item at the end of this paper. The terms are divided into three categories: Games, Online Learning, and Web Tools. This division was seen as an important distinction between the different elements necessary for implementing a GLE in an online environment:

See Appendix A for the list of the definitions of terms.

Chapter 2 – Literature Review

Setting the Scene

Online teaching and learning is a relatively new and quickly evolving form of education. One challenge with teaching in the online environment is low completion rates. A British Columbia Ministry of Education Quality Review Report for North Island Distance Education School in 2013 indicates that course completion rates for British Columbia distributed learning (DL) schools at the secondary level are between 30-50%. Thielmann (2013) estimates the completion rates for the Central Interior Distance Education School, where he works, to hover around 20%. According to a provincial government news release in December of 2014, the overall graduation rates in British Columbia are at 84.2%. Although this does not inform us of overall course completion rates, it does speak to a higher level of success overall. Looking outside the British Columbia K-12 environment, there is direct evidence that students are less likely to complete an online course than a face-to-face course. A five-year study of 51,000 community college students in Washington State found that 8% fewer students in online classes completed compared to those who enrolled in traditional face-to-face courses (Xu & Smith Jagers, 2011).

Although there are many factors that may affect completion rates, researchers and institutions regularly point to engagement as a means to address this issue as well as improve student learning. Engagement is also often used as a benchmark to indicate the quality of education and to guide practice and policy. In fact, Orosco (2014) suggests that lack of engagement resulting from the more impersonal online format is precisely the issue in the e-learning environment. Chen, Gonyea, and Kuh (2008) state that one can positively link engagement to a number of desired outcomes, among them, grades, student satisfaction, and perseverance. When students are engaged in their online learning, they are more likely to achieve

success and satisfaction in courses and, therefore, persist in online courses (Kuh 2001). This belief is not limited to academic circles. In the Surrey Connect Secondary 2013-2014 learning plan, they state their belief that strategies designed to increase student engagement will result in increased success rates. Even the Ministry standards for K-12 distributed learning in British Columbia make frequent reference to the importance of fostering student engagement (Ministry of Education, 2010).

The DL experience clearly demonstrates the power of engagement in student success in the online environment. The face-to-face classroom, however, is not exempt from the need for engagement. The research of Willms, Friesen & Milton (2009) theorizes that, at present, fewer than one-half of Canadian students are deeply engaged in their school subjects. Fredricks, Blumenfeld, and Paris (2004) describe engagement as an appealing mechanism to address declining academic motivation and achievement across grade levels. Korkmaz (2007), while discussing factors that contribute to student success, cites various research that links student engagement to positive outcomes in schools, including reduced drop-out rates, higher grades, and higher educational attainment. Disengagement in high school, on the other hand, creates inequity, not only because disengaged students have difficulty transitioning into adult roles, but because the majority of disengaged students are living in poverty, have disabilities, are from visible minorities or aboriginal communities (Dunleavy & Milton, 2009). The question then becomes: What exactly is engagement and how can one best create it in the academic setting?

What Constitutes Engagement?

One finds various definitions of engagement within research. Krause and Coates (2008) view engagement in terms of the quality of effort students devote to educationally purposeful activities that contribute directly to desired outcomes (p.493). The U.S. National Survey of

Student Engagement (2014) adds “amount of time” to the above definition. Other studies explain engagement in terms of time-on-task, motivation, interest, and effort, suggesting a causal link between engaged time and academic achievement (Bulger et al., 2008). Whitton & Moseley (2014), however, argue that the term “engagement” has been overused as a concept to the point of becoming meaningless without deconstructing the term further. They synthesize the literature on engagement with learning, and engagement with games. They propose a six-tiered model which breaks engagement first into superficial and deep engagement; with superficial engagement being associated with behavior and extrinsic motivation, and deep engagement representing more profound psychological interaction with an experience. These categories are then further broken down. Superficial engagement divides into two subcategories: participation (engagement as doing); and attention (engagement as commitment). Deep engagement divides into four subcategories: captivation (engagement as enthrallment); passion (engagement as feeling); affiliation (engagement as belonging); and incorporation (engagement as being). Their model allows both educators and researchers to identify what sort of engagement they are considering and to look more closely for any relationship between that particular aspect of engagement and learning. It also recognizes the difficulty in measuring some aspects of engagement due to it being an internal experience, accessible only to the person who is experiencing it. This explains why much research does not provide hard evidence on engagement, but rather relies on anecdotal evidence collected from student surveys and teacher observations.

Table 1. Types of Engagement, borrowed from Deconstructing Engagement: Rethinking Involvement in Learning

Superficial engagement	Participation Attention	Engagement as doing Engagement as commitment
Deep engagement	Captivation Passion Affiliation Incorporation	Engagement as enthrallment Engagement as feeling Engagement as belonging Engagement as being

Gamification as a Potential Tool to Increase Student Engagement

The natural question that follows is: How can educators elicit engagement? One emerging strategy to address engagement in the area of education is gamification. Gamification describes framing an activity as a game to make it more motivating (Fitz-Walter, 2013) or using game elements and dynamics to engage and motivate people. Kapp (2012 p.10) further refines the definition by suggesting it is “using game-based mechanics, aesthetics and game thinking to engage people, motivate action, promote learning, and solve problems.” One accomplishes gamification through the use of structures and designs, integrating game-based practices which include game-elements and embedding some characteristics of games within non-game contexts (Deterding et al. 2011). Most researchers agree that rather than being a game for learning purposes, gamification utilizes “the motivational properties of games and layers them on top of other learning activities, integrating the human desire to communicate and share accomplishment with goal-setting to direct the attention of learners and motivate them to action” (Landers & Callan, 2011 p. 421).

History of Gamification

It is difficult to pinpoint the first manifestation of gamification. Bell (2014) talks about war games played as far back as the 7th century as a means to educate and train personnel without the loss of life. Weir (2011) in his “History of Gamification” module, talks about Cracker Jack putting a toy surprise in every box one hundred plus years ago as a way to sell product, an idea

that was quickly adopted by numerous other corporations with the idea manifesting itself in strategies such as green stamps, frequent flyer points, etc. Gamification in this context, however, is a shadow of what we understand it to mean today.

From the 1980's onward, we start to see scholars seriously examine video games and their potential use in learning. Some of the most significant work is that of James Paul Gee, who has written a number of books about how video games encode powerful knowledge creation and learning mechanisms that relate to all of the deep research that we have on how people learn. Of particular interest are his thirty-six learning principles from "What Video Games Have to Teach Us about Learning and Literacy."

Another stream of work that has contributed to the development of gamification is the serious games movement. Serious games are games that are used for training, simulation or other non-game purposes. They have traditionally been used by the military, corporations and sometimes educational institutions. Although some researchers are adamant that serious games are not the same as gamification, Kapp (2013) maintains that serious games are indeed a branch of gamification as they are built around content that needs to be learned. In building a game around learning content, one must add game elements, game thinking, and game mechanics. Werbach (2013) adds that the work on serious games informs much of what we are doing in gamification.

More recently, a number of companies have launched gamification platforms that incorporate game mechanics like points, leader boards, badges, multiple strands, etc. which aim to help educators gamify their courses. Some such platforms are 3D Gamelab and GradeCraft.

In terms of learning theories, gamification incorporates the best elements from a variety of them, yet it has developed to a point that it can stand on its own and is unique enough that

some researchers view it as a learning theory in and of itself (Biro 2013). It draws and benefits from a wide variety of sources: the work of cognitive scientists; technological advances such as adaptive learning and learning analytics; flow; and other learning theories. Gamification has the potential to improve engagement and the student learning experience significantly.

Sources, Science, and Principles of Gamification

Cognitive Science

One facet of cognitive science looks at how information is represented, processed and transformed to determine how students can assimilate and retain material most efficiently and effectively. Sweller's (1998) work on cognitive load theory underlines working memory constraints as determining the effectiveness of instructional design. Including all the information necessary to understand a new concept up front may overwhelm a learner's limited working memory and hinder learning. Gee (2012) illustrates this beautifully in a talk he gives when he describes his initial experience playing video games. He started out reading the manual and was overwhelmed by all the cross-references and technical definitions. He had reached his cognitive load. Yet after playing the game for hours, he found he had no difficulty understanding the manual. This example also demonstrates how cognitive load benefits from situated cognition, or how hands-on experience and, in particular, gaming experience can prepare a student for theoretical discussions rather than the more traditional abstraction first, application second approach.

Instructional designers may use a number of strategies, including chunking size, the amount of content incorporated into one part, as a way to help learners manage their cognitive load and make learning more effective and engaging. Moreno (2007), demonstrates the effectiveness of chunking through an experiment where one group of participants was given a carefully segmented version of a classroom video to watch, and another group a non-segmented

version of the same video. Those who watched the segmented version regarded the learning material as less difficult and were able to retain more than those who watched a non-segmented version.

Educators need to look not just at chunking content, but how to effectively frame their goals and learning objectives. Franciosi (2011) compares goals in computer games to those of task-based language teaching. He finds computer designers generally more adept at creating concrete, explicit and often intuitive goals for their target audience. The goals in computer games generally require little or no additional knowledge to understand. Players easily understand the goal and its importance because it expresses outcomes which are explicit and objective. In comparison, although academic goals are often clear, they are rarely concrete or objective, but rather abstract with a pedagogical orientation and tasks that often have subjective outcomes. For some students, goals and tasks framed in this manner may cause cognitive overload before the student even embarks on the task. Gamification of courses may help lower cognitive load as it is oriented towards clear goals and chunking content by slowly revealing features, skills, and techniques to the user as he/she practices and assimilates them. Despite the tasks getting progressively more difficult, this set up makes content manageable, allowing the player to stay engaged over an extended period.

Gee (2005) believes that the theory of learning in good video games is close to the best theories of learning in cognitive science. It is then no surprise that some of his 36 principles of learning, align closely to these theories, including cognitive load. One such principle is the information on-demand and just-in-time principle. According to this principle, the learner is given explicit information both on demand and just in time, when the learner needs it or just at the point where the information can be best understood and used in practice. This ties in with

neuroscience, which tells us that the brain remembers information more readily when it is meaningful and can be linked to an experience. (Gee 2007)

Adaptive Learning

Incorporating adaptive learning technologies into gamified courses also has enormous potential to increase student engagement. Adaptive learning is an umbrella term whereby technology can be used to adjust the type or level of instruction or provide multiple paths through materials based on the student's abilities and or preferences with the goal of personalizing instruction to improve or accelerate a student's performance (Oxman & Wong 2014). We see adaptive technology in a variety of places in the corporate world: for example, sponsored ads on the Facebook sidebar tailored to previously indicated interests, or Amazon's "frequently bought together," or "customers who bought this item also bought."

Within education, adaptive learning technologies may provide supplemental practice or review to a student not performing strongly, or streamline a strong student allowing him/her to progress more quickly. In other words, keep the student in the "flow" to maximize engagement. Oxman and Wong (2014) explain two types of models for adaptive learning systems: rule-based or algorithm-based. Rule-based systems are built with an if-then function. Moodle, a free, popular learning management system, has an if-then function in its lesson blocks. These lesson blocks offer the opportunity for educators to sandwich quizzes and other activities between content to check understanding. If a student gets a question right, they will move onto the next section of content or selected activity. If he gets a question wrong, depending on how the lesson has been built, the student may be offered an explanation and then taken to a different page (or path) where the he will have further opportunity to review content and practice before being allowed to move ahead. Some adaptive learning technologies have even greater capabilities, such

as being able to remember questions or content where students had difficulty, and then cycle that content back at given intervals, thus assisting students in filling in identified knowledge gaps. SuccessMaker, an educational software that differentiates and personalizes reading and math instruction is one such example. This sort of technology assists students in keeping in a state of flow where the content is neither too difficult to be discouraging nor too easy to result in boredom and disengagement.

Algorithm-based software uses mathematical functions to analyse student performance or content performance (Oxman and Wong, 2014). Technology that uses an algorithm function can offer a more in-depth analysis of the student's strengths and weaknesses based on how the student performs not just on one question but a series of questions. If the technology is truly adaptive, it would then be able to offer content based specifically on how the student performed previously. The idea is that sequencing can be changed depending on previous performance. It also can offer up multiple ways of presenting content: video, audio or print, etc., allowing the student choice depending on how he/she learns best. Adaptive learning technology has the potential to make coursework more appealing for the learner, hopefully increasing student independence and resulting in increased engagement, time on task, and learning outcomes.

Teachers often teach to their own learning style (Stewart, Jones, & Pope 1999). It is, of course, natural to teach in the manner that one feels most comfortable learning, however, it has the potential to inhibit student progress, and when transferred to web-based instruction may offer a less than dynamic course environment. Adaptive learning technologies can help compensate for this tendency and offer a more enriched learning experience. Adaptive learning technology also dovetails nicely with another two of Gee's learning principles: the multiple-routes principle and the multimodal principle. The multiple-routes principle asserts that there are multiple ways

to make progress or move ahead. Learners should have choice, being able to rely on their own strengths and learning styles when solving problems, but also have the opportunity to explore alternative styles (Gee, 2005). The multimodal principle allows for meaning and knowledge to be built up through various modalities (images, texts, symbols, interactions, abstract design, sound, etc.) not just words (Gee, 2005). Adaptive learning technologies can make it easier to incorporate these two principles.

Learning Analytics

Many strong teachers try to adapt to their students' learning needs. However, challenges within the education system sometimes make this more difficult. Face-to-face environments struggle with increasing class sizes, which decrease the amount of individual attention each student gets. The prevalent asynchronous DL model in British Columbia means that students mostly work independently through content before submitting their assignments. As a result, teachers may not be aware a student is struggling until an assignment is submitted. However, as learning management systems improve, so does their ability to collect, measure, and report data about learners and in particular, with regards to certain learning activities. Rosetta Stone Advantage is a language learning software that incorporates this kind of technology. By analysing the computer generated student reports, the teacher can see if a student is having difficulty in a specific communication skill or linguistic skill and then assign content accordingly. Having access to this data can help teachers understand and optimize learning and the environments in which it occurs (Bell 2014).

Flow Theory

Flow theory is a useful construct for educators working towards increasing student engagement and achievement. Flow theory is a term coined by Mihaly Csikszentmihalyi (1975). It describes an optimal psychological state that people experience when fully focused and

engaged in an activity that is appropriately challenging to one's skill level. Csikszentmihalyi, in an interview conducted by Beard (2014), describes flow as perhaps the best manifestation of engagement. It can result in deep learning and high levels of satisfaction.

Hamari & Koivisto (2014) outline nine dimensions of flow Csikszentmihalyi lists as common to the experience: 1. balance between the challenge of the task and the skills of the individual; 2. a merging of action and awareness; 3. clear perceived goals, 4. unambiguous feedback; 5. focusing on the task at hand; 6. a sense of control of the activity; 7. a loss of self-consciousness or a reduced awareness of self; 8. time transformation; 9. and an autotelic, intrinsically rewarding experience. Many of these elements are inherent aspects of video games and regularly incorporated into gamified activities. Franciosi (2011) defines goals, skill/difficulty balance, and continual and ongoing feedback as the three most important of these nine elements. The importance of clearly defined goals was touched upon in the section on cognitive science. Providing activities appropriate to one's skill level is a delicate balance between "anxiety" and "boredom" (Franciosi 2011). Anxiety happens when the perceived challenge is greater than one's perceived skill and boredom happens when the perceived skills are greater than the challenge faced (Liao, 2006). The important thing is that the task not be too difficult as to provoke frustration, nor so easy as to cause disengagement. One might consider Gee's (2007) "Regime of Competence" principle, which states that the learner gets ample opportunity to operate within, but at the outer edge of, his or her resources, as a fitting description of the skill/level balance that facilitates flow.

Computer games usually provide continual feedback to the player about his progress/performance, or as Gee (2002) would describe it, "just enough" and "just in time." This immediate feedback keeps the player on his toes, to force him to adjust his strategies, learn, and

overcome obstacles. This feedback also facilitates Gee's (2002) "committed learning" principle in which learners participate in extended engagement through a lot of effort and practice and focusing on the task at hand. Because the player does not need to wait for feedback, he can continue to play and improve without losing momentum. When feedback is not immediate, it interrupts the state of flow. As previously mentioned, technology, and in particular adaptive learning technology used in education, also has the capacity to provide real-time feedback, facilitating flow and independent learning. Teachers can and should use this technology to try to create optimal conditions for flow to occur.

When analysing conditions that facilitate flow, it is worth noting how games handle failure in contrast to traditional educational institutions. Gee's "psychosocial moratorium" principle, universal to all games, states learners can take risks in a space where real-world consequences are lowered. Games are all about failing, taking what we have learned, and trying again. When we fail, we can have another turn, another life, or we simply play the game again with a slightly different strategy. Low risk lowers anxiety, helping to keep students in that important skill/difficulty balance. Further, it encourages them to persevere when they fail, thus providing a fertile environment for learning. Compare this to most educational environments where the risk of failure has high consequences. Even low risk activities such as worksheets that teachers do often provide are not "no risk" activities. Bodas (2003) sites several studies that document the debilitating effects of high anxiety on performance in academic settings. Although some anxiety may be beneficial, when it increases too much it can have significant negative effects on a student's ability to perform at an optimal level.

If flow is so important and it requires low-risk, high-feedback activities with clear goals, why are we not creating these kinds of activities for our students? Fundamentally, this kind of

activity is difficult to plan for and orchestrate, and most teachers can only manage to create a small number of activities which engender this kind of flow. This is where incorporating technology and gamification can help.

Conclusion

In conclusion, looking for ways to better engage students as a means to increasing student achievement preoccupies many educators' minds. The concept of engagement is complex, but can be broken down into various sub-categories, allowing one to evaluate different levels of engagement. One emerging strategy to not just engage students, but to provide fertile ground for deep learning to occur, is gamification. Gamification incorporates the best elements of cognitive science and flow theory. In short, its best principles address the conditions in which learning best occurs. Combining gamification with the use of technology and, in particular, adaptive learning technology and learning analytics, teachers can better engage students and develop independent learners.

Chapter 3 – Procedures and Methods

Major Project Design

The purpose of my major project was to examine how gamification principles could be used to engage learners, build independence and increase student academic success. This was done through the creation of a French gamified learning environment (GLE) which aligned with the BC Provincial Learning Outcomes (PLOs) and was targeted at an A1 level as outlined in the Common European Framework of Reference (CEFR). The project was created as a stand-alone offering that could function as an adjunct to an online or distributed learning (DL) course or be used in a blended learning environment.

For this project, we chose to use 3D GameLab as our learning management system (LMS). Although we considered other LMS's, we settled on 3D GameLab for a number of reasons. First, its features allow for easy gamified content creation. Next, 3D GameLab is designed so that quests are hidden until certain prerequisites are met, such as the completion of certain quests or the accumulation of a specified number of experience points (XP). Finally, 3D GameLab allows the designer to build in choice of activities and quests, allowing teachers the ability to support struggling learners and challenge stronger learners. This also can be used to give students some choice over their quest stream, which allows them more control of their learning in order to increase engagement.

The holding-back of quests until specific prerequisites are met, was of particular importance to me in the distributed learning (DL) setting. Students taking online courses often exhibit higher levels of anxiety or become easily overwhelmed. Hara (2000) discusses the pervasiveness of frustration, anxiety, and confusion among DL students, citing research that strongly suggests that these emotional states may impede learning. My personal observations as a DL teacher have led me to believe that the following factors, either in combination or alone, may

contribute to the above mentioned states: weak organizational skills, not following the sequence of lessons or assignments, difficulty tracking what has been completed, or seeing too much content (having access to the whole course) at once. The aspects of 3D GameLab which give the instructor control over student access to content, allow the course to be designed in a way that avoids these problems. This aspect of the design especially helps support novice or younger DL students.

Major Project Development

Although Summerfelt and I did not formalize our collaborative partnership until the spring of 2015, we had worked together on a number of projects throughout the OLTD program. We discovered that we both taught French as a Second Language and had similar philosophies of learning. When we developed our critical questions in the spring of 2015, although they were different, we realized that the results we wanted to achieve: student engagement, increased independence, and overall academic success, were the same. As we had both planned to explore gamification as a possible strategy to achieve these goals, we felt collaboration would be of mutual benefit to both our students and us.

One of the first things Summerfelt and I did when we started developing our major project, was to put together a timeline to help keep us on track. We wanted the implementation of our project to coincide with the start-up of the school year in September. This simplified our implementation while providing us with enough time to develop and complete our build. It also left enough time on the back end to evaluate our experience, collect feedback from our peers and draw conclusions. The outline of our timeline looked as follows:

July:

- Research, story development and curriculum alignment.

- Creation of Weebly blogs to document our learning and progress
- Weekly collaborative meetings

August

- Blog updates on process
- Transfer of quests into Google Sheets document
- Create Quests for episodes 1 and 2 in 3D GameLab
- Simultaneously run a test student through the courses to check for bugs

September – December

- Implement the course in classes - Target group -Language Level A1 (CEFR)

September/October

- Blog updates on implementation/feedback
- Implementation of Episodes 1 and 2; beta testing-adaptations made as necessary
- Obtain feedback from peer groups

November/December

- Blog updates on implementation/feedback of Episodes 1 and 2
- Continue to adapt and make changes to quests as necessary

As soon as Summerfelt and I agreed to work together, we started brainstorming our ideas. At the forefront, was the idea of interweaving narrative throughout our project to make it more interesting and engaging for our students. We hoped that embedding a storyline into our project with reoccurring characters, plot twists and surprises would engage students to the extent that they would want to complete the quests in order to move the story forward to find out what happened next. We had also hoped that providing a context for the application of tasks would

lend relevance and meaning to the experience. We settled on a mystery/spy theme as this genre naturally lends itself to the slow release of clues, and has frequent plot twists and the buildup of suspense.

Because of the scope and complexity of our project, to keep ourselves organized and the project manageable, we completed it in stages. The first stage was the planning and organization of the project. As Summerfelt and I were working at a distance from each other, we wanted a Web 2.0 tool that allowed us to collaborate and share both synchronously and asynchronously. We also needed a robust organizational tool and wanted something that would allow us to work both online and off-line. After considering numerous tools, we settled on Microsoft OneNote. OneNote essentially acts as a digital filing cabinet. Its ability to house multiple tabs and pages allowed us to keep organized. It was within the confines of this tool that we did all our major planning. We created a rough outline of our story; filled in our plot sequence; overlaid it with learning outcomes, activities, and learning strategies, etc.; created character sketches; wrote and kept track of character dialogues; housed ideas, web links and much more. The top tabs in OneNote ensured that we could adequately label our general areas of work, and then the side-bar within the individual tabs allowed us to easily find the various pages/areas on which we were working. The fact that all our work was within one application allowed us to easily toggle back and forth between pages and prevented us from losing time searching for documents.

The next two steps of our project involved preparing our quests for creation and the actual build itself. First, we moved our quests to a Google Sheets document. This document had three pages. The first page contained all the information needed to efficiently build the quest: quest name, quest details, prerequisites for the quest to open, experience points and/or awards given for completion of the quest, and whether the quest was manually or automatically

approved. This page also had an area to keep track of whether the quest shell had been created in 3D GameLab, and whether Voki's had been created for the quests that needed them. Once the quest itself was built, Summerfelt and I both had to look the quest over and approve it. We created an easily accessible column where we could quickly see which quests had been completed and whether we had approved them. The next page of our Google Sheets document listed the awards, badges and achievements and the conditions the student had to meet to earn them. The final page in this document listed the various ranks within our GLE and the number of XP needed to unlock each rank.

The transfer of information to our GoogleSheets document went by much more quickly as we had spent so much time in our initial planning process. Nevertheless, this document was crucial to our project build as it allowed us to easily manage a large amount of information and multiple tasks without becoming overwhelmed or omitting important details.

Summerfelt and I had planned to share not just our final project, but our planning documents as well. We felt that these additional artifacts might be of use to someone hoping to build on our work or embark on a similar project. Both Microsoft OneNote and Google Sheets provide permissions which allow its users to share their documents publically. This feature made them ideal for this purpose. In addition to our planning documents, we also each kept a blog on Weebly site. This blog publically shared our progress and learning throughout the process.

Major Project Delivery / Implementation

At the end of August 2015, our project build was mostly complete. At this point, Summerfelt and I each set up a student demo account to run through the quest chain. We discussed any difficulties we encountered and adjusted any identified quests accordingly. This helped ensure our project launch would run smoothly.

Our project, Operation FranGLÉ, was implemented in September of 2015. Summerfelt introduced the project to her face-to-face grade 8 class as a blended learning approach. Her group worked on computers within the school environment two times per week. At the same time, I introduced the project to my DL introductory French 10 students (a Board/Authority Authorized course equivalent to French 9). It is important to note that my DL school operates in a continuous entry, asynchronous environment. As a result, not all my students started on the launch date, and even those who did were free to work at their own pace.

While the context of learning was quite different in these two implementations, and the distance context provided some extra challenges, we determined that the extra experience that my students would likely have would allow them to better manage the course content without the weekly face-to-face support that a blended approach afforded. To further support the DL students and encourage more independent learning in both groups, Summerfelt and I had created a series of detailed “how to” videos to help facilitate students’ use of new technology and Web 2.0 tools. These videos were embedded within the quest for which these new skills were needed, following Gee’s (2003) principal of providing information on-demand and just-in-time. Another consideration was that, even within grade levels, our students come to us with different levels of French language exposure and abilities. To account for these differences, we had built a certain level of choice within the activities which allowed students comfortable with the content to fast track their learning and those who wanted more support could access additional explanation and language training. Finally, the content within each quest was chunked into manageable bits so as not to overwhelm the learner. Although we wanted the learner to operate within the outer limits of his or her ability, we did not want the experience to be so overwhelming as to become frustrating to the point that the student doubted his or her ability to accomplish the task.

At the same time we started piloting our project with our students, we invited select colleagues to review a demo version of the project and provide anonymous feedback. Both the feedback from our peers as well as our observations of our students led to some minor revisions at the time and later formed the basis of our conclusions and further recommendations.

Chapter 4 – Field/Beta Testing and Findings

Field and Beta Testing Methods and Processes

Once our major project was complete, Summerfelt and I sent out an invitation to colleagues to review Operation FranGLÉ and provide anonymous feedback. We deliberately tried to enlist professionals from various backgrounds to provide balance and reflect the diversity we might see in the classroom. As such, we chose people who had various levels of technological experience, French competency, knowledge about educational games and more specifically the concept of gamification.

The goal of the major project was to create a gamified learning environment to examine how gamification principles could be used to engage learners, build independence and increase student academic success. Much of the research I cited in chapter two points to gamification as an emerging strategy to increase engagement. Many researchers further suggest a correlation between engagement in academic settings and a number of desired outcomes, among them, improved grades, student satisfaction, course completion and overall academic success.

One of the difficulties in measuring the success of this project is that it is not clear how one can measure engagement. Whitton & Moseley (2014) deconstruct the term engagement into sub-categories of superficial and deep engagement. They observe that at the most superficial end of the spectrum, engagement may be visible as participation or interaction, but at a deeper level, engagement is an internal experience, often perceptible only to the person who is experiencing it. Because of this, any measure of engagement should include self-assessment for internal manifestations such as enthrallment or a passion for the activity. As a result, we relied on our peer review team to tell us how they felt about the project and, given their subjective experience, whether they thought it would be an effective learning strategy.

To facilitate the review process, we provided our peer review team with a join code and a link to a page on our project website which provided visual instructions on how to join Operation FranGLÉ. The two other items we provided on this page were an instructional video explaining how to get started using 3D GameLab, and a feedback form with a few guiding questions for them to complete once they had finished looking at our project.

Our reviewers were free to view as little or as much of our course as they wanted, but it was explained that a deeper exploration would give them a more complete picture of the course as a whole and its effectiveness as a tool for engagement. We also explained that the student version of our project encompassed some quests that needed instructor verification or approval before allowing the student to proceed to the next quests. We had removed this requirement from our demo version to facilitate ease of use. Once our review team had finished looking at Operation FranGLÉ, they were asked to return to the feedback form and comment anonymously on the following: their experience with the technology, how easy they found it to navigate within 3D GameLab and use the other Web 2.0 tools embedded within; quest attractiveness, in particular, if there was enough visual appeal to increase their interest level in the quests; how effective they felt the quest experience was as a learning strategy and tool to increase engagement; and finally their experience with the content, in particular, if they felt that the amount of information in the quests was well chunked so as not to be either overwhelming or inadequate.

While our peers reviewed Operation FranGLÉ, Summerfelt and I simultaneously implemented it with a select group of students. Students, however, were not asked to provide formal feedback in any capacity to inform this paper. Rather, Summerfelt and I used our general

observations of tendencies within our student groups as well as the feedback from our peers in order to make ongoing adjustments and improvements to our project.

Findings of Beta Testing

In our evaluation of our major project, we had two chief sources of information: one was from colleagues who successfully filled out our online review form; the other was informal feedback from colleagues who for one reason or another did not fill out the form. Summerfelt and I had a total of ten colleagues who formally responded on our major project review form. When I reviewed the responses to our major project, I did so through the lens of my critical question, which was to examine how gamification principles could be used to engage learners, build independence and increase student academic success.

We first asked reviewers to consider their experience with the 3D GameLab platform and other Web 2.0 tools embedded within our major project and to rate their ease of use on a four-point scale from easy to difficult. Determining the facility with which users could navigate the platform and Web tools we chose was important to me, as excessively cumbersome technology may interfere with engagement. My experience has been that students easily become overwhelmed and disengaged regardless of their ability to cope with the course content when technology does not operate as anticipated or is too challenging to figure out.

Eight of our ten peer reviewers rated the technology in our major project as easy to use, and no one rated it as either challenging or difficult, this despite the fact that both Summerfelt and I witnessed some initial confusion from some of our peer reviewers as they were getting started with 3D GameLab. After careful consideration, we determined that those who had some start-up difficulties had probably not read through our initial directives thoroughly. In most areas of our project, we included video as well as written instructions. However, our sign-in procedure

directives only had written instructions with photos. I suspect that including a video would have adequately addressed this initial challenge. In fact, one reviewer did state that she would have been more comfortable with a start-up video and that those who are not as familiar with computers and gaming may need more instructions. Reviewers commented that the toughest part of the technology was getting started, however, once into 3D GameLab, they found the technology intuitive and very easy to use.

Next, we asked our reviewers to rate the quest attractiveness. Although I cannot speak to any correlation between quest attractiveness and deep engagement, I suspect that the visual attractiveness of a quest might play a role in piquing initial interest. Within our quest design, Summerfelt and I tried to strike a balance between video, images, and print. Although we were limited somewhat regarding quest layout due to the confines of 3D GameLab, we tried to present our content so it appeared visually attractive and doable.

Six out of ten reviewers felt our quests were very attractive. Three rated them in the next category as being moderately attractive, and one reviewer said our quests were somewhat attractive. Of particular note, the reviewers responded positively to our embedded videos and Voki characters and liked that there was a balance of print and visuals. One reviewer said that she thought the layout would be effective in getting the students interested in the content. Another wished that there had been more colour and visuals on the homepage, but as I mentioned in the previous paragraph, we were limited in this regard by the design of 3D GameLab.

We also asked reviewers about the amount and quality of content presented per quest. Our intent in this question was to tease out whether the quests were too challenging. Overwhelmed students tend to disengage quickly, so, although we wanted students to feel

challenged, we also wanted them to see the quests as doable. Some of the respondents, however, appeared to have interpreted the question in a different way. For example, one of the respondents who chose the option “challenging” offered the following comment, “The information was well presented and intriguing without being overwhelming. The quests were challenging but well within the students’ abilities to perform.” We received similar feedback from those who chose the option adequate. For example, one respondent stated that the quests were well-balanced in that they provided enough information to interest students but not so much as to overwhelm. Other comments in this category were equally encouraging. Notably, it was said that the variety of formats were pleasing, and the speaking avatars were an excellent differentiation strategy. Reflecting back on our question to the reviewers, I think that Summerfelt and I could have better clarified the question by using the terminology “adequately challenging” and “too challenging”.

Our final questions to the review team were: Did they think gamification was an effective learning strategy? And did it increase their level of engagement? Five reviewers stated that they found the experience to be a very effective learning strategy, and the other five stated that they thought it was a moderately effective learning strategy. Similarly, concerning engagement, six reviewers found the experience very engaging and four found the experience moderately engaging. In informal conversation with one of the reviewers during the process, she explained how she had had a limited amount of time in which to look at our project the previous evening. She went on to lament that she had to stop just as the story line was getting interesting and that she was left hanging, wondering what was going to happen next. Another educator thought the storyline was a great hook for the students. These comments confirmed my belief in the power of using narrative and were exactly the sort of response I hoped to elicit from my students. Regarding other gamification elements, reviewers were similarly excited about receiving rewards

and badges. One person also responded positively to achieving new levels through completing quests and stated that she liked being able to share her results and connect with the group.

As a whole, the feedback on our project was very positive, and reviewers thought our students would enjoy Operation FranGLÉ. In particular, they appreciated that students could work at their own pace and that we had been able to incorporate a variety of learning activities into the project that might be challenging to incorporate in a regular classroom environment. Reviewers also raised some questions about the educational management of the project. Most of these questions would have been answered had the reviewers had access to the administrative side of the program rather than accessing it from the student point of view. One issue that was raised that was useful to Summerfelt and me was how to be more transparent about how student marks were generated in our gamified learning environment. We have been discussing this issue and hope to incorporate a solution into future versions of the program.

In conclusion, the reviewers provided much positive and some useful feedback. They felt the program took “language learning to a new level.” Essentially this was a pilot project rather than a research project. We created a system whose intent was to increase student engagement, build independence in learning and thus student success through a gamified learning environment. We have some initial indications that the project was successful in accomplishing this end. We do not; however, have a definitive result as we did not use student feedback to inform the results of this paper.

Chapter 5 – Conclusions and Recommendations

Conclusions

My major project developed out of a desire to create a rich learning environment for my students in the hopes that it would lead to deeper engagement in their learning tasks. I have long held the belief that engagement is an essential element to building independence in learning, increasing student satisfaction, and fostering student success. Academics such as Orosco (2014) posit that the impersonal format prevalent in many distributed learning courses creates an environment of disengagement. Other researchers, many of whom are cited in chapter two, associate engagement with various desired outcomes in education. Chen, Gonyea, and Kuh (2008) conclude that engaged students can be linked to higher grades, student satisfaction, and perseverance. Korkmaz (2007) further connects student engagement to reduced dropout rates and higher educational attainment.

During my research, gamification emerged as a promising strategy to increase engagement. To test this strategy, Summerfelt and I designed and constructed a French gamified learning environment (GLE) at the A1 level as outlined in the Common European Framework Reference. During the project design and construction, I paid particular attention to a number of Gee's main principles of learning (2005) and tried to incorporate them into the build. We submitted the GLE, Operation FranGLÉ, to peer review and deployed it with students in September of 2015.

For the most part, our peer reviewers were extremely positive and indicated that our project would indeed lend itself to greater engagement and would also be an effective learning strategy. In particular, the mystery narrative woven throughout the quests played a key role in holding the reviewers' interests. The building of intrigue and suspense within the story line, kept some reviewers motivated to complete quests in order to find out what would happen next. They

further felt that the subject content, although challenging, was well within the students' abilities. They praised how certain learning styles were addressed through talking avatars, video instructions, print, various Web 2.0 tools and other modalities. They felt that the release of information was appropriately chunked in a manner that would push students to the outer limits of their capabilities without causing them to become overwhelmed. They also found themselves excited by the accumulation of experience points and the earning of awards, badges, and achievements. Although we did not gather data on our students, our informal observations of the classes in action have been consistent with these peer reviews. There are, however, some areas for ongoing improvement. Some of the suggestions from our peer reviewers involved minor fixes, but the major issue to be addressed involved how to assess learning in a GLE such as ours.

Overall, the reviewers' feedback on our project supports my initial hope that a gamified learning environment would lead to deepened engagement and improved learning. However, because this was not a research project formally tested on students with a control group, I cannot categorically say this is true. While our findings are not yet complete, every indication is that this environment will engage learners, build independence and increase student academic success.

Recommendations

In the construction of our major project, Summerfelt and I learned much about the process of creating an actual gamified learning environment and about the limitations and challenges of such an environment. In this section, I outline my suggestions for further research on this topic. I have divided my recommendations into two categories: those relating specifically to our project; and those with more general implications for gamification research.

Recommendations specific to our project. As mentioned in my conclusions, assessment was the one area where the peer reviewers would have liked to have seen more explanations and

transparency. Although Summerfelt and I had numerous discussions around how to assess a student's learning in a GLE such as ours, due to the magnitude of our project and time constraints, it was an area that remained less developed. Part of the difficulty in assessing learning in a GLE is to know how much credit should be accorded for simply completing the quests, and how much for the quality of the work submitted. A certain mastery of course content is achieved simply by completing the work and progressing through the quests. One possible model for evaluating learning is to translate experience points (XP) into grades. A grade indicating that a student has met course expectations could be assigned for the amount of XP that a student would accumulate by simply completing all the quests. Further XP could be awarded manually by the teacher who evaluates the quality of work submitted during the completion of the quests. This would differentiate between students who simply meet course expectations and those who exceed them.

General recommendations. One unexpected outcome for me was that I came to recognize narrative as a powerful tool in the creation of engagement and a far more significant aspect of our project than I had initially realized. Had I realized the role narrative would play when I first embarked on our project, I would have given it far more attention. Regarding further research growing out of the project, I find this an intriguing topic to explore: the connection between narrative, or storyline, and engagement.

A major challenge to the expansion of the use of gamified learning environments in educational settings is the quantity of time which must go into the planning and construction of such a project. The amount of preparation in creating a project such as this vastly exceeds the effort that would go into creating lesson plans for a course. As a result, most classroom teachers are unlikely to be creating their own individual GLEs. Having said that, Summerfelt and I were

able to make considerable headway in the creation of what could potentially be turned into a viable classroom resource which could be used in a more widespread way. What this tells me, is that while individual teachers may be hard-pressed to create an extensive GLE with the inclusion of narrative, it may be possible, for groups of teachers to do so through collaboration and building upon the work of others. One possible direction for further study would be the potential for creating a framework for collaboration similar to the one used by Summerfelt and myself which could be used more widely by groups of instructors to create gamification resources. The artifacts we created in OneNote and Google Sheets would be a good starting point to further inform future research and practice in this area.

If the goal is to see gamification more widely used in education, another direction would be to focus on individual gamification strategies rather than creating an extensive GLE. It would be easier and far less time-consuming to develop a framework for student progress without an embedded narrative. Concentrating on the implementation of a few simple gamification elements such as the use of a leaderboard, badges, or a points system may be a way for educators to reap some of the benefits of gamification, such as increased engagement, without an onerous amount of preparation. More research, however, would have to be done in this area to confirm this as an effective strategy.

When first embarking on this project, I set out to determine whether the use of gamified learning environments would better engage my students, build independence and increase student academic success. The peer evaluation of Operation FranGLÉ, as well as its implementation in the classroom, show that they can fulfill these goals. While further work on the project, such as dealing with the assessment challenges and receiving student feedback, would be worthwhile, the bulk of my question has been answered. The creation of the project,

however, raised further questions: What role does narrative play in the engagement created by gamified learning environments? Can GLE's be made practical for the working teacher? Such questions are beyond the scope of this paper, but should certainly form the basis of future investigation if gamification is to realize its full potential as an educational tool.

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Appendix A

Definition of Terms

The following list of terms and definitions below were created collaboratively from the working list of terms that were identified by the needs of our project. They will assist the reader in understanding its scope and sequence. While some of the terms were unique to our particular critical questions, we found that working from an agreed upon list of definitions helped to remove ambiguity and confusion. As gamification is still a relatively new concept for most educators, the list of terms is substantial and stands more like a glossary.

Games

Avatar is the name generally given to the picture or in-game character that a players are given to represent themselves in game. Avatars can refer to the player of the game or characters that a player encounters throughout the gameplay.

Badges are a reward in many games or gamified environments to recognize certain achievements.

Experience points (XP) designate the points players receive for successfully completing quests. When a player achieves enough experience points, he or she will advance to the next level.

Game Elements are the parts of the game. Rules of play and game narrative are two important elements when designing a game.

Guild is a group of people in an online game that work together in defeating creatures or other mobs that cannot be done alone. Most online games now support guild chat, which allows guild members to talk to all other online guild members.

Guild site refers to a central site for players to share learning and insights. Can be social in nature.

Leaderboard is a term typically used in the video gaming industry to signify rank among people who play. Players can be ranked against other players on their number of kills, items collected, or some other metric. Leaderboards can provide an incentive for players to improve as they give many a sense of superiority or accomplishment.

Narrative is the element of the game that weaves the action together and is designed with the intent of giving purpose to the actions of the player

Player is the person who is playing the game.

Player Levels describes the overall status of a player. For example, in games that use level as a ranking method, all players start off at level one. As the player gains experience, they level up, acquiring new abilities and access to new content.

Quests are the activities that players may choose to undertake in order to increase levels, earn experience and gain reward items.

Educational and Online Learning

Agency is being used in this project to define the player's ability to exert control and have a role in determining the action of the game. Our purpose is to use agency as a possible means to increasing engagement and ultimately success.

Blended learning is a formal education program in which a student learns at least in part through delivery of content and instruction via digital and online media with some element of student control over time, place, path, or pace and at least in part at a supervised brick-and-Mortar location away from home.

Brick and Mortar School is a traditional school where students attend face to face in a building as opposed to an online or virtual school

Common European Framework of Reference (CEFR) is a standard that is used to describe the different levels of language ability. The DELF test is meant to test what level a person understands a language

Diplôme d'études en langue française (DELF) is the name of a test that is globally used and accepted as a gage of a person's language ability.

Distributed learning (DL) is used to refer to a course that delivered online. The instructor generally does not have f2f contact with the student as content is delivered online.

Engagement refers to the quality of effort students devote to educationally purposeful activities that contribute directly to desired outcomes.

Face-to-Face (F2F) are considered to be traditional classes in a bricks and mortar building.

Gamification is the use of game elements, mechanics and game design techniques in non-game contexts to engage and motivate people to achieve goals.

Gamified Learning Environment (GLE) is a term we coined to describe learning environments which incorporate game play, inclusive of narrative, to enhance learning.

Independent Learning Program (ILP) is a clearly planned and developed program which encourages students to work at their own pace in a more independent manner.

Learning Management System (LMS) is a software application for the administration, documentation, tracking, reporting and delivery of electronic educational technology (also called e-learning) education courses or training programs.

Online Learning and Teaching Diploma (OLTD) is a graduate program offered completely online through Vancouver Island University. OLTD can ladder into an online Masters of Education and Leadership.

Principles of learning refers to the principles that James Paul Gee first identified in his book *What video games have to teach about learning and literacy* (2003)

Scaffolding in education refers to a variety of instructional techniques used to move a student progressively toward stronger understanding and ultimately greater independence in the learning process.

Web tools refer to web applications that go beyond displaying individual pages of static content by allow a community of users to interact with the site and or each other by creating, adding or updating content.

Various Web Tools

3DGameLab is a gamified content creation and student tracking platform where teachers can design and share quests and badges to create personalized learning for their students. Students “level up” through the curriculum, choose quests they want to play, and earn experience points, badges, and awards.

Google Forms is a free Web tool that provides users a fast and easy way to create online surveys, polls or quizzes. Responses are then collected in an online spreadsheet for easy analysis.

Moodle is an open source learning management system (LMS) popular in many DL schools.

Microsoft OneNote is a free Microsoft based application and web tool that is designed to help one organize and capture notes across devices.

Quizlet is a web tool for students that uses flashcards, study and game sets to help students memorize material.

Voki is a web tool that lets you create personalized avatars to use on your wikis, blogs or websites. Voki avatars have the ability to use text to speech

Weebly is a web-hosting service featuring a drag-and-drop website builder.

Appendix B: The Original 36 Learning Principles

The 36 Learning Principles by James Paul Gee

From *What Video Games Have to Teach Us About Learning and Literacy*, by James Paul Gee, 2007.

1. Active, Critical Learning Principle	All aspects of the learning environment (including ways in which the semiotic domain is designed and presented) are setup to encourage active and critical, not passive, learning.
2. Design Principle	Learning about and coming to appreciate design and design principles is core to the learning experience.
3. Semiotic Principle	Learning about and coming to appreciate interrelations within and across multiple sign systems (images, words, actions, symbols, artifacts, etc.) as a complex system is core to the learning experience.
4. Semiotic Domains Principle	Learning involves mastering, at some level, semiotic domains, and being able to participate, at some level, in the affinity group or groups connected to them.
5. Metalevel Thinking about Semiotic Domains Principle	Learning involves active and critical thinking about the relationships of the semiotic domain being learned to other semiotic domains.
6. “Psychosocial Moratorium” Principle	Learners can take risks in a space where real-world consequences are lowered.
7. Committed Learning Principle	Learners participate in an extended engagement (lots of effort and practice) as an extension of their real-world identities in relation to a virtual identity to which they feel some commitment and a virtual world that they find compelling.
8. Identity Principle	Learning involves taking on and playing with identities in such a way that the learner has real choices (in developing the virtual identity) and ample opportunity to meditate on the relationship between new identities and old ones. There is a tripartite play of identities as learners relate, and reflect on, their multiple real-world identities, a virtual identity, and a projective identity.
9. Self-Knowledge Principle	The virtual world is constructed in such a way that learners learn not only about the domain but about themselves and their current and potential capacities.
10. Amplification of Input Principle	For a little input, learners get a lot of output.
11. Achievement Principle	For learners of all levels of skill there are intrinsic rewards from the beginning, customized to each learner’s level, effort, and growing mastery and signaling the learner’s ongoing achievements.
12. Practice Principle	Learners get lots and lots of practice in a context where the practice is not boring (i.e. in a virtual world that is compelling to learners on their own

	terms and where the learners experience ongoing success). They spend lots of time on task.
13. Ongoing Learning Principle	The distinction between learner and master is vague, since learners, thanks to the operation of the “regime of competence” principle listed next, must at higher and higher levels, undo their routinized mastery to adapt to new or changed conditions. There are cycles of new learning, automatization, undoing automatization, and new reorganized automatization.
14. “Regime of Competence” Principle	The learner gets ample opportunity to operate within, but at the outer edge of, his or her resources, so that at those points things are felt as challenging but not “undoable.”
15. Probing Principle	Learning is a cycle of probing the world (doing something), reflecting in and on this action and, on this basis, forming a hypothesis; reprobating the world to test this hypothesis; and then accepting or rethinking the hypothesis.
16. Multiple Routes Principle	There are multiple ways to make progress or move ahead This allows learners to make choices, rely on their own strengths and styles of learning and problem solving, while also exploring alternative styles.
17. Situated Meaning Principle	The meanings of signs (words, actions, objects, artifacts, symbols, texts, etc.) are situated in embodied experience. Meanings are not general or decontextualized. Whatever the generality meanings come to have is discovered bottom up via embodied experiences.
18. Text Principle	Texts are not understood purely verbally but are understood in terms of embodied experiences. Learners move back and forth between texts and embodied experiences. More purely verbal understanding comes only when learners have had enough embodied experience in the domain and ample experiences with similar texts.
19. Intertextual Principle	The learner understands texts as a family (“genre”) of related texts and understands any one such text in relation to others in the family, but only after having achieved embodied understandings of some texts. Understanding a group of texts as a family of texts is a large part of what helps the learner make sense of such texts.
20. Multimodal Principle	Meaning and knowledge are built up through various modalities (images, texts, symbols, interactions, abstract design, sound, etc.) not just words.
21. “Material Intelligence” Principle	Thinking, problem solving, and knowledge are stored in tools, technologies, material objects, and the environment. This frees learners to engage their minds with other things while combining the results of their own thinking with the knowledge stored in these tools, technologies, material objects, and the environment to achieve yet more powerful effects.
22. Intuitive Knowledge Principle	Intuitive or tacit knowledge built up in repeated practice and experience, often in association with an affinity group, counts a great deal and is honored. Not just verbal and conscious knowledge is rewarded.
23. Subset Principle	Learning even at its start takes place in a (simplified) subset of the real domain.
24. Incremental Principle	Learning situations are ordered in the early stages so that earlier cases lead to generalizations that are fruitful for later cases. When learners face more

	complex cases later, the hypothesis space is constrained by the sorts of fruitful patterns or generalizations the learner has found earlier.
25. Concentrated Sample Principle	The learner sees, especially early on, many more instances of fundamental signs and actions than would be the case in a less controlled sample. Fundamental signs and actions are concentrated in the early stages so that learners get to practice them often and learn them well.
26. Bottom-up Basic Skills Principle	Basic skills are not learned in isolation or out of context; rather, what counts as a basic skill is discovered bottom up by engaging in more and more of the game/domain or game/domains like it. Basic skills are genre elements of a given type of game/domain.
27. Explicit Information On-Demand and Just-in-Time Principle	The learner is given explicit information both on demand and just in time, when the learner needs it or just at the point where the information can be best understood and used in practice.
28. Discovery Principle	Overt telling is kept to a well-thought-out minimum, allowing ample opportunity for the learner to experiment and make discoveries.
29. Transfer Principle	Learners are given ample opportunity to practice, and support for, transferring what they have learned earlier to later problems, including problems that require adapting and transforming that earlier learning.
30. Cultural Models about the World Principle	Learning is set up in such a way that learners come to think consciously and reflectively about some of their cultural models regarding the world, without denigration of their identities, abilities, or social affiliations, and juxtapose them to new models that may conflict with or otherwise relate to them in various ways.
31. Cultural Models about Learning Principle	Learning is set up in such a way that learners come to think consciously and reflectively about their cultural models of learning and themselves as learners, without denigration of their identities, abilities, or social affiliations, and juxtapose them to new models of learning and themselves as learners.
32. Culture Models about Semiotic Domains Principle	Learning is setup in such a way that learners come to think consciously and reflectively about their cultural models about a particular semiotic domain they are learning, without denigration of their identities, abilities, or social affiliations, and juxtapose them to new models of learning and themselves as learners.
33. Distributed Principle	Meaning/knowledge is distributed across the learner, objects, tools, symbols, technologies, and the environment.
34. Dispersed Principle	Meaning/knowledge is dispersed in the sense that the learner shares it with others outside the domain/game, some of whom the learner may rarely or never see face to face.
35. Affinity Group Principle	Learners constitute and “affinity group,” that is, a group that is bonded primarily through shared endeavors, goals and practices and not shared race, gender, nation, ethnicity, or culture.

36. Insider Principle	The learner is an “insider,” “teacher,” and “producer” (not just a “consumer”) able to customize the learning experience and domain/genre from the beginning and throughout the experience.
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