Working Example: Using Popular Games for Serious Learning

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Figure 1: Students work together on a game from a previous project.

http://www.workingexamples.org/example/show/707

A team of MIT researchers, in close collaboration with high school humanities teachers, is designing and testing supplemental teaching resources for using games to support learning in the classroom. The images included in the Phases below represent games that have been central to our thinking about games as learning tools, but we hope to keep adding to the project's ludography!

Seed

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

There is a large and growing body of research identifying affordances of games that can support learning. In *What Video Games Have to Teach Us About Learning and Literacy*, linguist and educator James Paul Gee describes how computer and video games are potent learning environments. He observes that games are simulations of complex systems that allow learners to explore through trial and error and at their own pace (Gee, 2003). Building on Gee's work, Constance Steinkuehler shows that players of social online games display complex forms of distributed cognition, collaborative problem-solving practices, novel literacy practices, scientific habits of mind, computational literacy, and reciprocal apprenticeship. In other words, games give players an opportunity to organize themselves to solve problems together through information sharing, crafting of new tools (in-game tools as well as helpful modifications to the game), and engaging in some basics of scientific thought, including "hypothesis testing and revision and model-based reasoning" (Steinkuehler, 2007).

This research has lent itself to further investigations of games' potential in STEM (science, technology, engineering, and mathematics) learning. As these domains seem to dominate the current fields of innovation, STEM learning is incredibly important for today's learners. However, Gee's work highlights the different manifestations of literacy and the ways to teach it, from navigating language to parsing semiotic meanings to interacting socially

(Gee, 2003). In the American education system, these skills are associated with the humanities, which include the content domains of English, foreign languages, history, and the like. These fields too remain relevant for modern students, and yet they are often neglected or marginalized in discussions around education at all levels. Yet, teachers of the humanities are held to high and shifting standards around these so-called "soft" skills (written and verbal communication; literacy and reading comprehension) and skills also associated with STEM disciplines as approached differently by humanists (investigative systems thinking, critical reasoning, global citizenship).

Figure 2: *Valiant Hearts: The Great War*. (http://www.workingexamples.org/uploads/Image/960)

Our project, sponsored by the Arthur Vining Davis Foundation, seeks to apply games' capacity for implicitly teaching such skills. Our team seeks to create an adaptable set of curriculum supplement resources around commercially available digital and tabletop/physical ("analog") games. These resources will be designed for and with high school humanities teachers in the Boston area, using games to which their students are already exposed and may already be playing.

This project will be supported by qualitative research methods and learning science perspectives. The goals of the curriculum resources we aim to develop draws upon games' learning affordances, including:

   Scaffolding complex systems, allowing learning to build understanding incrementally through trial and error.

   Including opportunities for collaborative learning and team play.

   Modelling hypothesis testing and model-based reasoning.

   Embedding learning in a compelling narrative that engages students and motivates them to persist in the game when faced with challenging obstacles.

   Providing multiple paths for problem solving to accommodate multiple learning styles.

   Providing ongoing feedback and rewards that allow student to continuously monitor their own progress and motivate them to keep trying despite initial failures.

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

Our preliminary research has suggested that high school humanities teachers have been collectively encountering difficulties around the skills discussed above: writing and critical argumentation, verbal presentation, critical analysis, and deeper literacy practices such as discerning authorial intent. Games researchers, such as those cited above, have studied games' proficiency in fostering many of these skills, which can be further practiced via

teachers' existing pedagogies.

In order to avoid treating teachers as the other "guinea pigs" of learning research, sometimes made as much so as the students themselves, the resources we aim to create are not to prescribe curricula, highly specific activities, or even particular games to teachers for use. Rather than requiring teachers to adapt their curricula around an outside source, this project will tackle pedagogical issues with teachers as full co-designers and authors of curriculum supplements that slot in naturally with teachers' own styles and goals in ways both individual and scalable. Thus, we intend for the delivered resources to act as guides for teachers to use games in ways that work for their classrooms.

This research is not developing new games to teach the skills outlined above. Although these development projects clearly have their merits and are highly valued at MIT and elsewhere, they are not always feasible in classrooms with time pressures and limited access to particular technologies. Instead, the games already in students' mediascapes will become valid spaces for explorative coursework, potentially inciting motivation via fandom in some students and offering novel and intriguing ways to interact with games and with learning for students not otherwise interested in games. The project resources will include guides for implementation in both the classroom and the home and/or third spaces, drawing upon what can be uniquely available in these spaces.

Figure 3: *Gone Home.* **(http://www.workingexamples.org/uploads/Image/959)**

How does this work relate to what others are doing in the field?

This research follows in the lineage of Kurt Squire's work in bringing *Civilization* into world history classrooms (2011). That work itself draws from that of Gee as cited above and the trajectories of others in the game-based learning field (see, for example, Glazer & Hergenrader, 2014).

Figure 4: *Civilization V.* (http://www.workingexamples.org/uploads/Image/958)

MIT also has a history with game-based learning via the labs in which the current research is housed, The Education Arcade and the MIT Game Lab, which have created a series of innovative online and mobile games for use in classrooms and informal learning settings. Assessment of these projects shows that they have the best learning outcomes when they are embedded in the right "social envelope" – i.e., a social context that includes adult involvement, collaborative play, and integration with classroom learning. Selected highlights of the work done in these labs aimed at creating this optimal "social envelope" include the following:

1. In 2009, the Education Arcade partnered with Maryland Public Television and four public school districts in Maryland to test the learning impact of *Lure of the Labyrinth*, a state-of-the-art video game that provides engaging opportunities to work through core mathematical concepts. While the pilot focused on adoption by teachers in four districts that mandated participation, we discovered that a far greater number of teachers beyond these four districts spontaneously and enthusiastically adopted the game after hearing about its impact from their colleagues. This experience provides persuasive evidence of teacher interest in adopting any new tool that sparks student interest and supports learning. *Lure of the Labyrinth* has built-in teacher materials, providing guidance for introducing students to the game and using it in the classroom. These resources supported spontaneous adoption by giving teachers confidence that they could use the game effectively.

2. In the spring of 2011, the Education Arcade partnered with the Smithsonian Institution to create a new learning genre: the curated alternate reality game. Funded by NSF, Vanished was designed as an informal (out-of-school) learning experience; therefore, outreach did not target teachers. Nevertheless, we found that the best learning outcomes among the 6,000 middle-schoolers who played Vanished were associated with students who were introduced to this science mystery game by teachers and were encouraged to reflect on their game experiences in the classroom. Teacher response to the game was enthusiastic, and they noted remarkable learning outcomes – particularly among students who had shown little interest in or aptitude for science prior to playing the game.

3. In the spring of 2012, the Education Arcade conducted a nationwide competition wherein teams of math students played *Lure of the Labyrinth*, competing for prizes based on many categories including total points, learning gains, and best teacher-generated strategies for curriculum integration. Building on our experience with Vanished and the original *Labyrinth* pilot, our outreach strategy targeted teachers directly, with impressive results. Nearly 14,000 students across the country were enrolled by their teachers to participate in the competition, and these teachers provided a wealth of positive feedback. Teachers were supported by the professional development materials included on the *Labyrinth* website.

How can our community support you? (e.g. expertise, resources, feedback, etc.)

We know that the game-based learning scene houses a myriad of perspectives and wonderful support structures, so we are looking to the Working Examples and GLS communities to help us shape our side of the co-design, both in our ability to connect to and produce game-based learning research and in our ability to work with teachers constructively. Since Using Popular Games for Serious Learning is still in its early stages, we hope to collect feedback, critiques, and suggestions around the research literature (e.g. previous studies we may have missed), approaches to co-designing curricula and related teaching materials, qualitative work with teachers and in schools, experiences of piloting and implementing/scaling game-based learning in classrooms, and building a list of resources (including games) for teachers to draw upon as they adapt our resources to their curricula. We appreciated the discussions we had at the GLS Conference and hope to continue these over the course of the project, as a truly collaborative effort between our team of researchers and teachers and the communities of practice of both.

Figure 5: *Assassin's Creed*. (http://www.workingexamples.org/uploads/Image/966)

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

Our team includes Principal Investigators, staff, and research assistants of The Education Arcade and the MIT Game Lab, working in collaboration with high school classroom teachers in a Boston area public school system.

Principal Investigator Scot Osterweil is the Creative Director of the Education Arcade and a research director in the MIT Comparative Media Studies Program. He is also a founding member and Creative Director of the Learning Games Network, where he leads the Gates Foundation's Language Learning Initiative (ESL). Co-PI Eric Klopfer is the Scheller Career Development Professor of Science Education and Educational Technology at MIT, as well as the Director of the MIT Teacher Education Program and the Director of The Education Arcade.

Carole Urbano manages the communications and outreach for The Education Arcade and acts as liaison between school systems and MIT learning researchers.

Philip Tan is a research scientist at the MIT Game Lab and was the executive director for the US operations of the Singapore-MIT GAMBIT Game Lab, a game research initiative.

Rik Eberhardt is the Studio Manager for the MIT Game Lab, an instructor for two MIT Game Lab classes on game production, and has served as a mentor and director for multiple game development projects.

The team's research assistants are Kyrie Caldwell, a graduate student in MIT's Comparative Media Studies program, and Jesse Sell, a recent alumnus of the program. They are interested respectively in gendered semiotics of games and other play experiences and broadcast and spectatorship models in professional video gaming.

We are also working with a team of eight humanities teachers and numerous administrators across four high schools in a Boston area school district.

Figure 6: *The Last Express*. (http://www.workingexamples.org/uploads/Image/967)

Sprout

Tell us about your process and how your idea is evolving throughout the project.

The planning stage consisted of logistical and conceptual work, including recruitment of the team of teachers and our own brainstorming around types of games to use, goals and models of the resources, use cases, and critical approaches to games, both as part of the recruitment process and to prototype the deliverables. We hold weekly meetings in which we check in on logistical aspects and iterate upon previous ideas.

Importantly, our work has been impacted by interviews conducted with semi-local teachers of high school humanities, which specified particular skills that students have had difficulty in learning and performing. A first team meeting with administrators of the target school district was also helpful in testing the waters for teacher interest and likely adoption, as well as a general climate of the student body and district policies. We have also constructed and distributed a survey for secondary school teachers in the humanities to further inform our boundaries in terms of accessible technology, classroom time, current practices around and personal knowledge of games, etc. We also hope to test materials and ideas as frequently as possible, starting with an exploratory test conducted in the classroom of one of our co-designing teachers.

As the project is closely tied to teacher input and co-design, we want to continue this flexible and reflexive process of collecting data and iterating, hopefully including feedback and contributions as we begin working with teachers.

Figure 7: *Europa Universalis IV*. **(http://www.workingexamples.org/uploads/Image/965)**

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

We were able to share the first stages of this project at the Games+Learning+Society Conference in 2015. The conference came soon after the project's classroom debut, which gave us the opportunity to work through that pilot for and with the GLS community. In this first classroom test, we used *Rome: Total War* as an interactive text in a Latin classroom, framed in a role-play setting in which two revolving students acted as consuls to the rest of the class's Senate. Especially in regard to this test, one key thread in the feedback from GLS raised a concern for the innovation of our approach, particularly in terms of which games and analytical styles would be at the basis of the resources we aim to create.

We have been considering the connection between content and skills, namely that the affordances of games include more than content delivery, and as a part of existing classrooms and curricula, these games may better serve skill development and practice, for instance. Although always a key part of our project, it has become clear to us that the piloting process and resulting teachers' supplemental materials will need to focus on promoting creative uses of games outside of their content and the content covered in classrooms, leaving ample space and yet providing sufficient guidance for teachers to connect these games to lessons through not only content, but more importantly the skills valued in humanities education, such as critical thinking, various kinds of literacy, persuasive argumentation, problem solving, systems thinking, social emotional skills, etc.

How will you make sure that this thing you're creating will be adopted by your audience?

One of the foundational aspects of this project is its co-design process, incorporating teacher feedback at every stage. Thus, we began with the use of qualitative data from teachers in shaping our initial approach, which will be presented with our co-designing and piloting teachers. We plan to support, accommodate, and collaborate around teachers' and district needs throughout the design process via:

 Regular meetings with our teacher advisors.

 Meetings with curriculum coordinators.

 Presentations and demonstrations at participating schools to cultivate interest in game-based learning.

 Visits to participating classrooms.

 Distribution of regular project updates to decision-makers within both districts.

When we do pilot the program further, we will be drawing upon data and analysis derived from the following:

- Surveys and structured interviews with participating teachers and administrators.

- Classroom observation to document teacher fidelity to the recommendations and techniques presented in the professional development and curriculum materials as well as student response.

- Focus groups with students.

- Pre- and post-tests to assess student learning outcomes, both in terms of concept mastery and development of deeper learning skills such as critical thinking, problem solving, effective communication, collaboration, and learning to learn.

- Analysis of data generated by game play-- i.e., qualitative evaluation of student posts in game forums, time spent playing different aspects of the selected games, and game progress.

- Correlation of game-generated data with survey, test, observation, and interview results.

How might your project scale to provide greater impact?

In our initial research, we noted that some teachers are already experimenting with use of popular games as learning tools on their own initiative. For example, in the January 8, 2013 issue of eSchool News, an online publication for educators, the lead article describes how some teachers are using popular games to help students develop skills "from writing and physics to teamwork and problem solving." While teacher interest is confirmed by such reports, it is also clear that systematic development of curriculum materials and assessment of learning outcomes based on use of popular games – a critical component for supporting effective adoption – is not occurring.

Thus, this project does not aim to just insert commercial-game-based learning in the curricula of those teachers who co-design and pilot with us. Instead, through that co-design process, we will focus on developing teacher professional development and curriculum resources that support the educational use of popular commercial games in ways that are built to adapt to teachers' individual situations (and overarching ones, such as the country-wide Common Core curriculum standards) for the effective adoption of existing games for classroom learning.

Our main concerns in scaling this work revolve around access to technology (including quantity of devices and the power/ability of the hardware), teachers' professional development and classroom time, curricula flexibility, pedagogical need and use, game types/genres and varying levels of accessibility therein, and related issues that may arise. The preliminary data collection and that from actual classroom implementation will be key in designing more flexibility, and therefore scalability, into the supplemental resources to be produced.

Bloom

Looking forward, what kind of impact do you think your work will have? How might it continue to evolve?

As mentioned elsewhere, Using Popular Games in Serious Learning is still in its early stages, and has not yet begun to bloom. However, our team will continue updating the online Working Example where possible as we co-design with teachers and pilot in classrooms.

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Acknowledgments