Return of Gradequest - Evaluating the Third Iteration of a Gameful Course

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ABSTRACT

The use of game design techniques in a non-gaming context - or 'gamification' [9]- offers the promise to make education more motivating, engaging and enjoyable to students. This study reports on both the design and evaluation of gameful class that has incorporated a variety of game design techniques through an online application named 'Gradequest'. At the time of writing this paper, the course has finished its third iteration. Across these iterations, multiple methods were used to measure the outcomes of the course, including quantitative surveys, focus groups, teacher logs, small group instructional diagnoses, university-wide course evaluations, etc. This paper summarizes how specific changes to the course design during the three iterations has led to increasingly better outcomes. Furthermore, the students of all three iterations (N = 48) are analyzed in order to identify different student profiles. The findings of the study are used to formulate recommendations towards the design of gameful instruction.

Categories and Subject Descriptors

I.6.8 [**Types of Simulation**]: Gaming - K.3.1 [**Computer Uses in Education**]: Computer-Managed Instruction (CMI)

General Terms

Measurement, Design, Experimentation, Human Factors, Verification.

Keywords

Gamification, game design, education, learning, intrinsic motivation, course design.

1. INTRODUCTION

While the idea of 'gamification' and its strategy for motivating and engaging users is not new with historical examples stemming from Soviet attempts at replacing capitalistic notions of pay [26], the novelty of its term, which has appeared recently, resonated deeply in the arena of marketing. Though still a hot topic, the appropriation of game design techniques for non-gaming purposes, has slid into the 'trough of disillusionment' of Gartner's 2014 Hype Cycle Special Report - a subjective overview of the relative maturity of a technological innovation [15]. The end of Gamification's tenure at the peak of expectations seemed inevitable. Its hype deflation in the industry coincides with critics from both game design [25] and game scholarship [13] questioning the effectiveness of the process that has normally been connected with the use of game-inspired extrinsic motivations (e.g., badges and points) outside gaming contexts.

Previous investigations into gamification's role in motivating users illustrate a divide in what elements of game design are actually appropriated. Hamari, Koivisto, and Sara's literature review [19], for example, identifies 24 studies on applied gamification. Their sample demonstrates two camps: those that implement classic gamification (i.e., points, leaderboards, achievements, rewards, progress, and feedback) and those that focus on gameful design (i.e., levels, story, clear goals, and challenge). Rather than relying on the rewards structure and other surface-level features of games, which has been indicated by the aforementioned literature review to cause short-term positive effects, gameful design seeks to emulate the underlining mechanics of games as an avenue for increasing users' intrinsic motivations to participate and engage more.

This objective for discovering the motivational forces of games and applying them to the workspace and market has also cropped up in other fields such as education. In the classroom, gamification and gameful design have recently emerged as a subject of inquiry for instructors and researchers alike. Dicheva et al.'s [10] systemic mapping study of gamification's inclusion in education identifies 34 studies related to gamified courses. Following at the heels of the Gartner's Hype Cycle, publications about educational gamification increased significantly during 2013 [14]. Such attention being drawn to game-inspired course design translates into a grounding of expectations as the results detail not only positive results but also the studies' reliance on mediating factors and challenges faced in innovating courses.

In terms of the motivational effect on students, the literature highlights participation as a significant element in student's relation to course materials. For example, Barata et al. [3] describe how the inclusion of more challenges (i.e., forum threads) saw more student posts even when their overall weight did not factor heavily for grade calculation. As for during lecture, gamified instruction, as in Iosup and Epema's case study, accounted for higher attendance in optional lectures with students responding positively to having to unlock higher levels of content [22]. Outside higher education, Brewer et al. [5] introduced scoring and rewards systems to children and demonstrated a significant increase in participation at a lower age. Overall, the research suggests that gamification and gameful design foster engagement with activities and tasks in the educational setting.

Although gamification has shown some success with motivating students, the literature also underscores the problems of gamification or gameful design's implementation. Some challenges arise with the possible increase in competition among students [18], difficulties in evaluating a task [11], and increased work load doing so [28], design problems that are unique to very specific contexts [12], as well as cold reception from students

institutionalized by traditional methods of instruction [4]. While the field has begun addressing these complications, such as Aguilar et al. [2] possibly finding the need to allow for students opting in and out of certain game elements (e.g., leader scoreboards), more pragmatic knowledge is still needed to understand the best practices for integrating gamification in education.

Given these obstacles faced by instructors of game-inspired courses, the literature recommends to emphasize actual game mechanics, not just reward structures. This article presents the third iteration of a research project that has been informed by models and frameworks already in the field (e.g., [32], [24], and [27] for more influences, see previous papers [7], [6], and [8]). Following the design principles and elements of the aforementioned, the Gradequest project details the different student responses to many gameful elements while also providing a practical approach to gameful design.

2. THE GRADEQUEST PROJECT

Starting with the fall 2013 semester, two 3 credit hour undergraduate courses in a liberal education program were redesigned. The first course was a course on the principles of game design, from now on referred to as the 'non-gameful course'. The second was a course on game design for educational purposes, from now on referred to as the 'gameful course'.

Both courses share 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.

This paper reports on the third iteration of this project. For this iteration, the gameful course had 16 students (3 female) while the non-gameful course also had 16 students (5 female). The students in the courses majored in a wide variety of academic disciplines, including interactive media studies (10), computer science (4) and strategic communication (3).

2.1 Course design

In order to capture the essence of 'gamefulness' and move away from the surface-level inclusion of rewards systems made popular by classic gamification, a mixture of both approaches were included in the gameful course as the following game elements:

- heroes (fantasy alter ego's for the students),
- experience points (XP; gained by successfully completing quests and then 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 during class),
- achievements (rewards for certain goals in class),
- character levels (in-class superpowers chosen upon reaching a certain level), and

- leaderboards (high-score tables).

The above elements were selected as to align with pre-existing literature surrounding not only player motivation (e.g., [27], [31], and [23]) but also media enjoyment (e.g., [33]) and game design (e.g., [1], [29], and [30]). Such an amalgamation of social science, entertainment, and design influenced the overall aesthetic of the course, which strived to emulate games via being engaging (e.g., heroic personas and narrative), collaborative (e.g., guilds and group-based projects), and motivating (e.g., experience points and levels).

The course offered four different types of quests. *Story quests* were quests that featured required assignments and in-class activities that students had to complete throughout the semester as individuals or as groups. Such quests aimed to lead students through core experiences (e.g., as 'an avatar is born' (i.e., designing an avatar), 'the meta-game champion rises' (i.e., playing a custom made version of LocalNo12's metagame[1]), 'survive the midterm gauntlet' (i.e., a playful midterm reminiscent of Hasbro's Taboo[2] game), 'challenge the Fallen Ones' (i.e., presenting final projects in front of an expert jury).

Another major source of experience points came in the shape of *side quests*, or optional quests due on specific dates throughout the semester. Students were free to submit (or not submit) work, choose to work alone or in a team of two, and pick their favorite type of side quest (e.g., game design, game analysis, or literature review) and their favorite medium (e.g., paper/digital prototype, poster, or video). The point structure for each side quest allowed students to get a subpar evaluation or even a 'wipe' (i.e., 0 out of 100,000 XP) once and still be able to make up for it at a later time.

Besides main and side quests, students were presented with a plethora of *optional quests* that consisted of 'grind' quests students could accomplish every week (e.g., attendance). Other optional quests resembled achievements in that they awarded students who put extra effort in their work, such as

- master of the watch (attending every class in any given month),
- helpful hand (providing demonstrable help to another student and/or group),
- consult the playtest oracle (seeking feedback in the form of playtests for final projects),
- visit the wise one (having an expert in the field playtest a final project),
- epic win (submitting a side quest that truly surprises and excites the instructor [a rare event]), etc.

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[1] The metagame is a card game in which players have to argue why the game on their card (e.g., Tetris) is better at a random comparison (e.g., which has the bigger affinity group?) than the game on their opponent's card (e.g., World of Warcraft).

[2] Taboo is a game in which one player explains a term without actual naming it. The other players attempt to guess the word.

Finally, the course provided sporadic random quests called ambushes. These ambushes could take place either during the beginning or end of a class session. Random quests appropriated more explicit game mechanics in conjunction with quizzing students on recently covered material. For example, when facing a giant ogre, guilds would roll for initiative to see which would be able to provide an answer to the question, 'What are 5 ways through which the designed experience of Sid Meier's Pirates facilitates learning as mentioned in the Kurt Squire talk?' One-by-one guilds could respond with one of their answers until all correct responses are chosen. The random quests also served to incorporate guild activity since challenges were won or lost through teamwork.

Especially for the aforementioned ambushes, students accumulated character skills as they leveled their way through the class. These skills provided an additional layer of gameful design and allowed students to take more control over not only the gameplay of specific, game-like activities in class but also their overall grade. For example, a 'bodyguard' hero could jump in for another guild member if he or she did not know the answer to a question during an ambush, while 'dodgers' could pass on questions and answer different questions. Working in guilds, members could synergize their character skills where dodgers could skip questions allowing bodyguards more opportunities to rush in and answer. Other skills like the capstone skills-'giant' (i.e., a single-use boost of 15,000 XP) and 'trickster' (i.e., move up one spot in the grading scale)-affected students individually outside of ambushes and main quests.

The evaluation of student work determined how much XP a student would get for a quest. The course offered 5 possible results:

- "Wipe" - The student did not do the assignment, or completely failed to meet the rubric standard.
- "Barely acceptable" - The student did the assignment, but the rubric standard is not fully met.
- "Acceptable" - The student met the rubric standard.
- "Good" - The student exceeded expectations.
- "Very Good" - The student exceeded expectations to the extent that the work sets a new standard.

Each quest was assigned an appropriate amount of XP for each of the 5 possible outcomes, with a 'wipe' often being 0 XP. Several simulations were run to determine which amount of XP would be appropriate for which final letter grade. A student who would receive "Good" evaluations on the most important quests would end in the B+ to A range.

2.2 Software Development

To better facilitate the course's gameful nature through direct feedback and a sense of progression, a custom built system was constructed: Gradequest is a 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 (allowing the students to access a personal profile page, a quest overview page, a guild overview page, and a leaderboard).

The Gradequest software's interface is very minimal as it does not offer thematic graphics. While this contrasts with the actual course (which features a lot of thematic graphics) it was deemed more important to have a fast-loading and responsive mobile app, than a very thematic one.
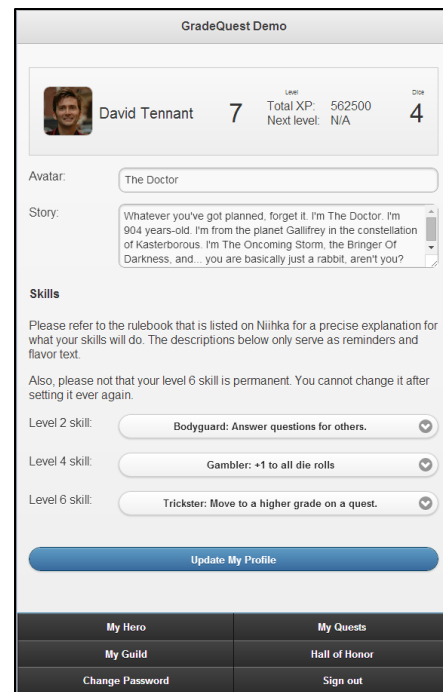

Figure 1 – The "My Hero" page of Gradequest

As to protect student confidentiality, the character levels were capped at 10 even when students could surpass that level's XP requirement, so they could not figure out each other's grades (i.e., the 525,000 XP requirement for level 10 is just shy of a D-grade). Likewise, the guild overview page only showed the percentage of XP each guild had accumulated in relation to the total amount of XP gained by the entire class.

Although the field is beginning to come out with gamified learning management systems, such as GradeCraft by Holman, Aguilar, and Fishman [20], Gradequest was chosen for this iteration of the gameful course in order to limit the potential changes brought out by the implementation of a new instructional system.

2.3 Changes for Iteration 3

As Gradequest went through multiple iterations, the project has been evaluated extensively through a multitude of qualitative and quantitative measures. After its first iteration, it was revealed how its implementation lead to lower levels of intrinsic motivation in comparison to the non-gameful course, and that mediating factors (e.g., the role of the teacher, the clarity of the teaching materials, etc.) outweighed the gameful format in explaining motivational outcomes [6]. Through numerous adjustments to the design for the second iteration [7], the project managed to find the same (positive) levels of intrinsic motivation among both courses.

While this result might seem disappointing, qualitative inquiry indicated that most of the students appreciated the gameful approach. It should also be noted that the gameful course is compared to a course that is highly appreciated by the students that take it, and both courses score good grades on the measures. Finally, from a teacher perspective, it is quite refreshing to teach in a gameful manner, as the game elements make the course more surprising.

After iteration 2, the following changes were made:

- Class time was used more effectively, as the story elements were explained a few minutes before the class started.
- The story line was developed entirely. In the second iteration, some shortcuts had to be made due to time constraints.
- To make the grading system clearer, the rubrics were optimized and a new module was added to Gradequest that showed students which quests were still available to them (see Fig. 1).
- A "quick assembly" slide containing the student names assigned to a team was used to speed up ambushes and other in-class assignments.
- The schedule for quests was shown after every class.
- The course allowed students to do less side quests.
- Two of the four side quests were given an optional theme (i.e., pervasive games and gameful instruction).
- Due dates for the quests were moved from Sundays to Saturdays.
- Students received a full explanation of the gameful mid-term a week before it started, (as opposed to learning about the rules when the exam started).
- One of the "engaging but not very game-like activities" of iteration 2 [8] was given an additional gameful element to see how this would impact its evaluation.
- The ambushes were designed with different complexities, in order to see which ones would be preferred.

Some of these changes are related to gameful elements, while others are more general in nature.

Figure 2 – Gradequest's Overview of Unfinished Quests

3. RESEARCH QUESTIONS AND METHODS

This paper considers the same research questions and methods as the previous two iterations:

1. How does self-reported intrinsic motivation and engagement of students differ for 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?

However, it is not the intention of this paper to reiterate every finding that was already reported. Therefore, a fourth question will be addressed as well. As opposed to the three prior questions, this question will be analyzed using data from the all three iterations of gameful course (N = 54).

4. What is the role of the player-student in explaining the motivational outcomes of gameful instruction?

To answer these questions, the following methods were used during iteration 3. For an overview of the methods used in the other iterations, please refer to their corresponding papers.

At the midpoint of the semester, the students were given blank playing cards and were asked to write up what they perceived to be the strengths and weaknesses of the course. These cards were collected, shuffled and entered into a spreadsheet.

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) [17], the core module of the Game Experience Questionnaire (GEQ) [21], and the Ten-Item Personality Inventory (TIPI) [16]. The SiMS measures the following motivational concepts:

- intrinsic motivation (Cronbach's α = .890; i.e, performing an activity for itself),
- identified regulation (α = .891; i.e., performing a valued activity as a means to an end),
- external regulation (α = .765; i.e., performing an activity for external rewards), and
- amotivation (α = .843; i.e., an activity that is neither intrinsically nor extrinsically motivated).

The GEQ measures the following concepts:

- imaginative and sensory immersion (α = .904; e.g. "*It felt like a rich experience*"),
- annoyance/tension (α = .923, e.g. "*I felt irritable*"),
- flow (α = .727; e.g. "*I was fully occupied*"),
- competence (α = .909; e.g., "*I was good at it*"),
- positive affect (α = .819; e.g., "*I enjoyed it*"),
- negative affect (α = .764; e.g., "*I was bored*"), and
- challenge (α = .738; e.g., "*I had to put a lot of effort into it.*").

The TIPI measures the Big Five personality dimensions: (As the TIPI only contains two items per personality trait, no Cronbach's alphas are provided.)

- extraversion (e.g. "*I see myself as extraverted, enthusiastic*"),
- agreeableness (e.g. "*I see myself as sympathetic, warm*"),
- conscientiousness (e.g. "*I see myself as dependable, self-disciplined*"),
- emotional stability (e.g. "*I see myself as anxious, easily upset*"), and
- openness to new experiences (e.g. "*I see myself as open to new experiences, complex*").

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 entered their student IDs, so that their grades could be attached to their answers.

After the students filled out the questionnaires, a focus group session was held. This session was informed using the course materials concerning gamification.

Aside from gathering quantitative and qualitative data, the instructor kept track of his own perceptions of the course, the students' behavior in class, and any changes made to Gradequest in a teaching log.

4. FINDINGS

4.1 SiMS and GEQ

The results of previous iterations concerning the GEQ and SiMS scales were largely replicated for the gameful and non-gameful course upon reviewing their respective surveys. There was no significant difference between the gameful and non-gameful group, except for external regulation ($U = 49$, $r = .43$, $p < .05$). 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 1. SiMS and GEQ measures between courses

(Mann-Whitney Test)

	Gameful	Non-Gameful	U
SiMS - Intrinsic Motivation	5.9 (0.9)	6.1 (0.7)	85.5
SiMS - Identified Regulation	5.8 (0.9)	5.8 (1.2)	89
SiMS - External Regulation	3.3 (1.1)	4.6 (1.6)	49*
SiMS - Amotivation	1.9 (1.0)	2.2 (1.4)	89.5
GEQ - Positive Affect	5.7 (1.0)	5.9 (0.6)	94.5
GEQ - Immersion	5.6 (1.0)	6.1 (0.7)	76
GEQ - Competence	5.2 (1.4)	5.4 (0.8)	103.5
GEQ - Challenge	4.3 (0.9)	4.8 (1.0)	76
GEQ - Flow	4.1 (0.8)	4.7 (0.8)	64.5
GEQ - Tension/Annoyance	2.8 (1.2)	2.9 (1.4)	103
GEQ - Negative Affect	2.7 (1.1)	2.9 (1.1)	89

(* Significant at the .05 level)

Similarly, only one significant difference was found when comparing iteration 2 and 3 to one another. Challenge ($M = 4.27$, $SD = 0.90$) was significantly higher in iteration 2 ($U = 77$, $r = .39$, $p < .05$). While the third iteration was therefore perceived to be easier than the second iteration, no support was found for this when comparing the average final scores of both iterations. A T-test revealed no significant difference, and the average score for iteration 2 ($M = 913,428$, $SD = 120,205$) was actually lower than the average score for iteration 3 ($M = 946,406$, $SD = 140,196$). It is therefore more likely that the significant difference is due to improvements in the course design (e.g., the clearer grading system).

Table 2. SiMS and GEQ measures between iterations

(Mann-Whitney Test)

	Iteration 3	Iteration 2	U
SiMS - Intrinsic Motivation	5.9 (0.9)	5.4 (1.1)	114.5
SiMS - Identified Regulation	5.8 (0.9)	5.4 (1.1)	107
SiMS - External Regulation	3.3 (1.1)	3.4 (1.5)	141.5
SiMS - Amotivation	1.9 (1.0)	2.5 (1.1)	95
GEQ - Positive Affect	5.7 (1.0)	5.2 (1.2)	106.5
GEQ – Immersion	5.6 (1.0)	5.3 (1.1)	125
GEQ - Competence	5.2 (1.4)	4.9 (1.3)	124
GEQ - Challenge	4.3 (0.9)	5.0 (1.2)	77*
GEQ - Flow	4.1 (0.8)	4.2 (1.0)	131
GEQ - Tension/Annoyance	2.8 (1.2)	3.7 (1.6)	98
GEQ - Negative Affect	2.7 (1.1)	3.5 (1.3)	86.5

(* Significant at the .05 level)

4.2 Gameful Design Elements

Like previous iterations of the course, the survey also evaluated the students' responses to the integrated gameful design elements. The results between both iterations concerning the elements appeared to be quite different. Table 3 provides the means and standard deviations (the latter between parentheses) for the extent to which students reported to enjoy, were motivated, and engaged. The provided means are averages of all the reported responses to each gameful element.

Table 3. Evaluation of the Gameful Design Elements

	Iteration 3	Iteration 2	Rank Change
Choice of Side Quests	5.9 (0.9)	5.6 (1.6)	+6
Metagame	5.9 (0.6)	5.6 (1.7)	+4
Random Encounters	5.6 (0.7)	5.2 (1.6)	+9
Feedback	5.5 (0.9)		
Playtests	5.5 (0.9)		
Achievements	5.4 (1.4)	5.5 (1.2)	+4
Civilization Exercise	5.3 (1.5)	6.0 (0.9)	-4
Gamification Exercise	5.3 (1.5)	5.9 (1.4)	-4
Final Project	5.3 (1.8)	5.3 (1.2)	+3
Character Skills	5.1 (1.4)	5.7 (1.1)	-5
RETAIN Exercise	5.1 (1.3)	5.7 (0.9)	-5
Heroes	5.0 (1.7)		
RETAIN Game	4.9 (1.3)		
Story Elements	4.9 (1.9)	5.6 (1.5)	-5

In-Character Emails	4.8 (1.5)	5.1 (1.3)	+2
XP Grading	4.6 (1.8)	5.3 (1.4)	-1
Leaderboards	4.6 (1.9)	5.5 (1.3)	-4
Midterm (Taboo)	4.1 (1.6)	5.1 (1.7)	0
Guilds	3.8 (1.7)	3.8 (1.6)	0

Although the results seem to demonstrate a lot of mobility, when analyzed through a series of Mann-Whitney Tests, however, no significant differences were found.

Looking closer into the random encounters (i.e., ambushes) –and more specifically, which types of ambushes students respond to positively - reveals that they prefer random quests that require them to think about previously discussed materials and/or create new insights. For example, the former received a mean and standard deviation of 6.2 and 1.3, respectively, while the latter scored 6.2 and 1.1. Although the other types of ambushes did not receive as positive scores, all scored favorably among the students (e.g., testing knowledge about previous class discussions [$M = 5.6$, $SD = 1.2$] and requiring the replication of old material [$M = 5.2$, $SD = 1.1$]). The extra work that was put into the ambushes and the variety of quiz styles did seem to pay off for this iteration.

4.3 Qualitative Results

Alongside questions aimed at collecting students' self-reported motivation and engagement, the end-of-semester survey also asked about their favorite characters that appeared in the course's fantasy narrative. Defeating the likes of Kurt Squire dressed as a wizard and a James Paul Gee Demon, the Vampire Kitty received the most votes. Interestingly enough, a student voted for one of his or her fellow student's fantasy avatar, "The Hashslinging Slasher," lending credence to the idea that by acknowledging students' avatars in class may increase the immersion of these gameful elements.

As for feedback on the general course design, most respondents focused on non-gamified elements of the class, such as providing more themes to select from during their side quests, presenting examples of previous student work with commentary on what makes each work successful, and moving due dates for side quests to later days of the week. Students' responses to the gamified elements of the course, vacillated from praising the novelty of the XP system and/or freedom to fail to discussing weaknesses to the point system. Similar to previous findings, students mentioned during the mid-semester evaluation that they found calculating their grade in the class difficult and wished for some way to extrapolate what their grade might be in the future.

4.4 Player-related Factors

Considering the values for the perception of the students prior to taking the course, the course was expected to be moderately challenging ($M = 4.2$, $SD = 1.6$). It seems however, that the course turned out to be more challenging than they expected ($M = 6.0$, $SD = .62$).

The extent to which student-related factors predicted the outcome of the course was analyzed through a step-wise linear regression analysis with an aggregate score for all course elements ($\alpha = .931$) as the dependent variable. The resulting model explained 50.2% of the total variance ($F(3) = 14.414$; $p < .001$). The strongest predictor was the extent to which the student self-identifies as a gamer or a geek (.334), followed by openness to new experiences (.333) and prior interest in the course (.286). The other personality traits did not predict the dependent variable.

There was no significant differences between male and female students in their overall evaluation of all course elements ($t(45) = 1.740$, $p = n.s.$).

5. DISCUSSION

For its third iteration, Gradequest has seemed to strike a delicate balance where most game design elements are positively evaluated except for the guilds, with the activities having values above the neutral value of 4. The guilds were never mentioned in any of the qualitative feedback. Possibly, this is a result of them being used only during ambushes (thus being connected to grades) and possibly being underused.

Most of the gameful elements received positive scores for enjoyment and engagement, with their values moving around in rank. The conclusion of iteration 2 that engaging activities surpassed gameful elements, which in turn came ahead of gamified reward systems with grade-related elements in last place still seems to hold true to some extent. However, engaging activities and gameful elements seem to be on par this time. A tentative explanation for this is the fact that the engaging activities were new to iteration 2 and copied for iteration 3 while the gameful elements were redesigned for iteration 3 and copied for iteration 2. Teacher performance and the quality of the course materials could therefore be a part in explaining this. The random quests or ambushes follow this idea as they were optimized and given a lot of attention in preparation. For this iteration, we therefore conclude that gameful elements are better than gamified elements, but engaging activities and grade-impact has to be left out of the mix. The second highest climber, i.e., the choice of side quests, could be explained by the reduced amount of side quests that were required for a good result at the end of the semester.

Specifically for this iteration, we added gameful aspects to one of the engaging activities: the RETAIN exercise. During the exercise, students get to review educational games (this iteration all games were provided by Midwestern game developer Filament Games) using Glenda Gunter's RETAIN model. These reviews were discussed in class, points were collected, and then students were allowed to guess how well the 4 games did when all scores were calculated. Relying on the explanation above, one could argue that this gameful element is not gameful enough and that it too strongly influenced by the opportunity to win points.

An interesting finding is that the feedback moments and playtests score highly. These are again very engaging activities that are not gameful by any means. Similarly, the one difference between iteration 2 and 3 (challenge was higher in 2) on both the GEQ and SiMS can probably be explained by optimizations made to the rubrics and having less side quests.

The results for the story elements are a bit low even though a lot effort went into it: Most of the students were present when the teacher told the backstory in the minutes before class, but for some students this was problematic as they had a class across campus that ended a few minutes before.

Using specific themes for the side quests did not work as well as intended. The first time this was mandatory and the students did it all, the second time it was optional and nobody did it. The side quests got a good score nonetheless, but there is no indication that the themes were helpful.

Gameful instruction seems to work best with students that have some self-identification as gamers or geeks, are open to new experiences, and have a prior interest in the course materials.

5.1 Game Design Guidelines

Besides previous recommendations in past papers and in conjunction with the findings of this iteration, the following recommendations should be made to not only make your games play smoother but to also refine your instruction. Some of these have been tested in the current iteration, others will be used in future iterations.

- *Make decisions meaningful throughout.* Especially considering character skills, the opportunities for using these powers is tied to how much time an instructor can spend on already time-consuming interactive activities (e.g., ambushes). Just as games strive for balance where earlier choices can still impact later stages of the game, so should a gameful course manage to keep its game elements relevant.
- *Time matters.* Between lecturing, fielding questions, and fostering discussion, the inclusion of games on top of it all makes every minute precious. Make sure to prepare your materials, set up your tech needs as soon as possible to avoid wasting a second. Setting agendas with estimated time checkpoints is a good practice.
- *Use space efficiently.* If you plan on utilizing multiplayer mechanics in the form of teams, guilds, etc. encourage your students to sit next to their teammates to avoid spending time getting into teams before each group challenge.
- *Test your students on their knowledge of the grading system.* Although some students may benefit from being shown the usefulness and uniqueness of your XP system, consider making a short assignment where they must find different routes to a B+ with your system. If you have designed with the concept of 'freedom to fail' in mind, add a restriction that states one of the major assignments must have received a 0.
- *Try to contextualize your materials.* Not every student will appreciate a random encounter with a vampire kitty; instead, consider your class composition and adjust your narrative and terminology to fit the context of your class, institution, and geographical location.
- *Playtest.* Practice what you preach in game design: if you are incorporating a new mechanic and/or game into your course, test it if you can to see any potential issues or time sinks.
- *As always, prepare for a lot of work.* It is worth repeating: turning every aspect of a course into a fun game and providing constant feedback while doing so, is very labor intensive.
- *Have fun.*

While the third iteration of Gradequest served to reinforce some of the already discovered conclusions, the addition of student identity with course expectations yields a promising avenue for inquiry. For example, given a diverse population of students, how should an instructor go about restructuring the aesthetics of a gameful course? What types of narratives and terminology best fit specific demographics? If gameful instruction works best with self-identified gamers and geeks, how do we as a field translate our work into different contexts-be they geographical locations, different fields, or newer generations of students? Regardless of the narratological framework, how will future gameful approaches to course design compete with purely engaging activities devoid of game mechanics?

We hope to investigate some of these questions further with future iterations of these classes and hope to provide the requisite material needed for a practical guide to gameful instruction.

6. ACKNOWLEDGEMENTS

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