GradeCraft

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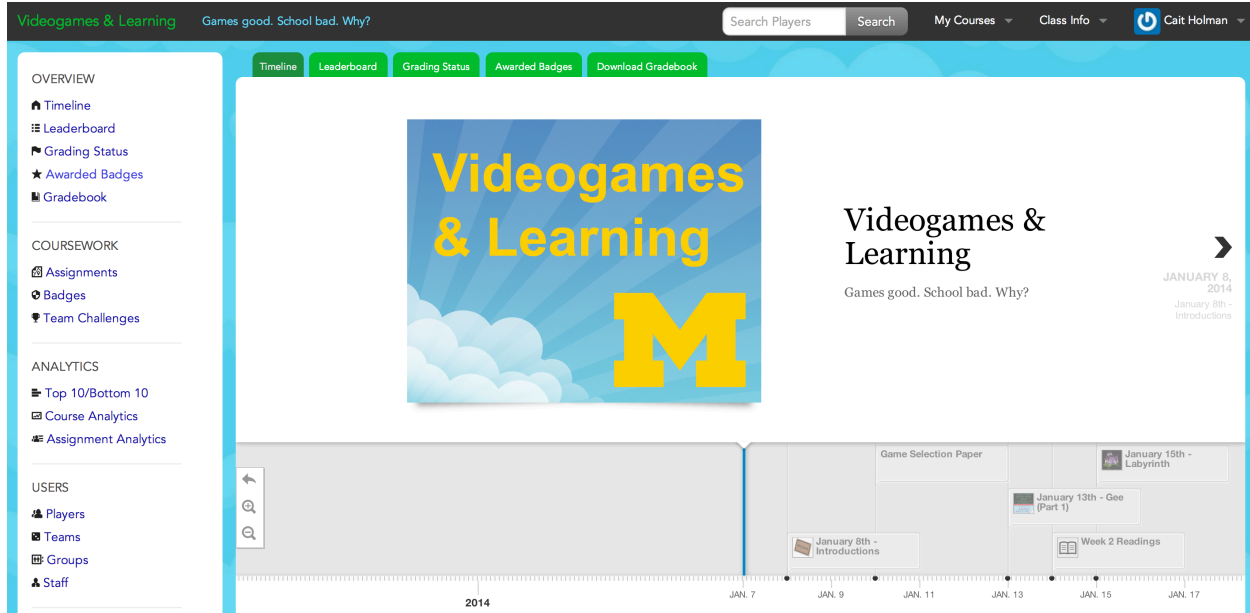
Figure 1: GradeCraft Homepage

Example URL: http://www.workingexamples.org/example/show/640

Project Summary

A growing number of teachers are transforming their traditional course designs into gameful systems, with the goal of creating an environment that allows students to autonomously select a path through the course content, enables them to take risks in their coursework and recover from potential failures, and asks them to work together to collectively accomplish class-wide challenges. Managing this multifaceted course format within a "standard" learning management system (i.e., one that was built to support traditional course designs) proved to be both limiting for instructors and confusing for students. We have designed a new learning management system, GradeCraft, to support the unique requirements of game-inspired courses. In this Working Example we document that process, detailing some of the challenges that we have faced, along with issues we have yet to address.

Seed

Tell us about your idea or project. What's your vision?

GradeCraft is a game-inspired learning management system. We believe that gameful courses can create more engaging classrooms, and we want to make it possible for any instructor interested in running a course like this to have a playful, intuitive space to do that. We are also dedicated to displaying real-time learning analytics information (e.g., patterns of system use and comparisons of assignment performance outcomes), to help teachers track the administrative workflow within their course, and facilitate students' ability to make informed choices about how they can achieve success.

What problem are you trying to solve and why does it matter?

GradeCraft grew out of a distinct classroom need - we wanted to implement a gameful course design that included having students select their own coursework from a variety of options, earn badges that recognize mastery of skills and course content, and work together as teams to accomplish big goals. Using our traditional learning management system (LMS) proved so frustrating that it detracted from the course experience for students, and created a significant management burden for the teaching team. In one course we are aware of, the teaching team had to use 300 spreadsheets to track individual students' assignment weighting decisions and calculate final grades. Our goal is to make it possible for instructors to implement gameful designs they could not otherwise have done without investing significant management time, and to design the supporting feature based on the latest research regarding what mechanics and displays are effective at supporting student autonomy and engagement.

What history or context should we know about?

We have begun our work at the university level, growing one class at a time in our implementation. We are interested in expanding to the K-12 space but want to make sure that we have fully assessed the differences in what K-12 classrooms will need from this type of system. We need to have more conversations with teachers and administrators before we will be ready to implement GradeCraft within that context.

What are your goals and how will you know if you've achieved them?

Our initial goal was straightforward: provide students with an interface that would display how they were doing within a gameful course, and aid them in planning their future work choices. We have accomplished this initial goal, but continue to work to improve those two core functions. Our next goals are to further support personalization strategies (for instance, allowing students to declare which assignments they would like to be receive further information about and when). We are also building a dynamic 'unlock' system that allows instructors to establish combinations of academic achievements and system behaviors that open up new opportunities, establish ways for students to better recognize and support each other's work, and build assessment tools that support faster and more effective feedback.

Who will your work impact? What do you know about them?

We have a number of different audiences that we are working to build for:

- Instructors who are already familiar with gameful course designs, often having run gameful courses via existing technologies (and sheer force of will!), have been our initial focus in trying to get the system adopted. As leaders in the space, they have been willing to take risks and push the boundaries of what has been done–and often requested that we build complex new features.

- Instructors who are interested in running a gameful course but have hesitated given the management tasks involved or because they do not know where to begin. We are hopeful that when we start to work with instructors in this category we will be able to offer them two things: first, recommendations as to best practices to structure a successful gameful course, and second a feature-rich, engaging system that does the heavy lifting in regards to the gameful aspects of course management.

What challenges might pop up?

One of our biggest challenges has been sorting out whether we want to develop features that are considered 'core' for a typical LMS (e.g., forums, chat tools, and resource utilities), or whether we should focus on building out a uniquely gameful feature set. We are trying to create a cohesive, engaging student experience, and we want to make things as manageable as possible for teaching teams. One way to address this goal would be to build all the 'core' tools our teachers want to use in these classes, establishing a single platform to manage the comprehensive course. From a pragmatic standpoint, however, that is not an efficient use of time—doing so would only serve to duplicate the quality work that has already been done in the community (e.g Piazza, LectureTools, etc.). Moreover, it prevents us from focusing on the development of gameful features we believe to be truly novel and exciting. Determining the appropriate scope here has taken significantly more time than anticipated. The solution seems to lie in a combination of leveraging tools built according to the Learning Tools Interoperability (LTI) specification,

developing selected features if their inclusion in the app can offer both analytics and gameful features to be built on top of them, and expecting that instructors will employ multiple applications that students will have to manage.

Much of what is engaging about good video game design is the plethora of immediate and immersive feedback on one's actions; we are not (and do not wish to be) automated in our assessment of student work, creating a break in the rapid feedback loop where a teaching team must expend effort to provide students with quality feedback. One example of how gameful strategies can complicate this that we have seen play out involved students being able to earn a badge that allowed them to resubmit a particular paper. A large number of students were able to successfully earn this badge and, assured of their ability to resubmit for a better grade, submitted a lower-than-usual-quality paper as their first submission. Reduced risk? Check! Successful strategy? Check! Taxing and frustrating for the teaching team? Check… We have an open question of how we should go about balancing reduced risk and unique pathways with the time and effort limitations of our instructional staff.

How can our community support you? (expertise, resources, etc.)
Feedback! We would love to hear what aspects of games teachers want to be able to incorporate into their course designs, and how we can do more to support these uniquely challenging endeavors.

Tell us about the team you have assembled or hope to assemble.

Barry Fishman is a Professor of Learning Technologies in the University of Michigan School of Information and School of Education. His research focuses on video games as model learning environments, the use of technology to support teacher learning, standards-based systemic school reform, and the role of educational leaders in fostering classroom-level reform involving technology. He was a long-serving Associate Editor of The Journal of the Learning Sciences, and served as a co-author of the Obama Administration's 2010 U.S. National Educational Technology Plan. Barry received his A.B. from Brown University in English and American Literature in 1989, his M.S. from Indiana University in Instructional Systems Technology in 1992, and his Ph.D. in Learning Sciences from Northwestern University in 1996.

Stephen Aguilar is a doctoral student in the Combined Program in Education and Psychology at the University of Michigan and is interested in understanding how game-inspired pedagogies and learning environment designs can serve to foster adaptive student outcomes (e.g., increase student engagement with course content; provide a sense of agency and autonomy over course experience; and promote adaptive academic identities). He is also interested in how Learning Analytics innovations mediate and support the above processes.

Stephen first became interested in how technology can be used in the classroom during his time as a Teach For America corps member, where he taught middle school history and science in East Palo Alto, California. Prior to attending the University of Michigan he worked as an assessment specialist for a charter management organization based in Los Angeles, California. Stephen is a Rackham Merit Fellow, and holds a Bachelors of Arts degree in Philosophy and Psychology from Georgetown University as well as a Masters in the Humanities from the University of Chicago.

Michelle Carr is a designer and animator interested in how social media influences education and learning. She previously worked with Design for America to implement an online platform that helps undergraduate students engage with design and civic innovation. Michelle received her B.S. in Brain, Behavior, and Cognitive Science from the University of Michigan, and her M.A. in Learning Sciences from Northwestern University.

Michelle Fiesta is a master's student at the School of Information specializing in Human Computer Interaction at the University of Michigan. She previously attended the University of Missouri, graduating

with B.A.s in Psychology and Anthropology. Michelle is interested in how gamified learning can affect student motivation to complete tasks, and how this ultimately affects education outcomes.

Adam Levick is specializing in Human Computer Interaction and Social Computing at the University of Michigan School of Information. He is interested in how incentives can be integrated into educational technologies to increase student motivation and learning. Adam works on development, design, and text analysis research within GradeCraft. He received his B.S in Environmental Science and Asian Studies at the University of Michigan.

Lauren Rocco Green is a Master's student specializing in Digital Media and Education at the University of Michigan's School of Education. Lauren is interested in education access and the creation of project-based, situated learning environments. Lauren has previously worked as an educator in both formal and informal education settings, an outdoor guide and a carpenter in the Antarctic. Lauren received her undergraduate degree from Dartmouth College in Government with an informal concentration in Computer Science.

Sara Molnar is a Master's student specializing in Digital Media and Education at the University of Michigan's School of Education. Sara is interested in learner autonomy, motivation, and self-regulation in game-inspired learning environments. Sara has previously worked as a technology coordinator and Media Arts teacher at an urban high school in Boston, MA. Sara received her undergraduate degree from Michigan State University in Media Arts and Technology, accompanied by a Philosophy minor as well as film and documentary studies specializations.

Caitlin Holman is a doctoral student at the University of Michigan School of Information. Her work focuses on the use of technology to support gameful coursework, and the impact of both game mechanics and learning analytics displays on student motivation and achievement. She received a B.A. in International Affairs from the University of Maine, and an M.S.I. from the University of Michigan School of Information.

Sprout

Tell us about your process and how your idea is evolving throughout the project.
We have grown organically, adding features in response to specific instructor requests and classroom needs. At the beginning, our goal was to build the grade predictor and a tool to award badges–just those two elements! But in order to have the information to power the grade predictor, we had to tell the system everything about the assignment structure; in order to tell the student the most up-to-date information about their progress, we needed the system to know everything about their grades. These requirements meant that we had to become the core assignment tool, and a full-fledged gradebook.

One of our most complex features, individual assignment weighting, has been the result of our collaboration with Professor Mika LaVaque-Manty, an incredibly innovative professor in the University of Michigan Department of Political Science. He wanted a system that would allow students to specify how much assignments would be valued towards their grade, as well as a way for students to self-award points for certain types of assignments (used for self-reported attendance in a large lecture class). These two features have helped us to consider how (both within the course design, and as a technical challenge) students should be able to interact with their grade.

Asking students to take these actions unmediated by any authority figure enhances their autonomy within the course. It also increases the potential for mistakes – students may make choices that are not ideal or do not work in the manner in which they expect. That concern reemphasizes the importance of building a system that reflects their progress back to them , with the hope that they will be able to recover from any issues.

What interesting patterns or insights have you discovered?

There is not just one type of gameful course! Within the four courses we have worked with, we have observed three distinct patterns: our first course fits a 'platformer' game model, having a fun leveling system, using badges to recognize achievement (but not contribute to the course grade), and offering a selection of paths through which students can engage with the course material. Our political science course parallels a strategy game, requiring students to assess their skillset, and forecast which type of work will lead to the best outcome for them. Our newest course, Professor Cliff Lampe's Intro to Information Science, plays out as an RPG, with students doing work in 'Houses' that contributes directly to their grade, completing quests that encourage skill development, and using leaderboards to assess competency and fuel competition.

Have your initial concepts/designs changed? Why have they changed? Show us how they're being refined and iterated.

Aesthetically we have always tried to incorporate a playful approach, using a bright color scheme and whimsical design elements to inspire a platform-game type experience. There is so much information to convey within these displays, we worry about the threat of viewer overload (not to mention the performance issues it causes!). We are currently doing user-testing to try to whittle the displays down farther, and ensure that we are highlighting only the most relevant information.

We have been through three distinct design iterations so far.
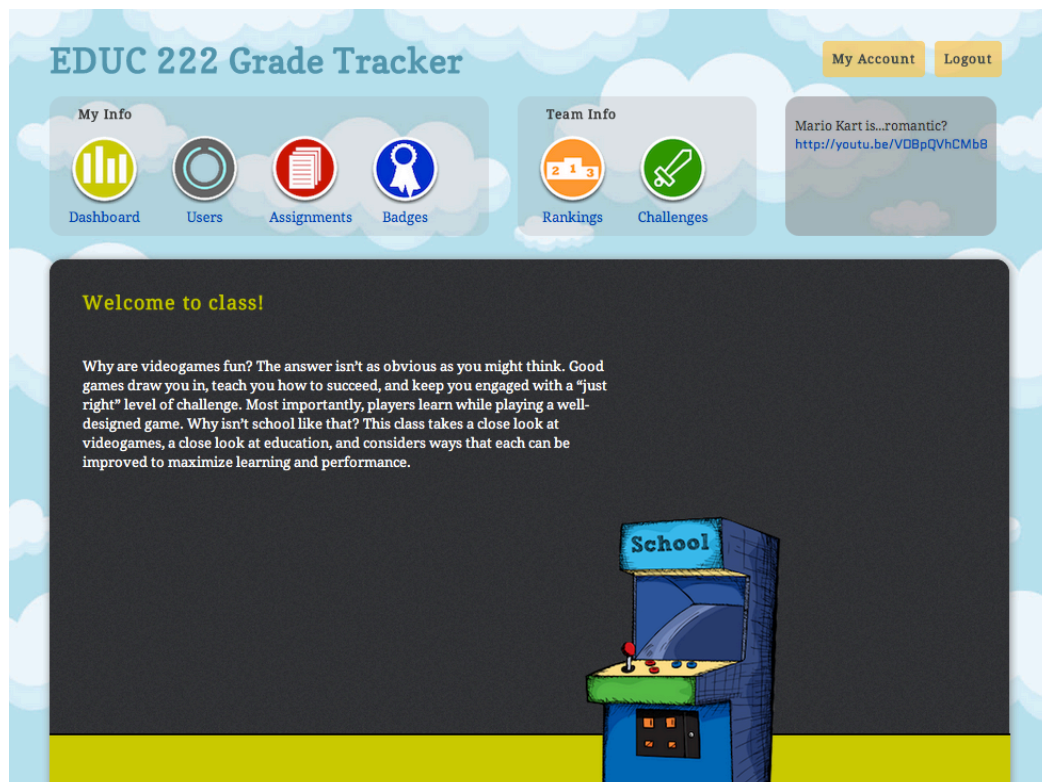

Figure 1: GradeCraft v.1 Design

The initial round was all custom CSS (Figure 1) with no responsive (the ability for a site to respond dynamically so as to properly in web-browsers, tablet devices, and phones) elements. We decided to move to a CSS framework to be able to leverage of some of the fantastic work going on in the open source community and improve our development workflow.
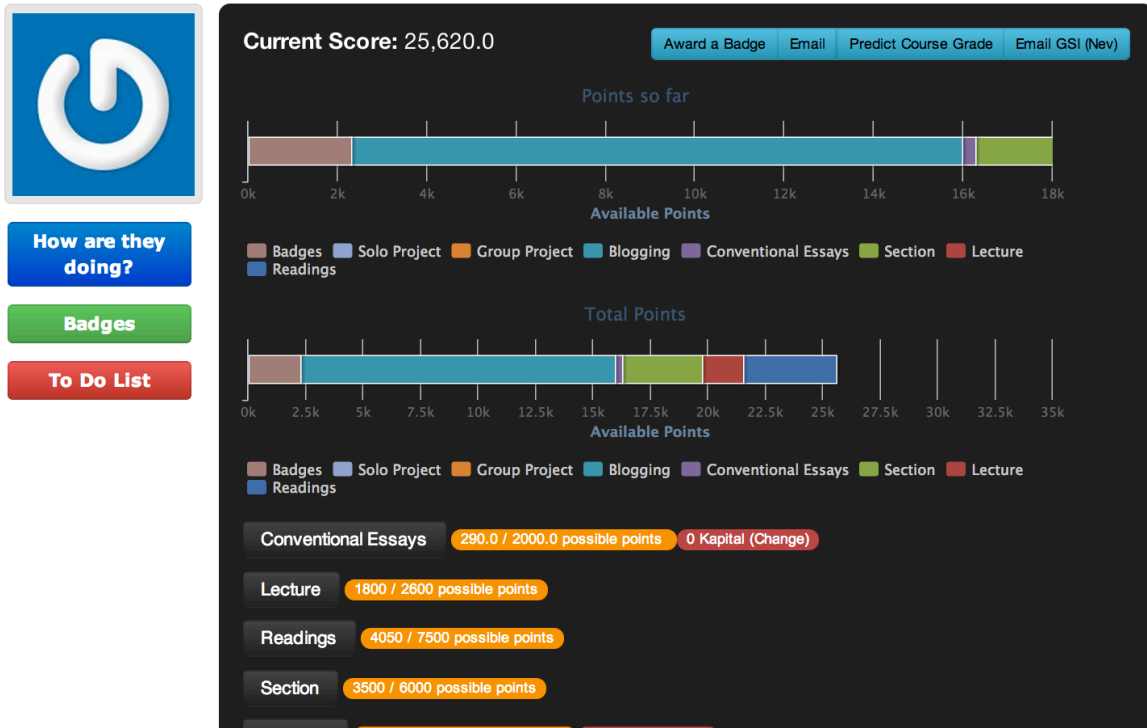
Figure 2: GradeCraft v.2 Design

We used Twitter Bootstrap in our second round of design (Figure 2), which was a huge step forward, but we never quite managed to customize it enough that it felt like we a unique design.
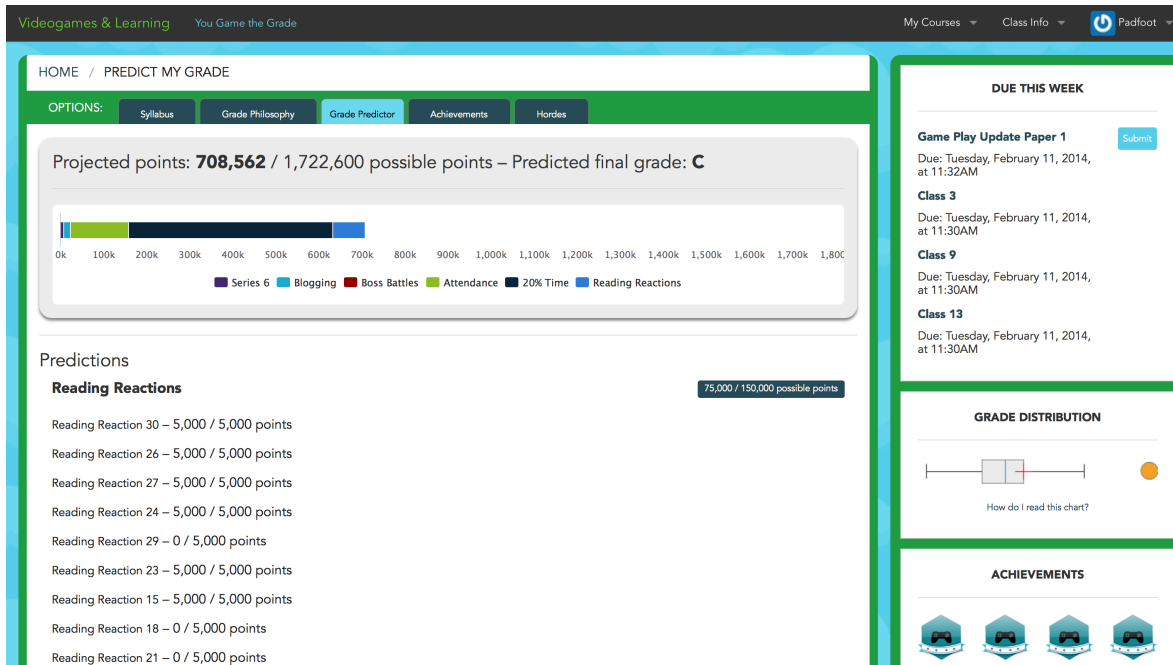

Figure 3: GradeCraft v.3 Design

Recently we have done a comprehensive redesign (Figure 3) using Zurb's Foundation framework. This has had a positive effect on the codebase itself, on our mobile presentation, and on our ability to build out new features rapidly.

Long term we want to intend to build out several themes that reflect the different game patterns we see, and allow instructor to choose which best represents the experience they want their students to have. We also want to explore allowing students to select between certain visual design elements themselves, to explore how that agency impacts their course experience.

How will you make sure that this thing you're creating will be adopted by your audience?
Our approach is that if we focus on building a beautiful, engaging tool, that includes the features that teachers who want to run a gameful course need, adoption will take care of itself. To make sure that we are doing that, we continue to have in-depth conversations and brainstorming sessions regarding the future with our course partners, so that we can be sure that we are actually building the features that are needed. We are also putting together a process through which we will run regular focus groups, as well as one-on-one user testing, to ensure that the system is as simple and usable as possible.