

Designing Games for Learning: Insights from Conversations with Designers

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ABSTRACT

This paper presents insights about design practices that can lead to effective and fun games for learning, gleaned from interviews with experienced game developers. We based our approach on Schön's notion of practitioners evolving shared 'appreciation systems' for discussing and critiquing work, and aimed to gather and share some of game designers' 'appreciation system' for games and learning. The resulting insights provide valuable pointers to other designers in the CHI community crafting game-like experiences.

Author Keywords

Game design, design patterns, games for learning, appreciation system, games and education, design practice.

ACM Classification Keywords

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

General Terms

Design, Human Factors.

INTRODUCTION

The potential of digital games to become a vehicle for education has been of interest almost since the inception of videogames (e.g. [14]). Educational games for drilling skills such as typing or memorizing math tables, and simulations that train skills and reasoning (such as business school simulations or military training software) have been successful, but there have also been many brave but failed efforts along the way, right up to the present (most are not aired publicly, for a rare exception see [1]). There is still, almost 30 years after videogames entered the popular culture, little informed and systematic discussion of design principles and practices for creating effective and fun games for learning, despite the presence of excellent books devoted to game design as a general practice [e.g. 16]. What predominates instead are two primary genres: books

targeted at popular audiences touting the value of games for learning in broad terms [10, 15], and scholarly articles in the educational and digital media literature that frame discussion through learning theories rather than designed examples (e.g. [5, 11, 17]). Design case studies and design-based recommendations are rare, though there are a few published case studies [4, 9, 12, 19]. These studies, however, represent the experience of a small group of practitioners who have by their own admission not always delivered satisfactory player experiences in their projects.

Our research accumulates insights of a wide range of expert practitioners. Professional game developers do not typically publish papers, though a few write of their experiences on websites such as *Gamasutra*, or blogs (e.g. [20]). This means there are few peer-reviewed records of design best practices for learning among experienced designers.

The authors are part of a 3-year research initiative launched in 2008 that aims to bring empirical rigor and evidence-based design thinking to crafting games for learning. Along with a literature review on the subject, we believed gathering practitioner insights would be a valuable contribution to the field. Rather than ask expert designers to document their knowledge themselves, we interviewed them to collect insights about games and learning. We intentionally cast our net wide to include designers of games that are not explicitly educational, although many of our interviewees have created such games. Our aim was to capture the insights of successful game designers and designer/researcher/educators, with the assumption that these experts would be able to share with us the kind of advanced knowledge and recommendations that come out of extended 'reflective conversations' [18] with the materials at hand. This kind of rich, embedded knowledge that can be difficult to articulate is exactly the kind of know-how that designers of learning games (and for that matter, designers venturing for the first time into crafting emotional, experience-focused systems) need.

THEORETICAL GROUNDING

This research is grounded in the recent movement within the HCI community toward research and design methods that help us create experiences that are less end-result-based and more based in the quality of the experience itself—experiences with intrinsically motivating qualities to them,

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which we must figure out how to craft. The shared language for this kind of design is still emerging—some use Dewey’s notion of aesthetics (e.g. [2, 7]), others talk of generating use qualities [13, 8] that are targets to aim for that in turn help define and shape the design and evaluation process. In any case, the consensus is that traditional approaches to determining success or knowing what a successful practice looks like do not work as well in these design contexts.

Games for learning is an area where theory and practice are not aligning well to reduce likelihood of unsuccessful efforts at crafting learning games [3], and where there is a need to articulate and drive toward design values and strategies that can lead to positive outcomes as well as engaging experiences. We suggest one thing lacking is a pathway between practitioners and theorists, that could help ground research efforts in what Schön [18] characterizes as practitioners’ ‘appreciation systems’ for discussing and critiquing work. It is this dialog about successful practice that we feel is missing, that leads to repeated mistakes and lack of scaffolding upon prior successful efforts. Practitioners do frequently informally discuss the work of those building educational games, but there is not a systematic communication between these worlds. Reasons for failed efforts in games for learning are often embedded in design choices that can be difficult to articulate to non-practitioners, and that are not usually articulated anywhere outside of water cooler conversations among game developers. The work of our project was to gather, glean and synthesize complex, nuanced and holistic insights about what works and doesn’t in designing games for learning. We see this as an example of teasing out important best practices that can guide designers in a target area—something like the internal practice lore Schön describes. We plan to also release snippets of the video interviews on the project website, to help guide practitioners in this area who may never find their way to a CHI paper.

METHOD

We interviewed 41 individuals with a range of design experience and practice. Interviews took place primarily at the 2009 Game Developers Conference, and at other game-industry events such as a mixer for the International Game Developers Association (IGDA) NY local chapter. Some interviews were conducted via Skype video. All were recorded for later analysis. This paper is based upon the full text transcription of a portion (17) of the interviews. Of those included in this set, all but one of the interviewees have developed games professionally (the last is a researcher who has successfully staged several alternate reality games). 7 work at or co-founded small game studios, 1 works at a social software startup after 20 years of game design, including some famous games; another is a famous game designer with many AAA titles, 3 characterize themselves now as academics but have a strong background in professional game development, 1 bridges between a research think tank and producing games, 3 teach on the side while they work as designers, and 1 is a highly placed

team member at a large game company. 4 out of the 17 are female, and ages range from early 20s to 50s.

We used a semi-structured interview process, with core questions focused on their experience in designing games and what examples or patterns for encouraging that we might be able to follow up with research. After doing full transcription of this subset of interviews, we used a bottom-up, grounded theory method [6] of gleaning practice strategies from the interviews, coding recurring keywords and themes among responses in an iterative approach, which led to the findings that we present here.

FINDINGS

We worked from Schön’s notion that expert practitioners develop a consistent ‘appreciation system’—a language with which they discuss design efforts and their relative success, that provides the means for engaging in a reflective practice. Here are some key concepts that emerged:

Fun as serious, respectable, and a central design value—the game must be fun *first*, and this is a challenging thing to do in its own right. Several designers became very passionate about this topic—for example: “So anything that gets fun back into the idea of education, is to me a huge benefit to education as a whole. So let’s not destroy games as we destroyed everything else in education.” This same interviewee noted that play had evolutionary value and that trying to stamp the fun out of play and games was destroying their very essence. Game designers ask themselves ruthlessly and rigorously what would be fun about any given idea. Several interviewees suggested avoiding the usual mechanics (e.g. “I think you should avoid sticking to the tried and true [...] I actually believe that you’re going to have to discover new mechanics or at least modify existing mechanics if you want to express new ideas.” And “you can take something really dry and boring and crappy and if you just think about it a little bit differently than sort of the default ‘Let’s make a quiz game’ you can actually make something enjoyable and convey the knowledge you’re trying to convey.”

Polish. A well-tuned end experience with no rough edges in appearance or interaction is a key factor in making or breaking fun. As one designer put it: “I think a lot of serious games and educational games fail just because so many of them tend to be low budget and there’s not a lot for testing and polish and really taking in that last 50% of effort then adds the final 2% that really differentiates it between okay and perfect.” This doesn’t mean one has to create a large and expensive game: “you could make a really interesting and high-quality style of game with a different approach.... There’s been a lot of presentations in the Indie Summit [at the Game Developers Conference] about games having a different aesthetic and maybe games for learning could learn something from those aesthetics because there’s some that are a lot easier to accomplish and are interesting and cool that are just easier. So try those.”

Games are already powerfully effective learning machines. All games involve training the user to work with (and enjoy) the constraints of the game's rule system. "Games are all about incentivizing people how to learn their way through a system." Games generate seemingly effortless build up of reflexes and rote memorization of vocabulary, geography, and myriad details of a system—e.g. "everything I know about geography or at least everything that started me on the path to actually be able to function and understand geography in any real sense was X-Com." They are also designed to gradually release information and allow contained practice and mastery that is built upon: "there's a very strong sense of progression. Try something in a safe environment, try something under pressure, try something in combination with the other tools you already have that you already learned". Designers say this may be a reason educators are attracted to games, but over-reliance can lead to shallow play (see next point).

Deep content versus 'bolted on'. Many designers said the best design embeds material to be learned deep in the game mechanic and goals, instead of 'bolting it on'. Choice-making and motivation, as well as what is fun in the moment, need to work with the learning goal. "We made a game for XX, and they wanted to teach their sales people some very specific things about how to do their job....specific things that they had to memorize like if a customer has such and such an objection then you should respond in such and such a way....It was the most boring dry bull#*&t in the world. So we said, how can we make an interesting game out of this because what they wanted was a quiz game, question, answer, question, answer. So our solution was to change the abstraction layer and instead of just being a person answering questions you were managing a team of little sales people that walked around the office and when they had a question about what the customer asked them and so you'd answer the same questions over and over again but it sort of became transparent and didn't really matter because conceptually speaking all you were doing was helping these other people to learn. They all had their own internal metrics for how much they knew or didn't know and you'd train your sales force up to be really efficient.... The sales people picked up on the knowledge and we have all these metrics about how many questions they answered correctly on the first game vs. the last game." Achieving deep integration of content may require a content expert: "projects having instructional designers and game designers together in the same room and if necessary they'd have a subject matter expert as well", and it certainly requires that the designer be passionate about the subject matter in order to deeply infuse learning themes into the experience: "You should not be making a game unless you are passionate about it." There must be both a master designer and someone passionate about the subject for this to work (a key theme that emerged, in terms of process).

Designers had strong opinions about *specific* opportunities for creating learning experiences through play.

- **Collaborative action and specialization.** Social games such as massively multiplayer online games provide structured experiences in which players take on specialized roles and work together to solve problems, leveraging one another's strengths (as opposed to the usual classroom experience of individual learning): "multiplayer games allow you to specialize and not be competing directly with your peers", "We allow people to collaborate in the solution of problems."
- **Role-playing and emotional engagement.** Games have the ability to position the player deeply in the center of a situation, taking on the perspective of others who are faced with the actions and choices and situations that the game portrays. One designer created a game to teach her daughter about the Middle Passage: "So I have all these little pieces, these wood pieces and parts around my house....and I give her a bunch and I give her some sharpies and I ask her to make me some families....so she's got all the kids and... she knows who's who and who belongs to who—and after this time I just come over and just grab a bunch indiscriminately. And I say we're going to America and this was not a cool moment right? Because she says, you forgot the baby. This is the baby and this baby belongs to this family....So now we're on our way to America and so we also have our little pile of resources. And as we are heading toward America it becomes obvious to her that at about midway we're not going to make it. There's not enough resources for the people and she asks me what are you going to do? And I say 'Well, there's two things, either we can put some people overboard or we could hope they get sick and die on the way. And if one gets sick, you know how it is here in the house, the others get sick. And I see the look on her face, right and I stop the game because she's 8 and I feel that... the learning has officially happened....she gets together with her father and has this genuine, real conversation about how do you suppose those kids felt, losing their mommy and daddy.... But she had seen a movie, she'd had lectures, she'd seen posters in school, they had read books—but none of that mattered because those were not her families, not her people that had been separated and screwed up. And as abstracted as it was, it was interactive and it was hers."
- **Exploration of moral and ethical dilemmas and processes through action.** "...the opportunity we have with games is to do what we don't usually do in other media. Which is to dig into the complexity upon the depths of an issue or a problem. To resist simple answers. To describe ambiguity and to characterize trade-offs and the uncertainty you might in dealing with those kinds of decisions. Whether it's about economics or world health or energy or those kinds of global issues that are so overwhelming. And to understand that there are not going to be some answers,

that's a part of the answer, I think." "Let people/players think about and experience things and think about how they feel about them instead of just listening to someone lecture them about how they should feel."

- **Exploration of systems—their constraints and possibilities.** Games allow people to viscerally experience abstracted principles, e.g. "World of Goo [an independent game with a physics-based game mechanic] is an awesome way of teaching people a lot of the principles of basic engineering without lecturing about physics or anything else. You could see how letting people just play and then going back and showing them the context of things they already figure out how these analytical ideas about thrust and force and rigidity all play out in what you are doing." As another designer put it: "A complicated system is best learned through a simulation or experimenting with a simulation. And as time goes on... people have to learn more and more about complicated systems. Games become really, really important for that because there's almost no other way to learn effectively."

CONCLUSION

Our interviews revealed a consistent 'appreciation system' for evaluating games, and identified key strengths of games for creating learning experiences. We hope the insights described here are valuable not just to educational game designers, but also to others interested in the opportunity for experience creation that games represent. Not all points are surprising, but convergence on an 'appreciation system' was our focus, rather than novelty per se. These should of course not be taken as hard-and-fast rules, but rather as information to aid in the design process. We also plan to share video clips from the interviews on the Games for Learning Institute website (<http://g4li.org/>).

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