Game Design in a Traditional High School: A Worked Example

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Abstract: This presentation outlines the work-in-progress developing, implementing, and revising a game design curriculum offered to high school students as an in-school elective. Joining "digital media and learning" and "educational technology" pedagogies, the curriculum bridges out-of school interests, culture and social experiences with necessary, yet motivating, in-school competencies and practices. *Elements of Game Design* was created by an Instructional Technology Administrator, Technical Education and Visual Arts teachers in 2010, and implemented 9 times during the 2011-12 school year. The "Worked Example" (Barab, Dodge & Gee, n.d.) offers a model to discuss conditions necessary to garner support and success implementing an in-school gaming curricula including: planning, infrastructure, culture, policy, resource allocation, curricula writing, teacher expertise, and student voice. This worked example provides a media-rich overview of the process involved when offering an in-school gaming curriculum, and invites conversation around the curriculum to discuss efficacy, challenges, overcoming barriers, and next steps.

Introduction

Game play and game design in the context of traditional classrooms is fraught with challenges making them an uncertain enterprise (Klopfer, Osterweil, Salen, 2009). Curriculum requirements, negative attitudes, logistics, training and support, evidence of effectiveness, inappropriate use, and stringent assessment requirements present enormous barriers to adoption (Klopfer, Osterweil & Salen, p. 18). Schools, notoriously slow to transform themselves, face additional obstacles when moving from basic literacies to applied, multimodal media-related skills unique to the 21st century (Collins & Halverson, 2009). Infrastructure and technical support often make in-school media-rich environments difficult to access. *The Digital Promise: Transforming Learning with Innovative Uses of Technology* (US Department of Education, 2010) proposes infrastructure, 24/7 mobile learning, digital media and games, and teacher training are worthy of funding, as leverage points the U.S. Government intends to capitalize on. As these issues are likely addressed, the influence of games and gaming principles towards high-quality learning may gain enormous traction. Enlisting, and better understanding, conditions that permit successful in-school gaming allows for appropriate curricula and project design. This presentation serves as a "contextual instance" to scaffold peer discussion eliciting "verification or refutation" for this type of game design curriculum in-school (Barab, Akran, & Ingram-Goble, Worked Example website, 2012).

Review of the Literature Supporting Games for Learning

Gee and many other learning scientists provide powerful arguments to bring games or the principles of good games into classrooms (Gee 2003, 2004, 2005, 2007; Klopfer, 2004; Squire, 2005, 2006; Jenkins & Squire, 2004; Steinkuehler & King, 2009). Game-making offers a window into rich, meaning-making that affords systems thinking, complex problem solving, storytelling, creativity, and a host of digital and visual literacies (Gee, 2007; Klopfer, Osterweil & Salen, 2009; Salen 2007; Steinkuehler, 2010). The National Education Technology Plan (US Department of Education, 2010) points to embedded technologies in games, simulations, virtual worlds, and collaborative environments as promising learning and measurement tools due to their capacity to engage, provide immediate feedback, and offer sophisticated and complex assessments (US Department of Education, p. 15). Students play, and recognize games as learning opportunities and suggest games fit into their vision for 21st Century learning which includes: social-based learning, un-tethered learning and digitally-rich learning (Project Tomorrow, 2010). They value the use of games for learning believing they are engaging, make difficult concepts more understandable, and generally offer increased learning about particular subjects (Project Tomorrow, p. 20)

Gee aptly sums up the potential in offering game design opportunities stating, "Good game designers are practical theoreticians of learning, since what makes games deep is that players are exercising their learning muscles, though often without knowing it and without having to pay overt attention to the matter" (Gee, 2005, p.5) When referring to using game design principles for learning *in school*, he suggests the greatest cost may involve changing minds about *how* learning is done (Gee, 2005).

Bringing Games into Traditional Schooling: Creating a Culture of Participation and Support

Undoubtedly, support for innovative curricula within traditional schooling is built over many years and involves, at minimum, a true understanding of the ever-shifting notion of literacy (Leu, 2000). The importance of 21st Century skills and new media literacies to affect teaching and learning environments must move beyond rhetoric and static text in research papers to envisioning the potential of digital media and game-based learning environments. Bridging research and practice with digital media and learning involves the research community considering and grasping the realities of schooling, and the practioner community feeling compelled and equipped to make changes because they have witnessed, read and discussed research around digital media and learning. In this case, transformational practices occurred after: (1) core groups of district administrators and teachers read and discussed books such as *Disrupting Class* (Christensen, Horn & Johnson, 2008)*, Rethinking Education in the Age of Technology* (Collins & Halverson, 2009) and *What Video Games Have to Teach About Learning and Literacy* (Gee, 2007). Staff attended numerous presentations focused on digital media, games, and emerging technologies to transform education. *Confronting the Challenges of Participatory Culture: Media Education for the 21st Century* (Jenkins, Clinton, Purushotma, Robison, & Weigel, 2006), became a staple of many on-site graduate courses, discussions, and on-site presentations, (2) entities such as Tech Cabinet were formed to vet, plan, and implement innovative ideas by core stakeholders from curriculum, technical support, administrative, teaching, and library-media staff and (3) on-site graduate courses and professional development communities were enlisted to read, discuss, plan, integrate, and revise digital media and learning opportunities into curricular areas. The supportive culture to participate with media and new media literacies, and purposeful efforts to work through challenges, when presented, was instrumental in moving the gaming curricula forward.

Planning and Implementation Process

The process envisioning and implementing the curriculum in this example is summarized as: (1) consultation with UW-Madison's Games+Learning+Society (GLS) (2) surveying high school students to gauge interest, (3) research and course proposal review to gain Curriculum Coordinating Council approval, (4) writing and revising curriculum, (5) equipment and logistical considerations, and (6) curriculum revisions based on staff and students perceptions.

After a small team of district staff met with three graduate students from GLS to review practices from their summer game design camp for school-aged students, it was determined a mock syllabus and student survey would drive the decision to offer the course in the school district. One-third of the approximately 1,500 high school students viewed the syllabus and answered survey questions. More than 75% of students surveyed responded they might, or would definitely, enroll in a gaming course. A course proposal was drafted inclusive of research supporting game design as a medium for engaged learning; the Curriculum Coordinating Council unanimously approved the offering. The sections below detail the last three portions of the above-mentioned process.

An Overview of the Course: Writing the Curriculum

Over the course of six months an Instructional Technology Administrator (ITA), Technical Education (TE) and Visual Arts (VA) teacher wrote the curriculum. The team was selected as the ITA had research-based experience in game play and design and the teaching staff expressed interest in teaching the new course. Research papers and books such as *MDA: A Formal Approach to Game Design and Game Research* (Hunicke, LeBlanc, & Zubek, 2004), *What video games have to teach us about learning and literacy* (Gee, 2003) and *Game Design for Teens* (Pardew, Nunamaker, & Pugh, 2004) provided an outline for the course, as did prior experience from the TE teacher, who was a gamer dabbling in game design during his middle school Technical Education courses. The VA teacher provided enormous expertise in activities meant to explore the aesthetics of gaming, and was adept at appropriate pacing, as well as formative and summative assessment criteria. Course documents were stored in Blackboard, and it was determined Google Apps would facilitate students' collaborative work and communication.

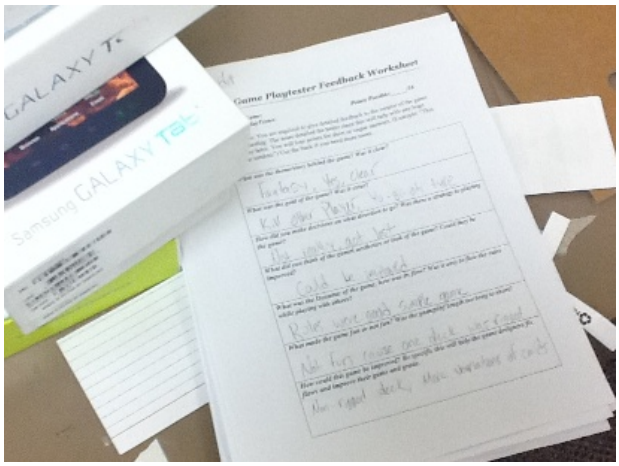

***Figure 1*: Gamer Playtester Feedback Worksheet developed to peer-evaluate games.**

The course is geared to critically examine the history, usefulness, and elements of gaming with repeated opportunities to explore the mechanics, dynamics, and aesthetics of game design. Games are created and designed collaboratively; no formal texts are purchased, instead free or low-cost websites, videos, and game-based platforms such as *The GameCrafter, Kodu, Scratch, ARIS,* and *Daqri* comprise much of the project-based work. Gaming culture, experts, and organizations are threaded throughout the learning instances, and students collaboratively produce a short TED Talk taking a stance on an issue in the gaming industry. At the end of each term, students have experienced designing board, digital, and mobile games.

***Figure 2:* Screenshot of student programming in Kodu.**

Technical Considerations, Logistics, and Cost

While most of the above-mentioned platforms are low-cost or free, a dedicated lab with reallocated or additional staffing positions are undeniable budgetary concerns. Unblocking websites, bandwidth, and wireless infrastructure issues presented obstacles necessitating multiple meetings, testing, and follow-up with Technical Support staff. The districts' progressive stance towards unblocking educational sites did not pose policy issues. Materials to create games, commercially produced board games, and mobile devices for students without access totaled less than $8,000; a fairly insignificant curricular cost considering the hundreds of students who will benefit in the coming years.

Game NOT over: Failures, Setbacks, and Successes

The course begins by building background on the history of games and the video game design industry before moving through the process of reviewing, creating, and playtesting a board game. Introductory programming and logic are taught and practiced through various 2-D and 3-D platforms; Scratch was incorporated into the first semester course sections as unreliable Wi-Fi, and unresponsive technical support prohibited the use of ARIS. Ultimately, ARIS was more fully integrated

during the fourth quarter of the school year. Unsuccessful portions of the course, as evidenced by observation and student reviews, which included an HTML game and heavy-use of Blackboard, were removed or revised in favor of more time programming in Kodu and increased use of Google Apps. Requirements such as investigating aspects of gaming history, selecting workgroups, or the length of TED talks were tweaked or left open-ended to match course pacing and student preference. Surveys suggest students regard Kodu as highly engaging, uncomplicated, and effective in teaching basic principles of programming.

On a macro-level the course is already considered a success. Based on first-year questionnaires, a majority of students deem the design, projects, learning, and tools within the course exciting, relevant to their learning style, important in building skills for future preparation, and a gateway to careers (in their estimation) requiring collaboration, prototype testing, programming, game design, electronics, problem solving, engineering, graphic design, and logic.

The Teacher

The instructor identifies himself as a gamer having tinkered with, played, and designed games since childhood. He clearly speaks the same "gaming language" as the students and understands the value and complexity involved in playing and designing games. When building background or providing exemplars, he draws on his gaming experiences. While no empirical data from this case suggests a "gamer" is best suited to teaching game design, in this example all observations indicate it assists in successful learning experience.

Student Voices

In the fall of 2011, thirty-five (N=35) students enrolled in two sections of *Elements of Game Design* course elected to answer questions aimed at understanding their interests and perceptions of the course. Nine weeks into the first semester, 26 boys and 9 girls, responded to open-ended questions via a Google Form detailing their personal interests and hobbies, observations about the course, career goals, and suggestions for course revision. In the interest of being succinct, responses to three of the six questions posed are discussed.

When asked to describe themselves, and tell what they are most interested in (hobbies, interests, or future goals), students responses (n=number of responses) demonstrated interest in: playing video games (17), physical activities including snowboarding, sailing, dancing, football, track, cross-country, horse-back riding (21), and creative activities (13) such as building things, playing music, drawing, painting, photography and writing.

When asked, "What, if anything, do you think you learned?" responses were classified in the following categories: Game Process and Design (10), Technical Skills (9), Complexity of Games (9), Teamwork (6), History of Games (5), Time Management (2), Educational Value of Games (2), and Nothing (1).

Students overwhelmingly responded they felt the course was valuable, surprisingly challenging, and that the course could be improved by allowing them to choose their own partners for group projects. Three students suggested the technical level of the course was too difficult, and one student suggested we offer an after-school gaming club allowing additional gaming opportunities.

Understanding and listening to students' views presents researchers and practioners a window into designing meaningful game-based experiences, prospectively affecting future academic or career opportunities. If the course proves successful, this style of engaged learning and 21st century skill development will foster credibility with staff, other students, and community members

Revisions

It is unquestionably early to fully evaluate and revise this new curriculum; however the instructor has responded to student, technical, and methodological concerns by making minor changes. Group work and partnering has been rethought, an HTML game that students largely dismissed as trivial has been eliminated, and the development of mobile games have been scaled back until reliable Wi-Fi can be accessed. Next year sections of the course will be offered in a hybrid environment, and plans to include opportunities for student-designed Apps will be integrated in the curriculum.

Challenges

While the visioning and approval process was relatively seamless due to the districts' culture supporting innovation, the actual logistics of implementation and future planning posed challenges to unblock and prepare the environment in time for the fall semester. Curriculum writing took six months of weekly meetings, work, check-in, follow-up, and revision by an invested group of teachers. Significant time and work in the preceding summer months was necessary to order equipment, prepare the lab, work with tech support, and finalize documents and projects. During the initial student implementation, weekly visits by the ITA were required to ensure technical issues that surfaced, and curricular questions, could be adequately addressed. Students electing to enroll in the course, at times, struggled with the complexity of the curriculum and intensive project work. Surprisingly, parents and community members were interested in, and supportive of the new course.

Conclusion: A Work in Progress, Suggestions, Next Steps

One-hundred and seventy-four students, 41 girls and 133 boys, will take *Elements of Game Design* this year. Regular check-ins, quarterly meetings, staff and student critique, and game-based innovations influence the on-going revisions to make the course successful. Since project-based learning, ISTE NETS (International Society for Technology in Education, 2007) performance indicators, new media literacies (Jenkins et al., 2006) and 21st century skills (Partnership for 21st Century Skills, 2004) drive the course, achievement is measured in formative and summative assessments geared towards these standards. Common Core Standards and more defined measure of achievement have yet to be explicitly integrated in the coursework. Suggestions for others considering this endeavor include (1) encouraging teaching staff to read about, play, and discuss games before creating a game design curriculum, (2) including students in the visioning and/or curriculum writing process to ensure relevance and engagement, (3) working closely with instructors to provide the necessary technical and curriculum support, and (4) enlisting community support for mentoring and suggestions to help students design games around authentic local and global issues. An after-school gaming club focused on interest-based game and App design began in February of 2012, and the high school principal has requested the curriculum-writing team to propose a second offering of game design focused on higher-level design skills. *Elements of Game Design* is genuinely a "working example".

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