A Playful Class:
Case-study Analysis of Gamified Course Design

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Abstract: Recently researchers of 'gamified' or 'badgified' classrooms are documenting promising increases in motivation and engagement using vocabulary swapping (Leach et. al, 2014), leaderboards (DeShutter & Abeele, 2014), and formative recognition strategies (Augilar, Homan & Fishman, 2013), yet these efforts retain core pedagogical designs of the traditional classroom. Gaming media leverages elements still foreign to classroom settings; like 'questing', 'adjusting play-style', 'voluntary competition', 'repeatable content', 'strategy guides', and 'cheats'. How much more can engagement be amplified by embedding these features as pedagogical changes to traditional course designs? We present qualitative design-based research and supporting evidence from one course iteration. Participants reported increased motivation and engagement supported by time on task data, 'help desk' data, and an increase in average task completion to 66.2 per student. We conclude game-like elements further increase student motivation, engagement, and investment of time on course tasks.

Introduction

Much work has already been done that shows the potential of digital media for learning. We review some of the seminal work along with efforts to bring playful design considerations to formal classroom learning spaces. Though an often contentious term, 'gamification' represents educators' efforts to take advantage of vocabulary, techniques, and tropes from popular gaming and digital media formats. If popular digital media effectively and consistently engages and motivates rigorous time on task and learning, it stands to reason that gamification of a course, when designed well, will likewise increase student interest and performance.

Classroom integration efforts are still in their infancy and documented efforts are starting with shifts to game-like vocabulary; where designers claim they communicate better with students and create language that resonates (Sheldon, 2012). Researchers also claim these changes, though simple, produce remarkable results including significant increase in attendance, participation, motivation, and engagement (Leach, et. al., 2014) - *just by using game-like language*. Building on past research, we designed and delivered three graduate level courses at a midwestern university testing popular game mechanics used as the central pedagogical approach and course design. *We want to determine if the results are further amplified if a course is designed to 'play' like a game, not just sound like one.*

This study describes the second of three courses in which we include six aspects of game design that we value from our own gaming experiences. We designed to include: 'quest selection', 'adjusting play-style', 'voluntary competition', 'repeatable content', 'help desk', and 'expansion packs' as core delivery instruments for the course. We use qualitative interviews, journaling, and supporting outcome data from the course to document the design process, goals, delivery of the course, and future considerations for designing a game-like classroom. Our findings document moderate fidelity between design intention and user experience, positive student perception of the course, increased time on task and task completion, student achievement exceeding past iterations of the course. We conclude that investing time to use design strategies from gaming media, even in preliminary efforts, can create incomparable learning experiences that warrant educator attention, research, and further case study and design iterations.

Literature Review

Widespread delivery of digital media, and increasing proficiency communicating in virtual worlds, can be treated as a form of literacy (Lankshear & Knobel, 2008). Among youth, converging technology and mobile devices serve to amplify interests, communications, and information access (Squire & Dikkers, 2012). Further, research indicates the potential of digital media and virtual worlds for leveraging engagement and motivation into measurable literacies (Steinkuehler & Duncan, 2008). Broadly speaking, increasing access and dedication to digital learning experiences is growing, but the classroom is not necessarily central to this conversation. Further we were informed by past research we have done exploring how exemplary teachers learn and adopt new technologies for the classroom (Dikkers, 2015) to inform our own practices. These teachers notably listened to their students, experimented, and measured their practice by student engagement and motivation.

What if a playful experience could be intentionally designed for classroom pedagogical implementation? Obviously, simply adding badges or awards to a task, does not turn that task into a playful experience, nor meet the criteria of 'playful' we are interested in pursuing. Instead, we are concerned with an intentionally designed experience that uses core motivational elements from mainstream game design. The most prominent examples of playful design have been the *Quest to Learn* (Q2L) school in New York (Salen, Torres, Wolozin, Rufo-Tepper, & Shapiro, 2011) and the Khan Academy (Light & Pierson, 2014). Using playful design for university courses, therefore, is an ongoing effort to explore the edges of information and computing technology (ICT) in learning.

Further, we follow a course charted by Lee Sheldon's (2012) reporting of his *Multiplayer Classroom* designs to alter grading systems, assignment of work, and the role of identity (or avatar) for his face to face undergraduate course. Aguilar, Holman, and Fishman (2013), for instance, recently recorded positive student perceptions (*N*=473) of the grading system after only *renaming* exams and essays ('boss battles'), and grades (experience points), and offered moderate assignment choices (students picked 2 of 4 assignments). Leaderboards have also been shown to be a net positive feature of gameful course design (DeShutter & Abeele, 2014). Further, in a randomized control trial, Leach, et al (2014), interestingly left course lessons and assignments *untouched*, to isolate the effect of 'vocabulary shifting' alone. This is a 'worst case' for gamification critics (not essentially redesigning the experience); yet they found earlier turned in work (averaging 1.3 days earlier), increased visits to the site, and *voluntary* online discussion including 47 threads (220 replies). These examples are easily applicable to course design and establish moderate foundational data supporting cosmetic changes to otherwise traditional classes.

Building on this work, this study seeks to move forward with classroom design using a growing understanding of emergent digitally mediated learning practices (Itō, 2010; Lankshear & Knobel, 2008; Dikkers, 2015), while testing more playful differentiation, pacing, and student interaction around relevant problem-based challenges. Particularly, game design seeks to create spaces where *every* element supports a central design goal (Shell, 2008), not just use of new terms. Finally, we intended to deploy an example of playful online course design that could be reasonably replicated by any instructor across many content areas. We then identify if learner perception and activity were positively associated with the course design:

- Do adult learners perceive increased motivation and engagement with course content because of game-like design elements?
- Does a gamefully designed course increase learner time on task, number of tasks taken on, pacing of work, and the difficulty of work performed?

Context and Course Design

Previous to this study, we had completed one course that replicated vocabulary and design elements used in earlier studies (above). This pilot served as an undocumented learning pilot for us and guided the selection of our target design features. We also considered our own experience with games and selected six gameful elements: 'quest selection', 'adjusting play-style', 'voluntary competition', 'repeatable content', 'help desk', and 'expansion packs'; each of which could be cultivated with changes to the delivery of content, reconsidering student-teacher relationships, and timely responsiveness. We purposefully designed a framework for course design that includes:

- **Quest selection and adjusting play style.** The traditional syllabus for the course included 12 weekly readings with reflection papers, a midterm test, and a final test (14 tasks). The new design included 73 different tasks (quests) and a final 'quest log' to be shaped by the learner around course objectives. Quests ranged from 30 minutes to 4 hours per quest (based on student self reporting). This allowed for authentic learner 'quest selection', self-adjustment to their 'play-style' to accept quests that fit their interests or schedule. Choice was intended to increase agency. Also, learner options allowed us to include more time consuming high-level activities that we would never require from all students; like full text readings, travel to conferences, and/or full software designs.

- **Voluntary competition and repeatable content.** Building on game design principles (Schell, 2008), we intentionally detached weekly, playful, activity from summative grading practices, and we included repeatable activities and a voluntary leaderboard (opt in). We expected complex activities to be infinitely replayable with minor changes, including visual design projects, reports, action research, travel, interviews, programming, and reading content area research materials. This essentially meant that only the final quest log was required work and we clarified an expectation that every student had 'production' toward the course objectives each week, without directing what exactly that work would look like. They could direct their own 'play style'.

- **The help desk.** Based on earlier research supporting online design (Barab, MaKinster, & Scheckler, 2003), we planned for having a fast, easy, and private way for individual students to get help using digital tools by

setting up a 'help desk'. Access was open to e-mail, phone, chat, and/or video conferencing as soon as we could get back to students. We documented each 'call' in and the nature of the call and replied to all inquiries within 24 hours. This could be considered renaming for "office hours", yet with a wider range of communication tools and no time limits.

- **The expansion pack.** Often mainstream games will release a 'full' game and later release supporting content for the game in the form of an 'expansion packs'. In course design, we considered the possibility that if learners engaged with the content like a game, they could increase work time and actually complete all 14 tasks from the course. We increased course activities from 12 to 73 for expanded choices, but still only required one project per week. In addition, we did ask "What if we had students that completely geeked out and finished all 73 tasks? We might need an expansion pack!" Yet we did not consider this more than a hypothetical situation.

Overall, course delivery included presentation of the 'game' of class largely being a chance to explore the field by selecting at least one quest per week and being ready to share their 'adventures' in class each week. Class time was then consumed by learner presentations of their adventures each week. All lecture content was woven into reactions to student 'quests', also it could be requested, shared via email, or found in the course folders. The final two weeks of the course were set aside for preparation of the 'Quest Log', or portfolio that would include their documentation and narrative. Their individual quests were designed to help with the final quest, however learners had to organize, analyze, evaluate, and relate their activity accordingly to show they had met the course objectives. As they turned in each quest, they would be graded as 'done' or 'needs work' toward inclusion in the end of semester portfolio. Also, work was given experience, or "XP points", that students could accumulate. These had no connection to their grade or final portfolio, and we explained them to be purely for entertainment.

The masters level course itself included adult learners (n=24) at a mid-sized midwestern university. The course covered technology applications for education and had five objectives including the use of technology for communication and collaboration, organization and management, increasing learner performance, evaluation, and lifetime learning. Students were made aware of the experimental nature of the course on the first day of class.

Methods

We treated the implementation as part of a longer sequence of design-based research iterations (Barab & Squire, 2004; Laurel, 2003) not to draw generalizable conclusions, but to clearly identify design elements, share design features, and report local reaction to those changes. Each week the research team met and discussed ongoing student (n=24) activity, recorded observations, reviewed learner activity as recorded by the learning management system (3D GameLab) and notes, and finally, we made adjustments throughout the course based on student reaction and suggestions. During the course, we documented informal user feedback, 'player' reactions, and anecdotal support that the design elements were or were not supporting intended experiences. As researchers and designers, this method ties us into the work at a level that we do not claim our findings are generalizable, but that they add findings that can be compared to other design efforts within this conversation.

Supporting data collection included class outcome data, reported time on task, number of completed quests, leaderboard results, and overall course grading. Actual course meetings were private, and no student is identified in the data. During the course, we collected weekly notes and looked for indicators that revealed learner motivation, engagement, time on task, and ways we could modify the course in progress or ideas for the next iteration. After course completion, all students were invited to take an online survey[1] and 14 volunteered to self-report on their perceived response to the course design. The research team then purposefully invited 6 students, based on our journals, unique comments in class, or high/low performance on course content. In the interviews we asked what influenced their motivation, engagement, and investment in the content and probed based on those prompts to identify what design elements were influential in their learning. We consider this data to be preliminary and informative for this individual course, but not necessarily generalizable beyond the context of this case.

Findings

Our learners positively responded to playful course design. First, we looked for and saw evidence of increased motivation, sustained engagement, and increased task completion. Students credited their increased motivation to expanded choices, self-pacing, experience points, and voluntary competition. Self-direction in the learning was often noted, commonly students shared statements like, "I like that I was able to choose and drop one if I did not feel like doing it and move on to another."

They also identified 'flex time' as supporting larger amounts of time on task, "I could crank out a maximum number

of points early in the semester before I got busy." This showed up in the overall quest completion rates (Figure 1). Students began to name this, "'binge questing'… I felt totally just engaged and I want to finish more and more quests so sometimes I maybe finish 20 quests in the weekend." This kind of work load would require an all day 'binge' doing course tasks. However, not all students chose to binge quest, where all students did flex between busy and slow weekly production, some consistently completed 1-3 quests a week, as required, and others had greater range in weekly production.

Overall course data shows our students were likely to binge quest early in the first five weeks, completing an average of 6-7 quests per week (see Figure 1). Overall, students self-report an average of roughly 4 hours/week of time on task; turn in an average of 5 activities/week; and average a total of 66.2 course activities per student. This production rate was clearly higher than the required 1 quest per week to stay productive (also the assigned requirement in the traditional course). Student weekly work increased.

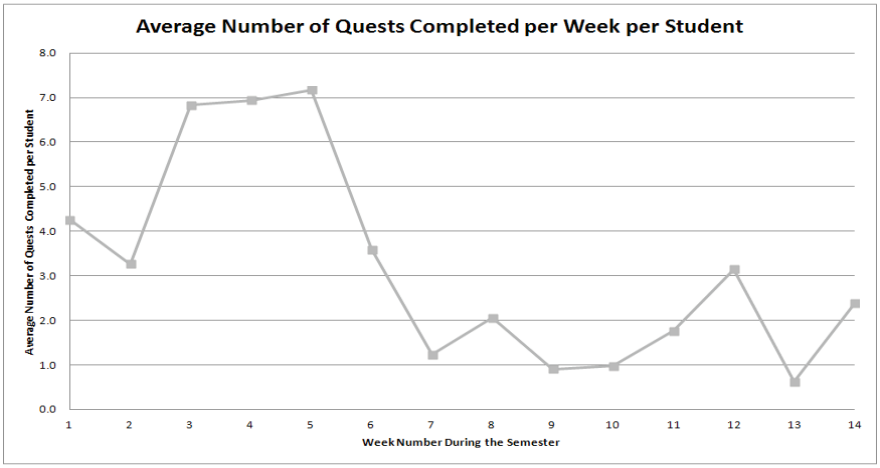

Figure 1: Average quests completed each week per student. *n*=24

Students suggest that their choices and speed of accessing new content allow them to customize experiences so they could more easily immerse, or 'addict' themselves in the learning. For instance, "I think I am getting addicted... I only wanted to complete one quest this morning and am now on my third-fourth." Despite detachment from formal grading, students ascribe motivational worth to informal XP points. Learners reported a clear connection to the XP points because of individual interest, "[I would] spend two or three days doing nothing but completing quests and watching my XP points grow"; to provide feedback, "I received immediate feedback on where I [comparatively] stood in the class"; and to motivate themselves, "I really liked getting up to that next level." XP also provided timely data with which they could self-regulate learning, "If I didn't like a big challenge I would pick out two or three tasks that were only worth a few points and that would be it for the day."

The leaderboard likewise provided a window for students to gauge performances against their peers using avatar names. "I did like to look at the leaderboard just to make sure I was kind of on pace." Others opted out of the leaderboard because they claimed they, "do not want to compare... I just want to learn for its own sake, for me." Also, five weeks into the course, four students finished all 73 existing quests. We guessed that if prior elements were effective, we would have some students 'geek out' on the course (Itō, 2010). Yet when this actually happened we needed two weeks to prepare and release another 70 quests which were aligned with course goals. These quests far exceeded expectations for the course and required learners to begin to code, read entire books, and do tasks far beyond the traditional course scope. Each required large investments of time. 7 students chose to invest in these "end game" quests and even aspired to finish all 70 after the course was over. 1 student in the course chose to stop accepting quests and wanted to invest in a single larger project on their own (still showing progress each week in class). *All* students in the course at least doubled the 14 original assignments (weekly readings and discussion posts) required in the previous iteration of the class; top performers completed over 90 quests and the *lowest* performer in the course completed 32 quests (this student dropped out).

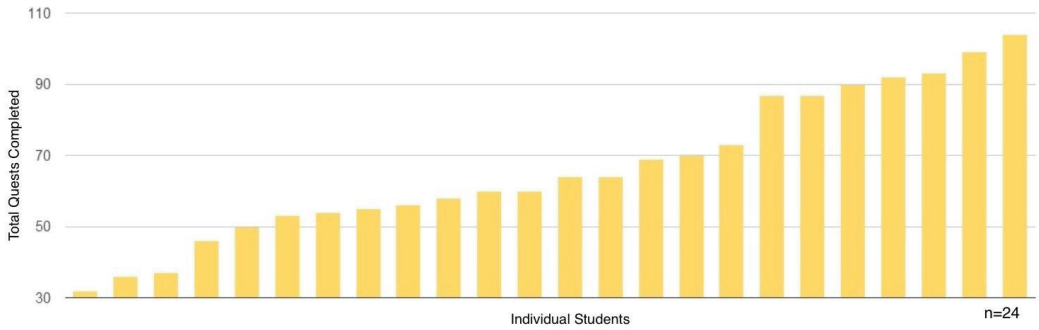

Figure 2: Number of total quests completed per student

Two design elements are not named as relevant for student motivation or engagement. Notably, repeatable content was not consistently done by students. Nor did any participants perceive repeatable content as influencing their motivation or engagement in the follow up interviews. Nor did we observe replaying quests as common. The help desk, (16/20 contacts via email) was used weekly by some students (*n*=9) with more regularity as the course content became more difficult and as we approached the final, graded, project. However, the help desk is not perceived by other participants as affecting their motivation or engagement; generally it is considered helpful and a "nice touch", but not necessarily needed beyond existing weekly meetings and contacting other students in the course. As a team we considered the help desk essential for those that used it and it addressed their learning preferences.

Interestingly, class discussions circulated around broader topics, but were ignited by the game-like elements in the course. For instance, quests that lead learners to introductory coding are not necessarily needed for course outcomes. When one student brought this up, others defended the quest as a 'real-world' skill that easily applied to the subject area. Overall, we ended up discussing the core goals of the course, school-to-work, and future employability.

Another discussion revolved around whether the leaderboard should be voluntary or required - and whether or not it was "legal to stockpile quests," (not turning them in to give others a false sense of 'winning' on the leaderboard). Indeed our most active students were "saving" quests so that the others couldn't see their performance level. Because the XP points were playful, they became part of the social game and tool of strategy among competitive learners. This conversation led to the influence of different cultures on an idea, the nature of education, and individual rights in a connected world. Other relevant discussions included the value of "points", independent lifetime learning, the value of competition and comparison to classmates, and working with others to troubleshoot and solve problems.

We observed that the competitive 'meta-game' that developed (above) was rooted in elements that were not connected to the grade. Not all of those that 'gamed' the course were competitive however, some were explorers. Once, one of our team incidentally bumped into a student drawing out a 'map' in their journal and asked what it was. He showed that he was trying to figure out how all the course quests were connected and if he'd explored the whole class. Having some hidden content, he was "looking for Easter eggs" in much the same way that he did in his computer games. His goal: to "share the map with everyone so they had a 'cheat' for min/maxing the course." Both 'cheating' (using tips and help guides to bypass game rules), 'clearing' (exploring every part of a map), and 'min/maxing' (investing minimal work for maximum output) are common gamer activities to get more out of a game. This student offered that these were fun for him in his gaming time and that he was enjoying the same entertainment from the course. To his credit, he had successfully decoded our quest trees, regular patterns for hidden content, and noticed that each tree had repeatable options.

From an instructor perspective, this course was time intensive prior to starting the course, and self-sustaining once the course started - with the exception of scrambling to add the expansion pack in week 7. Our role was primarily to maintain expectations (one task per week), provide a sounding board for students to tell their experiences to, and to guide with consistent and timely feedback on many of the quests. We noted the primary hindrance to student activity was our ability to 'confirm' quest completion to unlock new options. This is a design challenge for the next iteration.

In addition, we saw the quality of our writing in quests needed more work. Often entertainment media gives cause

for task completion into rich, compelling, narrative arcs. Where this takes creativity, time, and intention up front, we did see that as class went on, some students fell into a work pattern that was less enthusiastic than when they started. This was associated with a sense that they had “completed the game” and had what they needed for the final portfolio.

Discussion

Most course design considerations in this study are noted by students as being motivating, engaging, and we show a clear increase in task completion and time on task clearly exceeding our expectations for the course. It is worth repeating that our students *doubled* the workload of the previous course and appreciated the changes made to the class in evaluations. Overall, our results replicate previous research findings showing increased motivation and engagement. We agree that basic vocabulary shifts, (Leach et al, 2014) to create an environment of motivation and engagement in the class, as do the use of leaderboards, badges, and cosmetic visual design (DeShutter & Abeele, 2014). Moreover, we suggest in this case that activity choice and self-pacing offers a far greater opportunity to motivate and engage worthy of much more conversation and design work on how to manage a differentiated course. Aguilar et al’s (2013) design allowed learners to pick 2 of 4 projects, where we allowed them to pick 14 of 74(+70) quests. In both cases students reported and displayed significantly more engagement and time on task. In our case we saw the emergence of ‘binge questing’, course ‘mapping’, and small groups of competitive ‘gamers’ trying out maneuver each other. In this particular case, we see evidence that more choice in work, more challenging work, and more playfully competitive elements to compare work actually make the work more enjoyable and create positive class environments for learning - just like a complex game.

Interestingly, binge questing is an example of unexpected student behavior that breaks from our experience of traditional course activity. When we limit work to *only* one assignment per week, we wonder if we are actually *holding our students back* from far more invested and rigorous learning experiences. If a course is essentially redesigned, we should expect this and other essentially different student behaviors. Likewise, students invest more ‘play time’ toward the *beginning* of the course, rather than gradually increasing work loads toward a ‘final’ at the end of the course (see Figure 1) - this alone deserves greater attention by researchers. However, it is probably not surprising to game designers who expect high investment initially and a smaller percentage of players that stick with a game and replay it.

Further, we began to see a variety of play preferences and styles. Some did enough each week to stay productive, but over half of the class were well beyond an ‘A’ grade by the fifth week of the class. Some worked ahead and slowed down later in the course, others had a bump in effort at the end of the course when they needed more products to prove they had met the objectives. Some preferred quests increasing their reading load (to build their reference list), some preferred production quests, and some embraced the chance to learn coding basics. We also see variety in the level and kind of support that different students preferred between the help line, class questions, and emailing. Finally, we saw variety between learners that worked socially (either with or against their friends) and some that preferred independent learning.

Where we considered this effort a success in terms of motivation and engagement, we are limited by, nor did this study seek, quantitative outcome measures of learning that we know are valuable to many educators. We concede that it is possible that our students were very busy, but not learning in a measurable way. We also are limited in our claims due to the method used for study; a single design-based iteration is not capable of making any generalizable claims beyond the case in question. We also saw less impact from our efforts to design repeatable content, yet as a single iteration, this does not diminish our interest in this kind of design, instead we consider this a growth area for our design team. We suggest that ‘repeatable’ game content is generally in pursuit of a goal (‘grinding’) or to show expertise (challenging), so we do not feel we properly executed this part of the design and continue to look for positive exemplars from other course designers and the digital games that we play. Further, we seek out counsel from professional game designers that can inform what elements of this design could be improved on for better results.

We do claim the changes in learner activity in this design iteration are reasonably attributed to the design elements included in the course. Further pedagogical transformation of courses, can continue to be more game-like, we maintain that this design direction continues to have potential to produce greater motivation, engagement, and increased investment of time on task. That said, we are encouraged that the discussions on leaderboards and creating a ‘map’ of the class are *unique* experiences that support the success of unique game-like design elements to create player-like experiences, discussions, and the beginnings of communities of practice or affinity spaces around a game. In addition, we are convinced that these events were highly unlikely without the elements added to the course.

The community of gameful course designers can *and should* continue to build on these elements and increase outcomes, further document design-based research and ideas, and move toward quantifiable studies to test these local outcomes. Moving forward, we discussed that managing such a course was aided by the use of the 3D GameLab learning management system, however not required. In our third to fifth iterations (in process), we are now reducing the management tools down to a simple shared spreadsheet, and Google suite products. We are seeing positive, but less striking results however because we are not able to automate some of the quest completion elements as we did with 3DGameLab. We are still looking for an affordable (open source) learning management system that allows full control over layout, and differentiation using basic Boolean logic sequencing of content, and does not assume a traditional course design model. That said, the idea of authentic and diverse options for activity, self-pacing, leaderboards, and other possible game-like activities are workable with minimal tools.

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(Endnotes)

A PDF version can be found at the following web address: https://drive.google.com/file/d/0B5Z_Qz2HiUMPakU4dnBtWHVPcGc/edit?pli=1