"The Gradequest Tale of Scrotie McBoogerballs"

Evaluating the Second Iteration of a Gameful Undergraduate Course

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Abstract

The use of game design techniques in a non-gaming context - or 'gamification' (Sebastian Deterding, Dixon, Khaled, & Nacke, 2011) - offers the promise to make education more motivating, engaging and enjoyable to students. This study reports on both the design and evaluation the second iteration of a gameful class (N= 19) that incorporates a variety of game design techniques through an online application named 'Gradequest'. The course was evaluated using multiple methods. First, a quantitative survey was used to collect data to measure levels of intrinsic motivation and engagement for the course. Second, a teaching log was recorded to capture the instructor's perspective. Third, a focus group session was held, and finally, a Small Group Instructional Diagnosis (Clark & Redmond, 1982) was held at the midpoint of the semester. The project concludes that the applied gameful instruction did not necessary lead to higher levels of intrinsic motivation or engagement in comparison to traditional teaching methods, and that further improvements to the design and documentation of the course are necessary. However, further qualitative inspection indicates that the students appreciate the gameful approach, and that the approach does have potential. The findings of the study are used to formulate recommendations towards the design of gameful instruction, in particular through its assessment of the various game elements that were incorporated in the gameful course design.

Keywords: Gamification, gameful design, gameful instruction, course design, education, learning, intrinsic motivation

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Introduction

Over the past years game design techniques have been applied in a variety of fields that have little to do with actual games. Numerous buzzwords have been associated with this trend, such as serious games, games for health, game-based learning, advergaming, gamification, etc. While Raessens (2006) referred to a "ludification of culture" - an infiltration of the tropes of digital games into our culture and art – Deterding (In Press) identifies the "cultivation of ludus" as well: as games move towards the center of our cultural, social and economic lives, so do cultural, social and economic actors appropriate games for their own purposes. This process has been met with skepticism and hostility. Over the year, many prominent designers (for example, Colleen Macklin at Games+Learning+Society, Frank Lantz at the Game Developers Conference, Eric Zimmerman at Games For Change, etc.) expressed their wish for games to be treated with the respect they deserve as a meaningful aesthetic form. According to this movement, games are being turned into a tool with a blunt utilitarian purpose. They are being instrumentalized, and subsequently stripped from their inherent richness, complexity, and spontaneity.

Among the various forms of appropriated game design, perhaps gamification has been met with the most negative response, as 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, chance, etc.) and design principles (meaningful choices, clear and interesting goals, engaging 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.

Gamified, gamefully designed or game-inspired course design

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, and concluded 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. More specifically, 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), as well as some 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) 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'). Aguilar, Holman & Fishman (2014) use the three elements of Self-Determination Theory (i.e., competence, relatedness, and autonomy; see Deci & Ryan, 2004) to understand the motivational pull of two different "game-inspired" university course designs. Their evaluation found positive mediated outcomes towards student effort, a sense of control, and exploration of the assignment types, when students were given the ability to pick and weigh their assignments. Furthermore, the study also indicated that leaderboards were perceived positively for students who opted in for them.

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. While the criticized instrumentalization of games that was mentioned in the introduction of this paper is noticeable in the literature, it should also be noted that researchers, teachers and designers are aware of the issue, and are actively trying to weed out applications that do not do games justice. This article describes a design research project that can be classified

as such an attempt. It aims to create a gameful course that meets three quality criteria that are typically associated with digital games, i.e. enjoyment, intrinsic motivation, and engagement. While these criteria might not encompass the artistic merits of games as an aesthetic form, they arguably do provide a step in that direction.

Research Design

The study presented in this paper was the result of two 3 credit hour undergraduate courses in a liberal education program that ran during the Spring 2014 semester. The first course was a course on the principles of game design (N = 19; 1 female student, 18 male students), from now on referred to as the 'non-gameful course'. The second was a course on game design for educational purposes (N = 21; 8 female students. 13 male students), from now on referred to as the 'gameful course'. Across both courses, the students majored in a wide variety of disciplines, with the most prevalent ones being interactive media studies (6), computer science (5), media and culture (4), and creative writing (4). Surprisingly, only one student majored in (early childhood) education.

Both courses shared a similar structure and had the same kind of assignments: they required the students to write reflective blog posts, participate actively in class, and turn analytical or game design related assignments in at similar points of the semester. There was also overlap in the course materials, as both courses discussed game design theories and methods, with one course diverging towards learning theory, while the other emphasized entertainment theory and game studies. Considering the similarities between both courses, the decision was made to apply gameful instruction to the educational game design course, while teaching the general game design course using a more traditional didactic approach.

Both courses were taught by the same instructor and were in the second iteration. The evaluation and comparison of the first iterations have been published at a conference (De Schutter & Vanden Abeele, 2014; De Schutter, 2014). 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).

As a result, the second iteration specifically aimed to address the issues. The research questions for the second iteration were the following:

1. How does self-reported intrinsic motivation and engagement of students differ between both courses?
2. Which game design elements improve/worsen students' self-reported engagement, enjoyment and motivation?
3. How can the course design be improved?

The specific differences between the first iteration and second iteration of both courses have been published extensively in a previous conference contribution (De Schutter & Vanden

Abeele, 2014; De Schutter, 2014). This paper will compare both iterations when it is deemed necessary to explain research findings.

Mixed methods were used in order to answer these questions. During the semester, the students were asked to provide informal feedback whenever they saw fit. At the midpoint of the semester, Small Group Instructional Diagnoses (Clark & Redmond, 1982) were held by a third party facilitator to obtain feedback from the students. During these sessions, the students formed small groups and reached consensus on the following questions: What do you feel are the strengths of the course? What suggestions for improvement can you make? After several minutes of discussion, the groups reported to the entire class. The facilitator, following clarification with students, summarized the suggestions. The students were then polled to measure their agreement with the statement being summarized.

At the end of the semester, a session of the educational game design course was devoted to evaluating the gameful design of the course. 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).The SiMS measures the following motivational concepts:

- intrinsic motivation (Cronbach's α=.90; i.e, performing an activity for itself),
- identified regulation (α=.85; i.e., performing a valued activity as a means to an end),
- external regulation (α=.83; i.e., performing an activity for external rewards), and

- amotivation (α=.84; i.e., an activity that is neither intrinsically nor extrinsically motivated).

The GEQ measures the following concepts:

- imaginative and sensory immersion (α=.88; e.g. "*It felt like a rich experience*"),
- annoyance/tension (α=.93, e.g. "*I felt irritable*"),
- flow (α=.73; e.g. "*I was fully occupied*"),
- competence (α=.89; e.g., "*I was good at it*"),
- positive affect (α=.92;e.g., "*I enjoyed it*"),
- negative affect (α=.80; e.g., "*I was bored*"), and
- challenge (α=.75; e.g., "*I had to put a lot of effort into it.*").

Aside from these instruments, the questionnaire used 7-item Likert scales to evaluate to which extent the various design elements of the course led to enjoyment (e.g., "I enjoyed the XP-based grading system"), engagement (e.g., "The XP-based grading system was engaging."), motivation (e.g., "The XP-based grading system motivated me.").The questionnaire also asked if the students would prefer to have taken the course without the gameful elements (e.g. "I would have preferred to take the course without the XP-based grading system.").

The students were also asked about their playing behavior, identity as gamers, prior interest in the topic of the course, and how they would evaluate the course using common course evaluation questions (e.g. the instructor is an excellent teacher, the course materials were clear to understand, the course helped me develop competence, etc.). Finally, the majority of students were offered to enter their student IDs, so that their grades could be attached to their answers.

After the survey was administered in class, a short focus group session was held to discuss the design of the course, and to re-design certain aspects of the course. During this

session, the students were shown the theories (mentioned above) that were used in designing the course. The instructor of the course moderated the focus group session.

Finally, it should be noted that a flyer campaign was help at the beginning of the academic semester to recruit students for the courses, in order to help alleviate classroom atmosphere issues and to emphasize to prospective students that the course would be challenging and game-like (De Schutter, 2014).

Figure 1: The flyer that was used to recruit students for the gameful course.

Course design

On a macro level, the gameful course has been designed to implement the following game elements:

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

- experience points (XP; gained by successfully completing quests and transferred to a grade at the end of the semester),
- guilds (a different term for a group of students that can earn experience together),
- quests (a different term for the course assignments),
- a backstory (occasionally told by instructor during class),
- 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 choose themselves. 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. Finally, there were grind quests that students could do every week (e.g., attendance) and random quests that could occur during any given session (e.g. pop quizzes). While these elements would qualify for a gamified project, the course attempted to go beyond superficial gamification by implementing actual games, game mechanics and immersive storylines. For the latter, many sessions used digitally manipulated imagery and video footage, and whenever possible, the instructor communicated in-character (as "Dr. De Schutter, Force of Evil") with the students.

During the semester, the students are trying to figure out what happened to The Twelfth. The Twelfth is one of 12 prominent educational theorists, but has unfortunately disappeared. When stumbling into her room to investigate, they are attacked by a vampire kitty (i.e., one of the most dangerous creatures in the lands of IMSEDP225, as it is the perfect blend of deadliness and cuteness). To combat the vampire kitty, each guild has to send out a tank (a student role) to draw the evil cat's "mobs" (quiz questions about the 11 educational theorists). The tank is not allowed to battle the mobs as she is devoting all her energy to drawing them out (through a dice roll system). This puts guilds for an interesting choice: the best tanks tend to have the highest level (and best chance at drawing mobs) but are then no longer eligible to help defeat the mob. Thankfully, the guilds can swap tanks in between battles, and all students can use their character skills (which allows them to make the dice rolls easier, to pass on difficult mobs to others, etc.). At the end of the battle, each guild receives XP based on its performance. If a benchmark is met, everyone gains extra XP for defeating the vampire kitty. If the benchmark is not met, BF Skinner (who is depicted as vampire lord in the narrative) steps in and neutralizes the kitty through his behaviorist magic. Regardless of the outcome, the guilds get a choice that will direct the narrative and the next session.

While the full course design offered many different gameful, gamified and other experiences, the following elements were evaluated specifically:

- a midterm exam that 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),

- a session using a custom “Epic Game Battles of History” version of the meta-game (see www.metaga.me; i.e. a discussion game in which students have to argue that their game is better at a theoretical concept than the game of their opponent),
- a session in which the students had to develop their own lesson plan for the Civilization game series. After doing so, the lesson plans were analyzed in relation to the findings of Kurt Squire’s doctoral research,
- a session in which the students had to review 4 games using the RETAIN model (Gunter, Kenny, & Vick, 2008), and
- a session in which the students had to gamify a fictional product or service of their choice.

While the last three sessions were embedded in the narrative (e.g., the heroes wander into coven and are taught the black gamification magic, only to be saved in the nick of time by gameful designers), the gameful or gamified elements in these sessions were minimal. The Civilization and RETAIN session did require the students to play games though, and the next (third) iteration will include game mechanics for them as well.

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.

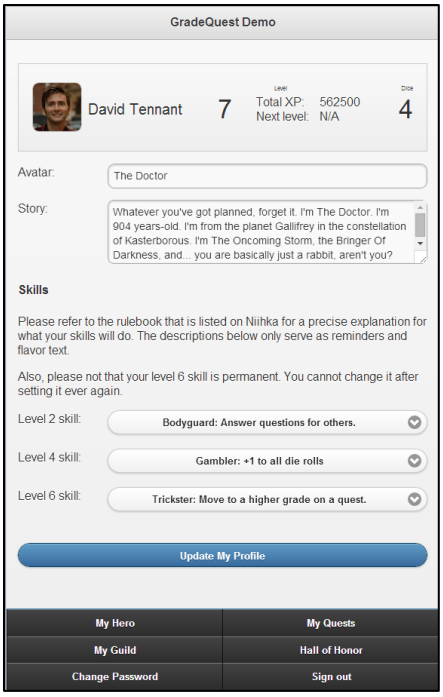

Figure 2: The “my hero” page of Gradequest.

Qualitative Evaluation

Teacher Log

In comparison with the previous iteration of the course, the improvements in class atmosphere were easily noticeable. The students rarely complained about course assignments, the gameful grading system, or each other during the semester. It seems fair to state that the improved course documentation and the option to do most quests in solitary fashion had a hand in this. Furthermore, the first session (in which the students were told directly that the course would be challenging and a significant amount of work) proved to be an efficient way to avoid students who signed up with the wrong expectations. A few students dropped the course and others mentioned during the year that the first session led to them adjusting their expectations. Aside from the improvement in class atmosphere, there were few notes worth mentioning in the

teacher log that are not replicated in the other, less objective methods of this research project (and that are described below).

Small Group Instructional Diagnoses

The SGIDs were held at the midpoint of the semester so they did not represent the full semester. Concerning the strengths of the class, 6 out of the 10 questions were simply positive comments about the teacher and class content. (E.g., the instructor is engaging (95%), the class content is a good mix of theory and practice (100%), etc.) The other 4 comments seemed to highlighted some of the strengths of the gameful instruction:

- 90% of the students enjoyed the story-mode style of the class,
- 80% preferred the “point system” (sic) rather than averaging grades,
- 90% felt that they had freedom in projects, and
- 85% felt that the group work during class was interesting.

The non-gameful course received 11 positive comments in comparison, and these seem to indicate that the students do not perceive too many differences between both courses. Even some of the findings that could easily be attributed to the gameful instruction methods of the other course are replicated: 88% of the students mention that they appreciate the opportunities for group work in class, and 94% mention felt that they had freedom to come up with their own assignments.

On top of listing the strengths of the class, the students also offered suggestions for improvement. Again, the majority of the 24 suggestions in the gameful course focused on aspects of the course that had little to do with the gameful instruction (e.g., make the due dates later in the day (95%), provide more supplementary readings (74%), etc.). However, one suggestion did

pertain to the gameful instruction, as 95% of the students asked to provide a way to gauge how they were doing in the class. This is a recurring issue with the gameful course. In comparison to the class letter system, it is more difficult for students to estimate their final grade. Unfortunately, it is quite difficult to provide students a glimpse at their future, as it is one of the perks of the gameful instruction grading that they have more opportunities to make up for mistakes in comparison to receive a letter grade average. During the first iteration an algorithm was implemented in Gradequest to let students see their projected letter grade, but this only led to more insecurities and confusion.

As the non-gameful course only offered 7 suggestions in comparison (4 of which did not even receive the support from more than 76% of the class), it seems that the non-gameful course is a more mature course design. Some of the best strengths seem to be replicated, while the students have less critical suggestions. However, from a teacher perspective, the students of the gameful course simply seemed much more involved with the course design. They were very interested in gamification (which is a topic that was discussed as part of the gameful course), and quite eager to improve the design of the course. When considering the gameful course on its own merits, the SGID seems to indicate that the course is appreciated by the students, even if there are still some issues to be sorted out.

Qualitative Survey Questions

During the survey (taken at the end of the semester), the students were asked a few open questions. First, the students were asked who their favorite character was. Their favorite character was “Kurt Squire (as Gandalf; 6 votes), followed by Vampire Kitty (5; see above) and “Ian Bogost (as Stan from South Park; 2)”. 2 students indicated that they did not remember any

of the characters at the time of the survey. This finding indicates that the fantasy aspects of the course content were remembered by most of the students.

Next, the students were asked to write down any comment that they had about the course that was not addressed in the survey. The majority of (anonymous) comments contained a lot of positive remarks (e.g., “more fun than all of the other classes”), both for the course’s gameful design, as well as for the instructor (e.g., “you did a great job”). The most often mentioned suggestion was that a student would ask for either “more quests like quest X” or “less quests like quest Y”. However, there was no clear pattern here. Next, a few students asked for a little less freedom in the side quests, in particular towards the choice of topic. They felt that the side quests would be more efficient if they would be assigned a topic (that preferably had already been discussed in class) or if they would have to pick a topic from a pick list. Finally, some students remarked that the grading felt too harsh, that they felt disadvantaged for not being a “gamer”, and that the workload was too much for a 200 level course.

Focus group

The focus group specifically addressed design adjustments for the course. Again, the students mentioned a lot of positive aspects (e.g., freedom of choice, helpful feedback, chances to fail and make up for it, engaging game-like activities, etc.). The students also mentioned concerns that have already been mentioned in this paper (e.g., a preference for themed side quests, grade predictions, etc.). However, three new concerns were raised. First, the students felt that the side quests should have a sense of progression. Ideally, a student would build upon a previous side quest when doing the next. For example, the first side quest could be a design document so that the second side quest could be the implementation of that document. While

nothing stopped the students from doing this, they nonetheless felt that it should be encouraged to do so in some way. Second, the students felt that the story – while much appreciated – seemed to eat up too much of the class time. They would prefer to receive some of the lore as text or video, or to be offered the opportunity to come in earlier for the class lore. Finally, the students felt that there should be more guild assignments.

Course evaluations

The course evaluations offered the possibility to compare the student perception of the course with other courses that are taught at the department. The results were positive as both courses scored higher than the department mean throughout the evaluations. The survey for the gameful course contained 6 comments. Overall, the findings that were mentioned above were replicated. Two comments are worth mentioning, though, as they clarify some of the previous findings. First, one of the students mentioned that she felt that "*the unbelievable amount of effort put into the course rubs off on your students*". While the amount of work that it costs to do gameful instruction could be off-putting to new teachers, this comment merits further study. Next, several students complained about the predictive value of the grade system again, but one student mentioned how she "*didn't recognize the value of stacking points instead of weighted assignments until late in the semester & realized I loved it!*" This suggests that more explanation about the grading system at the beginning of the semester could help to remediate the issue.

Quantitative Evaluation

Evaluating the design of the course elements

The students reported to check Gradequest about 2 times per week (M = 2.2, SD = 1.7), which seems to coincide with the 2 sessions of class per week. Table 1 provides the means and standard deviations (the latter between brackets) for the extent to which students reported to enjoy specific design elements, or the extent to which they were motivated and engaged by them. The 'without' column indicates whether or not the students would have preferred to take the course without the specific gameful element to it. As the survey used 7-item Likert scales, values below 4 are in disagreement, while values above 4 are in agreement with the statements.

Table 1. Evaluation of the design elements of the course

	Motivate	Enjoy	Engage	Without	Overall
Civilization Exercise	5.7 (1.1)	6.1 (1.0)	6.2 (0.7)	1.8 (1.0)	6.0
Gamification Exercise	5.8 (1.6)	6.0 (1.3)	6.0 (1.5)	2.2 (1.4)	5.9
Special Skills	5.7 (1.2)	5.8 (1.2)	5.8 (1.0)	2.2 (1.5)	5.7
RETAIN Exercise	5.5 (1.1)	5.9 (0.9)	5.6 (0.8)	2.8 (1.4)	5.7
Story Elements	5.5 (1.7)	5.6 (1.8)	5.8 (1.1)	2.3 (1.7)	5.6
Metagame	5.2 (2.0)	5.7 (1.9)	5.8 (1.6)	2.5 (1.9)	5.6
Choice of Side Quests	5.5 (1.6)	5.6 (1.6)	5.6 (1.9)	2.9 (1.1)	5.6
Achievements	5.6 (1.2)	5.5 (1.2)	5.5 (1.2)	2.6 (1.4)	5.5
Leaderboards	5.8 (1.6)	5.4 (1.4)	5.4 (1.4)	2.4 (1.6)	5.5
XP Grading	5.3 (1.4)	5.1 (1.7)	5.4 (1.5)	3.8 (1.9)	5.3
Random Quests	5.0 (1.8)	5.2 (1.9)	5.5 (1.6)	3.0 (1.8)	5.2
In-Character E-Mails	4.9 (1.2)	5.4 (1.2)	5.1 (1.2)	2.6 (1.4)	5.1
Midterm (Taboo)	4.8 (2.0)	5.1 (2.0)	5.4 (1.7)	3.3 (2.1)	5.1
Guilds	3.7 (1.6)	3.8 (1.6)	3.8 (1.6)	3.6 (1.5)	3.8

In general, the results suggest that students appreciated the various elements of the course. In fact, with the exception of the guilds, almost every item scored higher than 5 on average (which is significantly higher than the neutral value of 4 at the .001 level). The reason for the guilds lagging behind the other elements could be twofold: 1) students can miss

experience points during guild assignments when their teammates fail to perform, and 2) some students mentioned in the qualitative evaluation of the course that they were disappointed that the guilds were underused.

Comparing both courses

The survey also compared the gameful course with the non-gameful course, on measures of motivation (i.e., SiMS) and engagement (i.e., GEQ). Kolmogorov-Smirnov tests indicated that the distributions for all variables did not deviate from a normal distribution, and *t*-tests revealed but one significant difference between the gameful and the non-gameful course. The non-gameful course scored significantly higher on external regulation motivation ($t(32.259) = 2.058$, $p < .05$). The non-gameful students therefore seem to consider external rewards more often as a motivation for doing the course, as opposed to the gameful students. A tentative explanation for this finding could be that the non-gameful students are taking the course in the hope of landing a job in the gaming industry later on, while the gameful students are taking the course in a more casual manner.

Table 2. Analysis of the SiMS and GEQ measures (t-test)

	Gameful	Non-Gameful	t
SiMS - Intrinsic Motivation	5.4 (1.1)	5.4 (1.6)	-0.031
SiMS - Identified Regulation	5.4 (1.1)	5.5 (1.2)	0.310
SiMS - External Regulation	3.4 (1.5)	4.4 (1.5)	2.058*
SiMS - Amotivation	2.5 (1.1)	2.6 (1.6)	0.142
GEQ - Immersion	5.3 (1.1)	5.2 (1.1)	0.809
GEQ - Positive Affect	5.2 (1.2)	5.5 (1.4)	0.248
GEQ - Challenge	5.0 (1.2)	4.5 (1.1)	-0.411
GEQ - Competence	4.9 (1.3)	5.0 (1.2)	-0.145
GEQ - Flow	4.2 (1.0)	4.1 (0.9)	-0.902
GEQ - Tension/Annoyance	3.7 (1.6)	3.2 (1.4)	-1.462

GEQ - Negative Affect	3.5 (1.3)	3.5 (1.4)	-0.099

** Significant at the 0.05 level*

Even though they are few significant findings, the results are quite positive for the course design. Considering the SiMS scale, intrinsic motivation and identified regulation score one point higher than the neutral value on average for both courses, and well below the neutral value for amotivation. The results for the GEQ scale (which is a scale developed specifically for measuring game experiences) also indicate that the course is well-received. Immersion and positive affect score above 5 for both courses, while Challenge, Competence and even Flow manage to score above 4 on average. The two negative items (tension/annoyance and negative affect) received scores below the neutral value.

Other findings

While the eventual grade of the students correlated significantly with positive affect ($r = .286$, $p < .05$) and competence ($r = .342$, $p < .01$), no significant correlations were found between the students' final grade and the motivational factors or negative affect.

Discussion and conclusion

While the previous iteration of the Gradequest project led to an unfavorable result for the gameful course, it seems that the gameful course has redeemed itself in this iteration. As was to be expected, significant difference disappeared as the classroom atmosphere improved and the course was presented in a more clear fashion (see De Schutter, 2014 for an overview of all the changes that were made). The elements of the gameful course were also evaluated quite positively with almost every item scoring a full point above the neutral value of 4. It can

therefore be concluded that the gameful elements are perceived to be a positive contribution to the class. However, the qualitative inquiries provided more nuance to this assessment. Their findings suggest that certain adjustments still need to be made to optimize the integration of the gameful elements of the course.

Concerning the gameful elements of the course, a pattern seems to emerge. Three of the four top-ranked elements are engaging activities that are not necessarily very game-like, i.e. the RETAIN, Civilization and Gamification exercises. There are definitely similarities between the problem-solving activity that the students are presented with in these sessions and puzzle games, but overall these sessions do not include any direct competition or cleverly implemented game mechanics that are not essential to the activity. Considering the "chocolate-covered broccoli" metaphor that is used to describe educational games that are not very fun, one could argue that these activities are simply very well-cooked broccoli without any chocolate whatsoever. In the next iteration, some game elements (i.e., a wagering and competition mechanic) will be added to these to see how it impacts their success.

Looking past these three sessions, it seems that a second place would go to gameful elements (that use actual game mechanics), a third place would go to the gamified elements (that rely on extrinsic motivation), and a fourth place to elements that impact grades directly. This finding matches the conclusion of the previous iteration. However, the pattern seems to become less clear as in-character elements score quite low for an element that arguably would fit the gameful design idea. Nonetheless, the element did get a fairly high score.

Comparing both iterations, there seems to be an important role for the personal attitude of the student towards the course. The midterm was received poorly in the previous iteration, to the point that students became upset about it and wanted it removed from the course. For this

iteration, the midterm is still at the lower end of the spectrum (possibly because it strongly affects grades), but it is nonetheless rated significantly higher that the neutral value. Furthermore, some students came up to the instructor after the midterm to tell him that it was the most fun they ever had during an exam. This surprisingly positive reception of the midterm is an interesting finding as there was no change in its execution. The only difference was that there was a brief power outage during the midterm that forced students to continue playing with their cell phone lights on. While this led to a highly immersive 5 minutes of midterm – after all, the fantasy of the course was about the students trying to survive in a dungeon – it seems unlikely that these 5 minutes would lead to such a large perception shift.

A similar remark could be made concerning the guilds. During the previous iteration and its less than optimal class atmosphere, the guilds feature was evaluated poorly and the guilds were minimized for the second iteration. While the guilds still get the worst review out of all surveyed elements, the students of the second iteration were quite clear in their qualitative responses that they wanted more guilds-based assignments. Again, the attitude of the students towards the course seems to play a significant part.

Finally, the findings indicate that the experience that is delivered by the course is not that far off from an actual game. While the gameful course might not provide the artistic or aesthetic merits of a well-designed game, it does seem to provide an engaging, enjoyable and intrinsically motivating experience. While it can be argued that these three elements do not capture the essence of what makes a game a game, it can also be argued that they are definitely not completely foreign concepts to the nature of games either. Furthermore, it should be noted that the Game Experience Questionnaire (IJsselsteijn et al., 2008) that was deployed in the survey of this study, has specifically been developed to measure the player experience of actual

commercial games. While there is definitely room for improvement concerning the GEQ measures, the results for the gameful course are respectible.

For other instructors that are interested in adopting gameful instruction in their classroom, it should be noted that it is a long and laborious process to “get it right”. The gradequest project uses a wide range of design research methods, and all of them were able to add their own touch to the results of this paper. Nonetheless, while the quantitative results do not show an immediate significant result, the superlatives in the comments that were made by the students during the qualitative research seem to suggest otherwise. It would therefore be interesting to compare the gameful instruction method in courses that do not include many inherently engaging and creative activities such as game design.

Epilogue

The student who ended up with the highest score in class mentioned after the semester that the all-time leaderboard was highly motivating to him. (This leaderboard contains the top 3 heroes of all-time and is shown at the beginning of the semester). As he wanted to both immortalize himself and embarrass the instructor for years to come, he started the semester with the most vulgar hero name that he could came up with: “Scrotie McBoogerballs”, a reference to an episode of the South Park animated series. By the end of the semester, “Scrotie” did fulfill his questionable destiny and he became the #1 all-time hero of the course at the time of writing. While his legacy might end one day (hopefully before the instructor inevitably retires from teaching the course), his name even became the title of a research paper.

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