"Gradequest Strikes Back" – The Development of the Second Iteration of a Gameful Undergraduate Course

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Introduction

Gamification – or the use of game design techniques for purposes outside of gaming – has been a hot topic in the last couple of years. According to the 2013 Garner Hype Cycle Special Report (i.e., a subjective overview of the relative maturity of an innovation), gamification has reached its 'peak of inflated expectations' (Rivera & Van der Meulen, 2013). While gamification holds considerable promise (i.e., turning any tedious or mundane activity into an engaging, motivating or enjoyable one simply by adding game design techniques), both designers (e.g., McGonigal, 2011) as well as game scholars (e.g., Fishman & Deterding, 2013) have distanced themselves from the term. The reason for this can directly be attributed to the hype and unrealistic expectations that surround the concept. Gamification is often seen as an easy to implement panacea, and - as game scholar and designer Ian Bogost discusses in his often cited blog post (2011) - such notions of gamification are simply missing the point. Games are not engaging as a result of high scores, experience points, badges, achievements, or other largely extrinsic reward systems. While such systems might expand an already engaging gaming experience, the real "magic" of games is arguably to be found in other areas of the game experience, such as its game mechanics (e.g. turns, limited resources, time constraints, etc.) and design principles (meaningful choices, clear goals, enduring play, etc.). By successfully implementing these elements of the game experience, 'gameful design' hopes to provide some of the 'magical magnetism' that gamification seems to be missing.

While the debate on which elements of game design are transferable to other context is still ongoing, academic literature has studied the effectiveness of gamification. In their analysis, Hamari, Koivisto & Sarsa (2014) analyzed 24 studies, some of which are focused on classic gamification (i.e., points, leaderboards, achievements, rewards, progress, feedback, etc.), while others include the recommendations of gameful design (levels, story, clear goals, challenge, etc.). The study concludes that while the results of the gamified experiments are partially positive, the success of gamification often depends on mediating factors, such as the motivations of users or the nature of the gamified system. As a result, it has been challenging for research to make claims that transcend descriptive findings and provide recommendations that can be generalized or transferred to other contexts. Furthermore, the study indicates that gamification mainly leads to short-term effects, and that these effects could be caused by the novelty effect. While these findings are certainly interesting, they are also very much in line with what motivational research has indicated for years: extrinsic motivation can lead to weak but positive short-term effects, and potentially detrimental effects to the individual's desire to perform the activity in the long run (e.g., Bénabou & Tirole, 2003; Deci, 1975). Gameful design's emphasis on game elements that move beyond the quick and temporary solution of extrinsic motivation therefore seems to be a potentially more succesful approach to meeting gamification's promise. However, there are no guarantees that this approach will always lead to intrinsic instead of extrinsic motivation, or that it can be applied to just any kind of non-gaming context.

Gameful Instruction

Education has not lagged behind in experimenting with gamification and gameful design. Hamari et al.'s literature review (2014) identified 9 studies that are using gamification for learning and education, which also follow the partially positive trend of the non-educational applications mentioned in the article. The authors identified a possible effect of increased competition in the class room (Hakulinen, Auvinen, & Korhonen, 2013), difficulties in evaluating a task (Domínguez et al., 2013) and increased work load in doing so (Rozeboom, 2012), and design problems that are unique to very specific contexts (Dong et al., 2012).

The academic literature also provides educators with advice towards the design of gameful classrooms. Stott & Neustaedter's analysis (2013) who present 4 underlying dynamics and concepts that "*are shown to be more consistently successful than others when applied to learning environments*": 1) freedom to fail, 2) rapid feedback, 3) progression, and 4) storytelling. Nicholson's (2012) work provides a user-centered theoretical framework, while also focusing on a variety of theories and concepts that emphasize the importance of freedom of choice and meaningfulness. Kim & Lee's Dynamic Model for Gamification of Learning (DMGL) (2003)and to widely announce a pure and right function of game through our model. For the theoretical contribution of gamification, we propose a dynamical model of game based learning that aims to maximize educational effectiveness that correlates with the four main primary factors (curiosity, challenge, fantasy and control provides a design model that is similar to acclaimed game design models such as the MDA framework (Hunicke, LeBlanc, & Zubek, 2001). Basing itself

on both game design theory, instructional design and the influential work of Thomas Malone (e.g., Malone & Lepper, 1987; Malone, 1980), DMGL aims to maximize educational effectiveness through four primary aesthetics: challenge (e.g., clear fixed goals, uncertain outcomes, appropriate difficulty levels, etc.), curiosity (e.g., progressive unlocking of new content, time-based patterns, thrills, comedy, etc.), fantasy (storytelling, audio, visuals, etc.), and control (i.e., offering the player control over the 'game'). Finally, Sheldon (2011) provides an overview of the many iterations that his gameful classes underwent.

In summary, the literature currently seems to indicate that there is potential value in adding game design elements to educational courses, while at the same time emphasizing the many issues and complexities that need to be considered in order to design a course using game design techniques. This article describes a design research project that attempts to facilitate engagement and intrinsic motivation among undergraduate students through the use of gameful instruction (i.e., instruction that adopts the principles of gameful design).

The Gradequest Project

The Gradequest project (De Schutter & Vanden Abeele, 2014)"publisher-place":"Fort Lauderdale, FL","event":"Foundations of Digital Games 2014","event-place":"Fort Lauderdale, FL","author":[{"family":"De Schutter","given":"B."},{"family":"Vanden Abeele","given":"V."}],"issued":{"date-parts":[["2014"]]}}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}   started in the Fall of 2013 by applying game design principles to a 3-credit hour undergraduate course on game design for educational purposes (N = 17; 7 female students. 10 male students). The game design elements that were used in course were derived from the previous literature that was mentioned above, as well as from literature on player motivation (e.g., Jansz & Tanis, 2007; Sherry, Lucas, Greenberg, & Lachlan, 2006)2006 media enjoyment (e.g., Vorderer & Hartmann, 2009) and general game design (e.g., Adams & Dormans, 2012; Salen & Zimmerman, 2003; Schell, 2008). The course design strived for as much 'gamefulness' as possible (i.e. striving for activities that are fun in their own right, without having to rely on external reward systems to motivate students). Finally, Lee Sheldon's book (2011) on his 'multiplayer class rooms' had a large influence on the class' design. Briefly summarized, the course used the following game design elements:

- heroes (fantasy alter ego's for the students),

- guilds (a different term for a group of students),

- quests (a different term for the course assignments),

- a backstory (occasionally told by instructor during class),

- experience points (XP; gained by successfully completing quests and transferred to a grade at the end of the semester),

- achievements (rewards for certain goals in class),

- character levels (based on the amount of XP a student gained),

- character skills (in-class super-powers chosen when reaching a certain level), and

- leaderboards (high-score tables).

The course offered different types of quests. Main quests were unavoidable quests that took place in class on set dates (e.g., midterm, presentations, etc.). Side quests were quests that students could pick themselves (e.g., game analysis, game design, literature review, etc.). Finally, there were optional quests that students could do every week (e.g., blog posts, attendance, etc.) and random quests that could occur during any given session (e.g. pop quiz, short in-class assignments, etc.). Every quest was made as playful as possible, by attempting to add some sort of intrinsic value to it. For example, the midterm quest was named "Survive the Gauntlet", and was similar to Hasbro's Taboo game (i.e., a game in which one player explains a term without actually naming it, while the other players attempt to guess the word).

The course was managed using Gradequest, a custom designed PHP-based jQuery Mobile application that offers a back-end (allowing to grade the students and view their grades and skills) and a front-end that allowed the students to access a personal profile page, a quest overview page, a guild/team overview page, and a leaderboard.
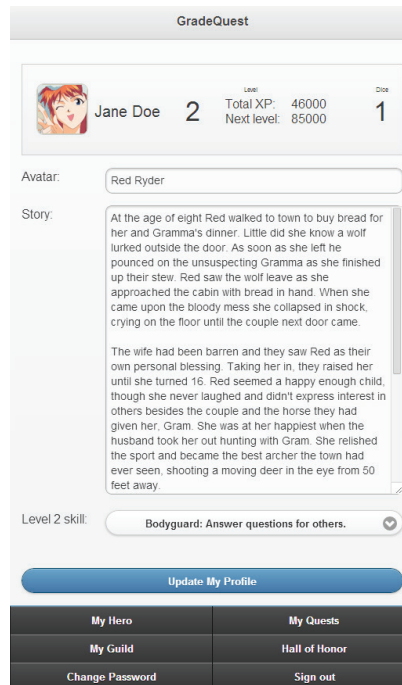
Figure 1: Gradequest's 'My Hero' screen on a smartphone

Evaluation of the first iteration

The research questions for the first iteration were:

1. How does self-reported intrinsic motivation and engagement of students differ from the non-gameful course?
2. Which game design elements improve/worsen students' self-reported engagement, enjoyment and motivation?
3. How can the course design (as well as Gradequest) be improved?

The study used mixed methods to answer these questions. During the semester, the students were asked to provide informal feedback whenever they saw fit. They could do this by talking directly to the instructor, but in addition, an online feedback form (using freesuggestionbox.com) was provided so they could provide feedback anonymously without having to fear any repercussions. At the end of the semester, two sessions of the educational game design course were devoted to evaluating the gameful design of the course. The evaluation was done using both quantitative and qualitative methods. The quantitative part was done using a Qualtrics survey. The questionnaire consisted out the Situational Motivation Scale (SiMS) (Guay, Vallerand, & Blanchard, 2000) and the core module of the Game Experience Questionnaire (GEQ) (IJsselsteijn et al., 2008). A focus group session was held after the students finished filling in the survey. During this session, the teacher acted as the moderator.

The gameful course was compared to a similar but non-gameful course on the principles of game design (N = 23; 4 female students, 19 male students). This comparison is published in detail in a previous conference paper that was published earlier this year (De Schutter & Vanden Abeele, 2014)"publisher-place":"Fort Lauderdale, FL","event":"Foundations of Digital Games 2014","event-place":"Fort Lauderdale, FL","author":[{"family":"De Schutter","given":"B."},{"family":"Vanden Abeele","given":"V."}],"issued":{"date-parts":[["2014"]]}}}],"schema":"h ttps://github.com/citation-style-language/schema/raw/master/csl-citation.json"} . In summary, the comparison revealed how that the gameful instruction did not lead to expected higher levels of intrinsic motivation or engagement in comparison to the traditional course design. Instead, the non-gameful course scored significantly higher on intrinsic motivation ($t(16.163) = 2.802$, $p < .05$). However, when controlling for mediating factors (i.e., teacher effectiveness, classroom atmosphere, clarity of the course, competence development, prior interest, and playing time), the difference in intrinsic motivation between both courses disappeared ($F(0.335,1) = 4.688$, $p = $ n.s.). These results matched the findings of the various qualitative methods of data collection that were used during the project, as some of the students complained about needing more structure (~ clarity of the course) or about problems that occurred while trying to work on an assignment with other students (~ class atmosphere).

Design of the second iteration

For the second iteration, no significant changes have been made to the content or the learning outcomes of the game design for education course. The gameful aspects of the course did receive a significant update based on the evaluation of the first iteration.

Reduced course documents

While the majority of students in the course noted that they never had any problem figuring out the rule book, some students mentioned that it was "too long" or "complicated" for them to figure out. In order to avoid this complaint for the second iteration, and to simplify the tasks the instructor has to do, the rules of the course's inner game were made clearer, less complex and more elegant wherever possible. As a result, the syllabus for the second iteration was 38% shorter (from 8,623 words to 5,328 words). The biggest reason for the shorter syllabus could be related to changes that were made to the quests and their evaluation (see below). The rest of the document largely remained the same. The syllabus also contained some new additions. For example, it now included a planning that clearly stated when each quest would start and when each quest was due, as some students seemed to have problem keeping track of everything during the first iteration.

Transparent quest titles

The first change that was made to the quests was the result of a student suggestion. During the focus group session at the end of the first iteration, a student asked to make the names of the quests more transparent. For example, the quest that required students to do a playtest session for their educational game design was originally named "Consult the Oracle". For the second iteration, the quest was renamed to "Consult the Oracle of Playtests". By doing so, the course keeps its fantasy theme, while potentially communicating the content of each quest better to the students.

More opportunities to fail (or succeed)

While the story quests (i.e., required and unavoidable in-class quests such as the midterm and final project quests) remained largely the same, the function and structure of the side quests were changed dramatically. The students could still pick their favorite type of side quest (game design, game analysis, or literature review) and their favorite medium (i.e., prototype, poster, or video) for a side quest, but they were now able to submit their side quest at five different times during the semester (as opposed to two times previously). This change allows for students to get a subpar evaluation or even a 'wipe' (i.e., the equivalent of an 'F') once and still be able to make up for it at a later time. To make room for the larger possible amount of side quest, the students were no longer required to write blog posts. Furthermore, some of the amount of experience points that was associated with the midterm and the final project was carried over to the side quests.

Unified rubrics

During the first iteration, students could pick one out of 6 possibilities for their side quest: write a literature review paper on the topic of games and learning, make a video about games and learning, analyze the educational potential of a game in a paper, analyze a game in a video, write a game design document for an educational game, or develop a prototype for an educational game. While the students were positive about being able to pick their preferred type of quest (with an overall score of 5.55 out of 7; see De Schutter & Vanden Abeele, 2014)"publisher-place":"Fort Lauderdale, FL","event":"Foundations of Digital Games 2014","event-place":"Fort Lauderdale, FL","author":[{"family":"De Schutter","given":"B."},{"family":"Vanden Abeele","given":"V."}],"issued":{"date-parts":[["2014"]]}},"prefix":"with an overall score of 5.55 out of 7; see "}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"} , every option required its own rubric and this led to a lot of confusion.

For the second iteration, it was decided to expand the range of option to 9 possibilities (i.e., choose between a poster, video or prototype as the medium, and choose between game analysis, literature review or game design as the topic). Instead of providing a rubric for each possibility, a unified 4-item rubric was developed that could be applied to every type of side quest (and even some of the main quests). The new rubric evaluates the following elements:

  □ *Structure* is the extent to which a quest utilizes the structural form of the medium correctly; e.g., a text should be grammatically correct, a video should be edited properly, and a game should have clearly stated rules.

☐ *Presentation* is the extent to which a quest successfully uses audiovisual materials; e.g., a prototype should use graphics to support its theme, a text should use graphics to clarify its arguments, and a digital video should use in-game footage.

☐ *Source* is the extent to which a quest appropriately relates to high-quality sources; i.e., an educational game design should relate to empirical research in its design decisions, a paper should reference peer-reviewed research, and a video montage should reference its source materials.

☐ *Content* is the contribution of the quest to the field; e.g., a video or a poster should provide an insightful and relevant argumentation, and a game should contain interesting or innovative gameplay.

☐

Less emphasis on guilds

The first iteration's emphasis on teamwork within guilds led to some problems. Some of the students were very enthusiastic about the course and willing to work hard, while others were not really interested in the topic and barely put in any effort. As a result, both groups became frustrated with each other which led to problems when students had to work together. To avoid this in the second iteration, the guilds' importance was minimalized. Guilds are now only used for in-class quests such as ambushes (i.e., an in-class quiz game or assignment). In order to encourage students to work together and help each other, a new quest (named "A helpful hand") was introduced that rewarded a student who added a significant contribution to completing the quest of one or more other students.

Clearer communication of expectations

Aside from reducing the importance of the guilds, the second iteration also attempted to improve overall communication to the students. The first session of the course is therefore now fully devoted to communicating the rules of the course and to set the expectations. While the first iteration of the course already attempted to do this, the new version confronts students with some new messages. First, the students were told that this would be a challenging course that would require 6 hours of time investment outside of class on a weekly basis. Second, the students were confronted with fictional scenarios resulting in an F, a C and an A. In particular, the students were made aware that not doing any work prior to the midterm would result in a C or lower at the end of the semester. The students were also informed how they redeem themselves by doing optional quests to make up for another class leading to a less than optimal outcome. While these measures might seem harsh, they were deemed essential as some of the students voiced in their course evaluations that they expected a "casual and easy course about games" based on the title.

Improved backstory and presentation

While the first iteration of the course contained story and a narrative for the heroes, the majority of preparation time was invested in the course materials and developing Gradequest. One of the students mentioned during the focus groups that he loved the fantasy aspects of the course, but that the implementation was just too minimal. Since, the story elements also received a respectable score in the quantitative survey (with an overall score of 4.52 out of 7; see De Schutter & Vanden Abeele, 2014)"publisher-place":"Fort Lauderdale, FL","event":"Foundations of Digital Games 2014","event-place":"Fort Lauderdale, FL","author":[{"family":"De Schutter","given":"B."},{"family":"Vanden Abeele","given":"V."}],"issued":{"date-parts":[["2014"]]}},"prefix":"with an overall score of 4.52 out of 7; see "}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"} , it was decided to invest more time into them for the second iteration. In particular, a map was used that was procedurally generated using the resources available through donjon.bin.sh/fantasy/world, and story elements were added to some of the lecture slides as well. For example, game scholar and designer Kurt Squire was transformed into a Gandalf-like figure warning students of upcoming ambushes, BF Skinner was depicted as an old vampire (i.e., Gary Oldman in Francis Ford Coppola's 1992 Bram Stoker's Dracula movie) who manipulates people through behaviorist techniques, and the first session opened with an edited version of the intro of the 1983 animated Dungeons & Dragons TV series in which "Venger, Force of Evil" was replaced with the instructor. To add to the fantasy aspect of the course, all e-mail communication between from instructor to the students was done in-character.

Hall of Legends

During the first iteration, students were given access to the "Hall of Honor" on Gradequest. This is a high score leaderboard showing the students' avatars and their level. (For privacy reasons, a student's name and actual

experience points were never disclosed with the other students. Furthermore, the levels stopped at an amount of experience points that was lower than the amount that was needed to get a D-.) The leaderboard was received well by students (4.78 overall score out of 7; see De Schutter & Vanden Abeele, 2014)"publisher-place":"Fort Lauderdale, FL","event":"Foundations of Digital Games 2014","event-place":"Fort Lauderdale, FL","author":[{"-family":"De Schutter","given":"B."},{"family":"Vanden Abeele","given":"V."}],"issued":{"date-parts":[["2014"]]}},"pre-fix":"4.78 overall score out of 7; see "}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"} and some students specifically pointed out during the focus groups that they felt that it was motivating. Therefore, the Hall of Honor was expanded upon in the second iteration, by adding the "Hall of Legends" to it. While the Hall of Honor contained a leaderboard with all current students, the Hall of Legends contains the top 3 students of a semester who are ranked by their total amount of experience earned during the semester. Students that manage to get into their top 3 will have their avatars and backstories immortalized for generations of students to come.

Discussion

The second iteration of the course is still in progress at the time of writing. (The research questions are the same for the second iteration.) After three weeks of classes, some differences with the previous iteration are noticeable. The class atmosphere seems to be improved drastically and the students have asked remarkably few questions about the rules of the course. The students also seem to be more engaged and less distracted. There has not been one occurrence yet of a student being preoccupied with Facebook or Reddit yet, and students are much more active in class. There is also a lot more playfulness.

While the first impressions are very positive, the changes that were described in this paper will be evaluated thoroughly at the end of the semester. In order to do this, the research questions and methods of the first iteration will be replicated, and expanded upon by also comparing the first and second iteration to each other. Furthermore, the evaluation will add Small Group Instructional Diagnosis (SGIDs) to its methods, and these will be held by a third party.

Our experiences with Gradequest so far lead us to believe that three guidelines are essential in designing a course that aims to engage and motivate students through game design elements. First, the role of the teacher, the class atmosphere, and the clarity of course documents cannot be overstated. If either one of these elements is preventing students from being engaged or motivated, then adding game design elements to a course will not help to achieve this. Second, the course designer should be very careful when implementing game design techniques, in particular if he or she is a gamer or game designer. It is easy to get carried away and end up designing a course that requires too much pre-existing knowledge about games. Finally, a course designer should communicate from day one that gameful instruction is all about challenges and engagement. Students seem to relate gameful instruction to fun and casual course with little work load, which is often not the best attitude to enter a course with.

Acknowledgements

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