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Gamifying an M.Ed. Course: A Post-Mortem

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Abstract

This paper is about the collective experiences of a graduate level education course that had been partially gamified. A common model for graduate level Education courses uses a seminar approach where participants complete various readings and then respond to them in short editorials or blogs. This course gamified that component by requiring students to complete numerous small to medium sized activities that included these typical ones in order to accumulate points. These points contributed to their final grade. Students gave feedback on their experience with gamification throughout the course which included increased ownership and control of learning and grades, as well as unwanted competition, and onerous marking for the instructor. The paper concludes with suggestions for meaningful gamification in future courses.

1. Introduction

The term 'gamification' is still very new but even so its exact origins are not known. The first documented use was in the digital media industry in 2008 and it has become popular in the last couple of years [1]. A search performed in June 2013 on Google Scholar using the term 'gamification' turned up over 3000 hits, and with 80,000 people registered in the Coursera Gamification course in Sept/Oct 2012 [2], the attention that gamification is getting makes it one of the trendiest concepts to surface in recent years.

As with many other terms in the field of video game studies, there is no standard definition for 'gamification', so it is necessary to explain for each context what is meant by the term. Many confuse the notion of gamification with the use of digital games for learning [3] and although these two terms are related, they are not the same thing. Even though some resistance remains in formal education, the use of games for learning (digital game-based learning, or DGBL) is slowly beginning to enjoy mainstream acceptance as more research supporting the viability of games as a medium for learning becomes available [4]. Gamification does not yet have the same recognition.

This paper reports on the collective experiences of the participants in a graduate level education course that had been partially gamified. Many graduate level education courses follow a similar model so the gamification of this one was seen as quite novel. The common model for graduate level Education courses uses a seminar approach where participants complete various readings and then respond to them in short editorials or blogs. Readings are discussed in class or in an online forum, and participants are typically assessed on their participation, which includes classroom discussion in a face-to-face course, and forum postings in an online course. Many courses include a final research-oriented paper and a major project related to the subject-matter of the course, such as designing a lesson in an educational technology course, or a doing a case study in a research methods course. This template was the norm at the institution where this particular course was taught, and it was thought that too great a deviation from 'the norm' would be counterproductive. As a result only part of

the course was gamified. However, given that the subject matter of the course had to do with digital game based learning, it was decided that a gameful approach was appropriate. Further, given the experimental nature of the approach, it was decided to encourage the participants ('players') to provide ongoing feedback regarding their reactions to and progress through the gamified portion of the course, so it then followed that an appropriate reflection on the course design would take the form of a cooperative inquiry [5].

In the games industry as in many design activities, it is common for developers to reflect on a game project once it is complete. The Game Developer's Magazine, the official publication of the International Game Developer's Association (IGDA) refers to these post-production reflections as post-mortems and has developed a relatively formal structure that it follows when publishing them. They include technical details of the game and the development team and three main review sections: What Went Right, What Went Wrong, and a Conclusion. In keeping with the gamified theme of the course being described, a similar approach has been adopted here.

2. Related Work

Gamification can be broadly defined as the application of game features and game mechanics in a non-game context, but gamification does not typically include using actual games. Like most new approaches, it has both champions and detractors. Vocal critics such as Ian Bogost complain that gamification often takes "the least essential aspects of games and presents them as the most essential." He describes it as little more than 'pointsification' designed to motivate participants with superficial rewards and refers to it as exploitationware [6]. This simplified application of the concepts is typically embodied in what others refer to as 'PBL', which stands for "Points, Badges, and Leaderboards". Charles, Charles, McNeill, Bustard and Black [7] simplify the term even further to awarding "points to students for the successful completion of tasks throughout the course of study", but this can easily degrade into nothing more than a translation of letter grades to points. Gamification need not be trivialized in this way. We believe that the concept of gamification has more potential than that promised by slick marketing or superficial applications. In fact, many of the ideas described as part of meaningful gamification are not new at all and the authors suggest that this new term can be quite useful. It can be used as a way to describe the collection of strategies that together can create a more gameful approach to learning.

Some applications of gamification go beyond points, badges, and leaderboards. Nicholson's Meaningful Gamification [8] is designed to help participants find deeper meaning in a non-game setting, and the theories behind meaningful gamification come from educational theories as a way of using play, reflection, and narrative to engage learners. Sebastian Deterding has suggested a broader approach which he refers to as gameful design [9]. For Deterding, a key design question is: "In what ways would this be broken if it *were* a game?" This turns out to be a useful lens through which to view approaches to gamification.

2.1. Gamification is Not New

Many of the techniques now being touted as gamification are not new at all. Even those aspects often criticized as being superficial have been used in various forms at various times to greater and lesser effect. Children in elementary school often get stickers for completed work; both the Boy Scouts and the Girl Guides (as well as a great many other organizations) use badges to symbolize various achievements, and of course, medals and badges have been a longstanding tradition in militaries throughout the world. The notion of leaderboards is also not unique to videogames, or games of any sort for that matter, as they can be found in many businesses as ways to highlight sales records for example, and in schools to commemorate a myriad of achievements academic and otherwise. If we consider the concept of levels in games, then certainly the grades (K-12) and years (freshman, junior, senior, sophomore) of formal education are the very embodiment of 'levels'. There are known requirements for completing one level and each new level opens up new content and additional options.

At its core, a game, whether it is digital or not consists of some well-defined goal, a set of actions that can be attempted, and a rule system that includes some consistent form of feedback. Looked at this way, most courses would qualify as games, yet most would also agree that most 'normal' courses aren't gameful or gamified. So what's the difference? What in fact *is* new in gamification?

One answer lies in the vocabulary: the names of the various components have been changed to use videogame terminology. Thus, assignments become 'quests', groups become 'guilds', grades become

‘experience points’, and so on. However, if that is all that gets altered in a gamified course design, then complaints that gamification is little more than superficial window dressing are well founded.

When one goes beyond the superficial labels, gamification is about designing instruction to be more gameful. One way to provide a gameful approach is to define distinct levels of achievement for each assignment. An example of this was implemented in an introductory programming language class [10] where functional requirements were described for ‘C’, ‘B’, and ‘A’-level solutions and students were free to choose which level they wanted to complete. In another course students were given a rubric that described the requirements for the entire course. They were then allowed to choose from over 100 different assignments, each of which had been analyzed to identify which overall course requirements it was likely to meet. Allowing students this degree of choice introduces a gameful quality to the course work, as each participant may choose which challenges to meet, but must still demonstrate competence according to an overarching set of rules [11]. In another design the instructor gave the students numerous different options for tasks that could be completed - only some of which had to be completed for a full score, and where each task was individually scored [12]. This approach has been used in the current course design, which is described in more detail in the section on course design.

2.2. Research Methodology

The course was a graduate level course for a cohort of course-based Master of Education students, all of whom were completing their studies primarily by distance. Almost all of the students were professional educators working full-time, some with many years’ worth of experience teaching in a classroom. Given their level of expertise it was deemed appropriate to treat the class participants effectively as peers and as a result the research methodology used in this study was co-operative inquiry. According to Heron [5]:

> *“In co-operative inquiry a group of people come together to explore issues of concern and interest. All members of the group contribute both to the ideas that go into their work together, and also are part of the activity that is being researched. Everyone has a say in deciding what questions are to be addressed and what ideas may be of help; everyone contributes to thinking about how to explore the questions; everyone gets involved in the activity that is being researched; and finally everybody has a say in whatever conclusions the co-operative inquiry group may reach. So in co-operative inquiry the split between 'researcher' and 'subjects' is done away with, and all those involved act together as 'co-researchers' and as 'co-subjects'. “*

The fact that most of the learners were themselves teachers provided a unique opportunity to approach the course design as a cooperative inquiry. As a result it was decided to adopt a relatively ‘open’ approach where the input and suggestions from the participants informed the progress of the course while the course was running. It was decided to reflect on the experience collectively rather than as one researcher reporting on the feedback provided by the rest, and the author list includes numerous class participants. Students were invited to comment on the DGBL (Digital Game Based Learning) design while the course was still running, and this was ultimately combined with a collectively created post mortem, allowing for a more comprehensive course analysis than is typically permitted by student surveys, and shifting the role of the instructor from teacher as knowledge keeper to teacher as collaborator.

3. Course Design

The students in each class were members of two cohorts enrolled in a course-based Master of Education degree program. The bulk of the degree was to be completed online as most enrollees were full-time professional educators. Part of the course requirements for the degree was the completion of a number of face to face courses offered in a highly compressed two-week format over the summer. The DGBL course was offered in two formats in two different semesters: 1) as a three credit face-to-face course that ran for two weeks and met daily for three hours (2012), with an additional week after classes were over to complete and submit coursework, and 2) as a regular 13-week online course (2013). The course had been taught by the same instructor three previous times (2005, 2006, 2007), but this was before the concept of gamification had become known and as a result, the course did not include that topic. The first offering of the gamified version of the course took place in the summer of 2012. At that time the idea of gamification of learning was starting to become more prominent and it was decided to add the topic to the course content. Given

the nature of the topic and the fact that the majority of the students were practicing teachers, the idea of implementing gamification as part of the course design rather than simply studying or discussing it seemed to be an innovative way to embody the notion of signature pedagogies for a graduate level education class. Signature pedagogies are meant to be "the types of teaching that organize the fundamental ways in which future practitioners are educated for their new professions" [13]. Education is unique among disciplines in that when we teach a class, we are actually *doing* what we are teaching. Given also the fact that that course took place over such a short period of time, there was really no time to adjust either the content or the assessment once the course began. This lead to the idea of inviting the students to examine and critique the course design as it was being taught, which then evolved into a cooperative inquiry [5] that included a number of the students in the class.

3.1. Learning Objectives

The fundamental learning objectives in this course were largely unchanged from previous, ungamified versions of this course, although the topics had been adjusted to reflect new technological developments. The main learning objectives were:

- To examine the potential and limitations of digital game based learning in the context of an educational setting including social, administrative and pedagogical issues as well as implications of different models and theories.
- To explore the design and use of educational and commercial games and identify characteristics of effective digital game media in both
- To identify the implications of utilizing digital game based learning in mainstream education and the institutional changes necessary to realize the full potential of new teaching and learning technologies focusing on digital games
- To explore the current theories on the practice of digital game based learning and teaching and the implications of digital games as a medium for formal and informal learning

After completion of the course students were expected to be able to critically reflect on the value of digital game based learning, design and develop educational games, analyze prospective educational games for their suitability in an educational setting and access/assess resources for gathering information about best practices in digital game based learning.

3.2. Gamification

Initially, the gamification of a section of the course assessment was meant to be a "throw-away" piece - it was added at the last minute in order to demonstrate a hands-on example of the topic which was part of the syllabus. However, over the course of the two weeks it became a focus and a touchstone to which we as a class returned again and again.

To implement a gamified approach, the instructor provided an assortment of reading and response activities for which students could earn points. There were minimal requirements in that all participants had to attempt each kind of activity (quest) at least once, but each quest could be repeated up to a specific maximum number of times. For example. one of the quests was to complete a game review of a digital game. Students (players) had to complete at least one game review but could submit as many as 5, albeit for different games. The options were such that players did not have to complete all quests in order to earn the required points. An accumulation of points related directly to percentage points towards an overall course mark, but players could also earn points over and above those required. "Extra" points earned in this way were applied to the non-gamified portions of the course.

3.3. Assessment & Scoring

There were a number of ways that assessment in this course diverged from the more traditional approach. This course is a master's level seminar-style course. At the authors' institution, these sorts of courses typically involve weekly readings that form the basis for in-class or online discussions. Graded portions of such a course normally include marks given for discussion in various formats (in class, blog, forums, etc.), a design or development project related to the course topics, and possibly a discussion or research paper. Assessment criteria are normally described in the form of a rubric, and each learning task counts for a specific percentage towards a final grade. The final grade is recorded as a letter grade only, and there is a standard mapping of percent to letter grade that applies to most courses in the program.

One of the important ways that gamified courses differ from 'non-gamified' courses is in how marks are earned. Some of this difference is largely perceptual, but this can still have an important effect. Often students think of themselves as having 'A's in the course when it begins, and that they lose marks throughout the term as a result of mistakes or

omissions. Each assignment is thought of separately as something to be passed (or failed) rather than one component that builds towards a larger whole. One of the fundamental perceptual shifts facilitated by using a gamified approach to scoring is that students start the class with 0 points and everything they do is additive. Whereas earning less than an 'A' is seen as a form of failure to some, earning less than the maximum possible points on a single quest can be seen as simply taking a smaller step towards the overall goal than one might have liked. When there are sufficient quests to choose from, no-one is required to complete them all, and some may complete fewer tasks for the same number of points. Either way, both strategies (fewer quests with higher scores or more quests with lower scores) can result in exemplary completion of the course.

Quests were assigned a maximum number of points for completion, although students would not necessarily receive full points for each activity. Table 1 shows a list of activities and the number of points possible for completion. Multiple submissions were allowed for all of the activities, from 2-10 submissions, depending on the activity.

Table 1. Available Activities

Quest	Details	Max. Points	Max Repeats
3.00	Introduce Yourself	10	1
3.01	Peer Review of Lesson Design (Quest 1)	15	5
3.02	Self-Assessment of Lesson Design (Quest 1)	20	1
3.03	Peer Review of High Concept Game Design (Quest 2)	15	5
3.04	Self-Assessment of High Concept Game Design (Quest 2)	20	1
3.05	Rating course resources (either instructor or participant contributions).	5	10
3.06	Annotating resources provided by the instructor.	10	10
3.07	Contributing new annotated resources.	15	10
3.08	Posting an original Blog Post	15	5
3.09	Adding meaningful comments to the posts, reviews, resources, etc. of other participants.	10	10
3.10	Posting an editorial response to a news item, blog post, or other article.	20	5
3.11	Writing a critical review of a research or development project conducted by others.	25	5
3.12	Game Review	20	5

In order to maintain compatibility with the standard university grading system, the points were converted to percentage amounts towards a final course mark. Each 10 points students earned in the game was worth 1% towards their mark in the course. The gamified portion of the first offering of the course allotted 20% to the gamification portion of the marks which was increased to 50% in the second offering. Players were allowed to complete as many activities as they chose and were given the opportunity to have their points to actually exceed the allotted percentage. In this way they could compensate for less than perfect marks in other assignments. It was possible, if a student completed and received full marks on every single quest, to earn 47% of their mark in the first edition and a full 100% of their marks in the second edition through this avenue. As a result, some students completed the course with a mark of over 100%. The instructor created individual scorecards made from spreadsheets for each student in order to keep track of everything. Existing course management systems don't support this kind of scoring and so points and grades needed to be tallied elsewhere.

4. Post Mortem

In many ways, the design of this course was a departure from anything most of the students had experienced. On the whole the students liked the approach, but found there to be a substantial learning curve due to the complexity that resulted from increased choice and the scoring scheme. The second iteration of the course went far more smoothly in spite of the fact that the scoring was in fact more complex.

A number of students reported that this was the best course they had ever taken, and that they had learned more in this course than in any other. On the other hand the marking load was extreme, so some combination of automatic and personal scoring and assessment is necessary.

4.1. What Went Right

Some students put more work into the readings and responses than they may have otherwise done had the course not been gamified. Although many students were skeptical at first - some admitted that they had originally planned to complete the minimal amount of work necessary to earn a reasonable grade - by the end most students felt more ownership of their own learning and confidence in their ability to succeed in the course. Since the possibility existed for students to complete more activities in the gamification portion of the course as a way to compensate for marks 'lost' in other areas, students had more control over their final grade than they would in a traditional style course. It also served as a mitigating factor in reducing the perceived risk of attempting quests or contributing to conversations, which resulted in more varied conversations. Since there were many opportunities to earn points, participants were freer to experiment. One author reported being surprised at how enjoyable it was to do the assignments, submit them, and then wait for the leader board to show up so she could see where she was in the rankings.

4.2. What Went Wrong

Some students were put off by the competition that naturally occurred, yet others found it motivating. The traditional approaches to evaluation of reading responses failed in large part due to the sheer volume of submissions. The instructor found it very challenging to keep up with the scoring and had very little time to provide detailed feedback. Several methods for submitting quests were tried, including the use of GoogleDocs and Moodle which caused confusion and stress for many.

4.3. Surprises

One author reported reluctance among the other participants to share scores. In a non-gamified class, many of these same people felt open to share, and the marks seemed to be second to the content so the shift of focus onto scores was curious. It was also interesting to note that it was assumed that certain people had the high scores even though the leaderboard contained no names, only scores. However, close to the end of the course, the score cards were more a sense of pride than ego as they were at the start. Most of the participants were striving to earn the extra points, so at this point it was really a keen way of having everyone engaged on task, and extending the learning after the objectives have been reached.

5. Key Elements of a Gamified Design

Key elements of a gamified design include various aspects of games, but should not be limited to the superficial score-keeping. While it is important to tie quests to course objectives, participants should be allowed to re-try a quest whenever possible, and there must be a variety of paths the 'the end'.

For some, the notion that everyone started off with a '0' and everything they did throughout the course was guaranteed to add to their final score constituted a significant perceptual shift. Rather than each item being assigned a letter grade, points indicated overall progress towards the end goal which for some had the effect of taking pressure off of individual components. While most items could not be re-submitted, it was possible to submit an additional item in the same category or to submit something in a completely different category. That way even if an individual scored poorly on a single component, that score still added to the total like all the others, and at worst, a poor score meant they had to complete additional quests if they wanted to increase their score. Just like in a game, players could keep trying a task until they felt they had mastered it.

The logistics of the course design are perhaps more important in a gamified course than in a more traditional design. Gamified courses often have more individually scored components than other kinds of courses, so careful organization is key. There are a number of ways of facilitating submission when there are many items, such as having students number and label items, or providing one document where all new items are collected together. The creation of a submission form was one idea that came up during class discussions. It was tried by a few of the participants and both they and the instructor found it to simplify the process considerably.

	week										
	3	4	5	6	7	8	9	10	11	12	final
rank											
1	85	185	250	260	430	430	555	555	555	650	650
2	55	80	120	235	390	390	450	450	500	599	649
3	50	75	120	220	315	335	415	450	476	594	594
4	45	70	120	190	310	310	390	439	439	590	590
5	30	65	100	120	244	279	345	374	410	576	582
6	20	45	95	100	205	220	344	345	399	534	576
7	10	40	85	95	180	215	260	290	320	511	534
8	10	30	70	85	151	151	215	266	297	442	529
9	10	10	22	50	129	129	171	260	291	435	526
10	10	10	10	29	79	96	96	235	285	386	491
11	10	10	10	22	50	70	87	180	260	349	445
12	10	10	10	10	49	65	70	111	111	310	433
13	10	10	10	10	25	49	65	65	65	160	380

Figure 2 Leaderboard

It becomes almost impossible to assess submissions individually as the number of items to be submitted and scored increases. In the first iteration, each participant was able to submit up to 43 items, worth from 5 - 25 points. There were 22 participants, which means a possible total of nearly 1000 items to be read and marked. In the second iteration this grew to 73 items per student. The 13 participants in the online edition collectively submitted 488 items for assessment. Nonetheless, fast turnaround of feedback is essential as this too is a crucial aspect of games and one which can have a profound impact on student motivation. Figure 2 shows the weekly scores for the online version of the course. It was decided by the instructor to use only the scores rather than listing any names. This way players could see where they ranked, but no individuals could be singled out. Note that scores were sorted strictly numerically, so each line does not map on to any individual player. Player 'A' could be ranked 7th one week and 3rd the next. While some participants were quite slow to get started, 3/4 ended up earning more than was needed for a 'perfect' score (500). Since very few tasks had set deadlines, participants were free to adjust their workloads to compensate for other things that were happening in their lives. This freedom had disadvantages as well. As can be seen by the progression of the scores over time, it is important for the instructor to keep an eye on every student's progress and to try and encourage those who are falling behind to catch up. In a course where the content builds upon earlier understandings, deadlines and milestones would have to be designed differently. It is interesting to note that those students who earned the highest scores also earned high scores on all other components of the course. In most cases, the extra points *had no effect on the student's score.*

6. Conclusion

Ultimately providing authentic, meaningful learning is at the core of all good instruction, gamified or not (Merrill, 2002). Gamification can manipulate students into taking on tasks or can motivate them to engage more deeply with course material. At the heart of these concerns is the concept of Self-Determination Theory. In order to have a positive mental outlook toward engaging with something, learners need to feel like they have choice in the learning, that they are seeing progress, and that they can relate to the world [14].

Adding gamification to a class adds a significant amount of overhead, and instructors need to decide – is their time better spent developing a mechanic-heavy gamification system or class management or creating more engaging game-based learning activities within a traditional structure?

It has been said that imitation is the sincerest form of flattery and perhaps in education, it is also an indication of acceptance. The authors note that the subsequent instructor for this same course is following the lead set in these two classes and is continuing to use a gamified approach.

7. References

[1] S. Deterding, D. Dixon, R. Khaled, and L. Nacke, "From game design elements to gamefulness: defining "gamification"," presented at the Proceedings of the 15th International Academic MindTrek Conference: Envisioning Future Media Environments, Tampere, Finland, 2011.

[2] K. Werbach, "course announcement," Coursera Gamification Course Registrants, Ed., ed: Coursera, 2012.

[3] C. Renaud and B. Wagoner, "The Gamification of Learning," *Principal Leadership*, vol. 12, pp. 57-59, 2011.

[4] S. Tobias and D. Fletcher, "Learning from Computer Games: A Research Review," in *Serious Games: The Challenge*. vol. 280, S. Wannemacker, S. Vandercruysse, and G. Clarebout, Eds., ed: Springer Berlin Heidelberg, 2012, pp. 6-17.

[5] J. Heron, *Feeling and Personhood: psychology in another key*. London: Sage, 1992.

[6] I. Bogost. (2012, Oct 2, 2012). Persuasive Games: Exploitationware. *Gamasutra*. Available: http://www.gamasutra.com/view/feature/6366/persuasive_games_exploitationware.php

[7] D. Charles, T. Charles, M. McNeill, D. Bustard, and M. Black, "Game-based feedback for educational multi-user virtual environments," *British Journal of Educational Technology*, vol. 42, pp. 638-654, 2011.

[8] S. Nicholson, "A User-Centered Theoretical Framework for Meaningful Gamification," presented at the Games + Learning + Society 8.0, Madison, WI, 2012.

[9] S. Deterding, "9.5 Theses on the Power and Efficacy of Gamification," in *Microsoft Research*, ed: Microsoft Research, 2012.

[10] K. Becker, "Assignments that Meet the Needs of Exceptional Students without Disadvantaging the Average," in *8th annual conference on Innovation and technology in computer science education*, Thessaloniki, Greece, 2003, pp. 40 - 44.

[11] K. Becker, "Reconciling a Traditional Syllabus with an Inquiry-Based Introductory Course," *The Journal of Computing Science in Colleges*, vol. 20, pp. 28-37, December 2004 2004.

[12] K. Becker, "How much choice is too much?," *SIGCSE Bull.*, vol. 38, pp. 78-82, 2006.

[13] L. S. Shulman, "Signature Pedagogies in the Professions," *Daedalus*, vol. 134, pp. 52-59, 2005.

[14] E. L. Deci and R. M. Ryan, *Handbook of self-determination research*. Rochester, NY: University of Rochester Press, 2002.