Dancing (and Wrestling) with Learning Objectives and Game Mechanics

Bert Snow, Muzzy Lane Software, bert@muzzylane.com
Caitlin Feeley, The MIT Education Arcade,
Jason Mathew Haas, The MIT Education Arcade, jhaas@mit.edu
Peter Stidwill, The Learning Game Network,
Dave McCool, Muzzy Lane Software, dave@muzzylane.com
Scot Osterweil, The MIT Education Arcade, The Learning Game Network, scot_o@mit.edu
AND OTHER CONTRIBUTORS IN THE SESSION.

Abstract: Designs for intrinsic learning-game are often created through processes where game mechanics are inspired and built from the learning objectives the game designers want to embody in the play experience. It sounds straightforward, but in our experience it's not: Mechanics are built and played, and the play teach the designers new things that lead to looking at the objectives differently, and therefore the mechanics, in a challenging creative cycle. In this Fireside Chat, we'll host a lively discussion of practitioners who have been living this process.

A Spirited Discussion among Practitioners

The aim of this Fireside Chat is to spark a lively discussion among the many wizened (and scarred) designers of learning-games who will be at the conference. The intent is to focus the discussion on one aspect of design process: the choice and development of game mechanics building from the learning and practice objectives the designers are working with. We will talk about the experience and the lessons of the work itself - the goal and concepts we begin with, and the ways in which the work itself changes our understanding of the starting-point learning objectives, and how game elements can be combined to embody them.

The Authors (Wrestlers)

The authors are designers who between them have many games on their resumes, and in particular a lot of work and thinking about learning games. While we generally share an interest in working forward from core learning or practice objectives, our approaches have tended to vary quite widely.

The authors' work has ranged from ingenious puzzles to complex strategy games to open games-as game-building-systems to radical MMOs and mobile collaborations, language-learning-through games, and much more. In addition to learning-game design and development, we variously have written extensively on game design and learning, have helped invent game genres, and have worked with educators in many different disciplines. We don't expect to always agree – and hope for several good arguments and also to draw out experiences and ideas from everybody who joins us.

The Focus

Playing a game involves attention to the goal a player is trying to reach, the role being played, and to the tools, actions, and strategies the player can use to reach the goal. To succeed, the player must learn about all of these elements – what tools make sense when, what strategies worked – and didn't, what the responsibilities of a role really mean. To design a game to inspire learning in a particular area, it can make sense to look for goals, tools, actions, and strategies that relate to that area – that are intrinsic to it. Hopefully then, play will naturally lead the player to engage with and learn about those elements – and the topic area itself.

To accomplish this, the authors have different processes and favored approaches that we start with….but in game design things don't usually go as planned – and that's what we want to focus on – how the curves and lessons of design and development inform and change the starting point – and how to take advantage of the creative opportunities in the process while not losing our way.

Including the Audience

The questions were shared with attendees, with an aim of bringing to light interesting experiences and lessons from the rich group of designers who will be at GLS. Within the session we will ask questions, and seek answers and examples from the audience as well as from each other.

The Stories

The following are the stories told by our five initial storytellers, plus by many others who we invited to contribute after our first round of stories was complete.

BERT SNOW: Vice President of Design, Muzzy Lane Software

I'm Bert Snow; I lead the design work at Muzzy Lane; we are a studio that has been working on designing and developing games for learning for almost 10 years. I'm going to start with a story about objectives and the choice of game genre.

I'll talk about a project to develop a game where students work with the concepts of marketing (concepts like positioning, pricing, promotion, and distribution). The game's audience would include students in Introduction to Marketing courses. We had two eminent marketing instructors working with us at the start of the project who were very enthusiastic. One was data oriented– ready to think about the underlying game systems, and the other was very enthusiastic and had a lot of ideas about how the games might work. Specifically, he was very bullish on doing a real-time game. (You may know that Muzzy Lane has a strong background in turn-based as well as real-time games, and we've learned – partly from this project – that this is an important distinction.) There were some good arguments for taking a real-time approach: the students are an active group, and it was felt that speed was important, and real-time tycoon-style games have had commercial success.

The important point for this story is that we made a quick decision to choose that genre – real-time strategy – without a thorough process. We went forward through a design phase and built a prototype. We were able to build actions and roles to pull in many of our specific learning objectives: players formulated a product (a juice drink with an acai-berry like 'super-fruit' ingredient), targeted a market, chose advertising messages and media, and so forth. It looked great. But when we started playtesting the prototype, we found there were issues with players being able to take in the feedback and use that information to understand the consequences of their actions in a way that would help them develop better strategies in the future – a key goal.

We tried a variety of changes and interface solutions, which helped somewhat, but in the end it was a mismatch of genre. When we had an opportunity to re-tackle this topic, we chose a multiplayer turn-based strategy mechanic, and the resulting game was much stronger – as a game and in meeting our learning objectives. The turn-based mechanics provided time for players to look at what competitors were doing as well as analyzing their own performance, and let us deepen the interaction and feedback in each area of marketing.

I guess the one sentence lesson is, "Don't assume that the genre you think you're going to build your game is it the genre that you should build your game in." We've found it's important to look carefully at the strengths and weaknesses of different genres (and combinations of genres) in relation to your play and learning objectives.

CAITLIN FEELEY: Game Designer and Project Manager; The Education Arcade, MIT

I'm going to tell you about a casual game we did called *Farm Blitz*. I wanted it to be called Money Bunny, but I didn't get to make that decision. We were approached by a financial education group that said, "We need a casual game to teach low to moderate income women who are heads of household how to avoid and manage high risk debt. It needs to be a short casual game, maximum 20 minutes seat time. That's not optional. So I had to figure out how to make a game that was casual and appealing to non-gamers that dealt with math and debt. And all I needed was to somehow convince them to get a root canal in the middle of it to make it the most appealing game ever."

So we got to talking about this demographic -they're at higher risk for payday loans, predatory credit cards, things like that...what the big kind of educational and psychological barriers there are to making good decisions about debt. And part of it is, a lot of people were raised thinking, "You've got to save money, you've always got to have an emergency fund." if you have a savings account with a quarter of a percent interest, but a credit card with 18.5% interest, there's no sense in saving your emergency fund when you could be paying down the credit card. But people may still have a thousand bucks, maybe even two thousand in their emergency fund while their credit card is spiraling out of control.

These people know what their interest rates were. As Scot likes to say, we could write down everything they needed to know on a 3x5 card but they wouldn't actually internalize those lessons. I tried to think of a way that would make this very easy to grasp and appealing. I thought of a story I was read when I was a very little girl, about some parable about a man in China requested a single grain of rice to be doubled every day from the Emperor. By the end of the month he had all the rice in China, because once you start compounding things it gets completely out

of control.

So what we ended up with was a Bejeweled-like mechanic where you had a farm. You had to line up little vegetables in rows of three or more, and you had to harvest them. You earned money from that. Meanwhile, you could buy more seeds, garden tools, other things to make your farm awesomer. But every time you did that it cost you a bunny. There was a bunny that got put in a pen. “Here’s your seeds, and here’s your requisite bunny. You must take a bunny if you take seeds. It’s free bunny day!” There’s a pen, and as long as you have fewer bunnies then there are slots in the pen, you’re okay. If you have more bunnies than there are slots in the pen, they get out and they eat your vegetables and ruin your life. And of course, eventually, bunnies make more bunnies. So if you have more than one or two bunnies, it’s not long before your farm is a desolate wasteland, and it’s game over.

So then we had this idea to teach the relative value of savings to debt. We had this idea that you had a tortoise, because tortoises grow really slow, and you had to feed the tortoise periodically. That eventually evolved into you had an orchard. You could put money into the orchard, and money was safe. The bunnies couldn’t eat it. Periodically something like a tornado comes and destroys your entire farm, but the money would be safe in the orchard. The trees would grow very, very slowly over many, turns. Eventually the trees would be huge and dripping with diamonds. It took a really long time to get a diamond tree. But if you needed the money you could chop down a tree and use it to pay off your bunnies. Very quickly people figured out the balance between paying down the bunnies as fast as possible, and then socking away everything they could possibly spare into the orchard until they needed it. And people would be very careful about which trees they harvested...”oh, this one’s been growing for a long while, I’m going to let that investment grow.” It really worked well, we tested it with a group of low income women. So the fact that this made this very approachable in a very easy to grasp way worked out really well. We were actually nominated for a G4C award (and lost to Bert!).

If you had to take one lesson from that?

Ask yourself why people aren’t grappling with whatever it is you want them to learn or understand. It’s not enough to say, “Oh we just need to find a fun way to teach it.” There’s a lot of ways to make something fun, and there’s a lot of things that people need to learn. You need to ask yourself, what is standing in the way? Nobody thinks debt is good for them, so why aren’t they stepping over that line and making the decisions they need to make? And then think about to break down that psychological barrier and make it approachable.

JASON HAAS: MIT Media Lab

I’m going to tell you a story about *Vanished*, our science ARG from two years ago. The lesson up front: The right subject matter expert is magical. For us, we were pursuing a collaboration with the Smithsonian. We have this great data about silverback gorillas, and we want to make a flash game about extinction and what that might mean for silverback gorillas. Seems like a good idea, we could get some traction there. They wanted to get their scientists involved, putting the museum out there.

We got to talk to Matt Curano, who is a paleontologist at the Smithsonian. We were talking with Matt...he was a bit cranky that day, he was all “I hate the way science is taught. You know what the worst thing is? The scientific method. The thing is you do all those steps but you never do them all.” nosing through data and stumbling across something. Conversations in the hall that would spark something, rarely do you go through all the steps in order. Do you inspire people to learn with ordered steps? Not necessarily. What’s the most important? It is colleagues. Working with other people is what science is about. I’d been reading about ARG’s a lot at the same time.

People communicate to solve puzzles, they wouldn’t always start in one place and move in a straight line. As a result you can start to see that this might be what middle school students for instance can use to get inspired about science. It’s more like something they would do on their own. Organizing themselves to solve a puzzle is really important.

Having it be something that had an end point kept it sustainable. It allows you to put in benchmarks and say, “If by this point you haven’t done X we need this type of scaffolding.” for the most part that really worked out. The other great thing about ARGs is you can bring in People like Matt. We have Carrie Brulhide, talking to kids about what it means to do forensic anthropology, doing archaeology on people’s bones and with civilization may have been like based on those sort of things. Having the right content matter experts who are willing to interact with kids and interact with them like they are adults is amazing. So finding that right subject matter expert in the first place, someone who has good opinions, who knows their field, isn’t just participating in traditional education, has ideas about how their field should be taught and what their field really is cannot be replaced.

PETER STIDWILL: Executive Producer, Learning Games Network

I'm going to talk about a game, *MP For A Week*, that I made for the UK Parliament while I was working for the House of Commons and House of Lords in London. The overall aim of the game was to explain what Parliament does, and demonstrate what role it has in the context of kids' lives.

So the first big challenge appeared to be that kids aren't generally interested in politics. However, when we sat in on the sessions where kids visit Parliament, and we talked to them and held focus groups, it turns out they are actually very interested in political issues. But they are turned off by political parties and a lot of the coverage they see on TV. For example, Prime Minister's Question Time, the sparring match between the prime minister and the leader of the opposition. Although entertaining, the arguments can be petty, and it actually disengages many people as it reinforces the 'old boys club' stereotype. It's very good drama and the media loves it, but unfortunately it puts a lot of people off.

Coupled with that, when we bring kids into Parliament, they are often awed by the building itself, which is very old and ornate. It's a potential hook to get kids interested, but on the other hand they're in a palace - the Palace of Westminster - and how distant is that from their lives? How can politicians there be representing and legislating on my behalf? So we tried to take advantage of the building but show that real work goes on here. We had to summarize what Members of Parliament (MPs) did, and put kids into their shoes. But it turns out that it's not that simple to figure out what MPs do. The MPs themselves don't agree on exactly what it is they should be doing - there's no job description. Plus, in the middle of game production, there was the expenses scandal, where many MPs were using public money in ways that the public did not like. That was an interesting backdrop to launch this game.

We wanted to ensure that we got the perspectives of everyone involved in the political process. We interviewed a lot of people about what they do. And through that, we realized that what we needed to do was simulate a complex system of people, lobbyists, journalists, MPs, constituents, etc. We wanted to try to get across the nuances of the political system. One of the big challenges was that everyone we talked to had ideas about what should be in the game, although many did not necessarily have much experience with gaming or games. So it was a case of pulling in all these ideas and working out our learning objectives. We had to ask ourselves: how many learning objectives is too many, and what's the ideal amount? It depends on the game, of course, but if you try to do too much, the game will fall apart. We created a shortlist of core learning objectives to inspire our game mechanics, and then used a lot of the other rich material and suggestions as authentic content to fill the game.

My take home message

Do your research, get all your subject matter experts involved, and really get into the heart of the content to get all the insights. But also be clear about what it is you're trying to achieve with the game and don't try to do too much.

DAVE MCCOOL: President, Muzzy Lane Software

So my story is about a game related to government as well – a common theme! This is a project for the Intro to American Government course, which is widely taught on college campuses, and required in states like Texas and Georgia. We talked to lots of instructors, and found that the course is almost universally disliked students (especially where required). The kids do not want to be there. So one challenge was to build engagement and interest. We also had a book full of learning objectives – lots of them; Civil rights, civil liberties, how the branches of government work, elections, and so on. We met with teachers, and looked for a player role and set of goals that might address all of this. What we came up with was running for the House of Representatives, legislating once you're elected, and trying to stay in office. The game is called *Government in Action*, You raise money, sponsor bills, talk to the media, work with your party, try to stay in office. We thought a game could do a great job of getting students inside the system – to see what's interesting about it.

Another influence was role-playing games. Teachers have often done live-action role playing with classes but it's a lot of work, and they were interested in something more approachable So the genre we chose is a multiplayer turn-based strategy game, with about 18 players playing different representatives, competing as Democrats and Republicans. Fundamentally, it's a resource management game where you're balancing spending time in your home district getting elected and working with your constituents, versus how much time do you spend in DC co-sponsoring bills, getting bills passed. You work with a cast of characters, including the president, lobbyists, and the media, constituents.

After getting this core game working, we found we were able to add back in some of the learning objectives we'd

set aside earlier: For instance, in your home district, if you're doing a "Town Hall Meeting" to raise awareness on an issue you care about, a constituent might say "I hate the way everyone's criticizing the president, we should just throw them in jail", and you need to respond in a way that shows understanding of the Constitution and the First Amendment.

My takeaway lesson?

If you start with a wide group of objectives, it's valuable to focus on a few, build a game what works there, and look for opportunities to add others to that core.

SCOT OSTERWEIL: Creative Director, The Education Arcade, Learning Games Network

I'm going to start with a light bulb joke from the advertising industry: How many creative directors does is take to change a light bulb? Why does it have to be a light bulb? I think that should apply to all game designers. We should always be interrogating our objectives by saying: Are these the right objectives. Learning objectives are always: I want the player to learn this. Not only is it impossible, it's anti humanistic.

Let me tell a story to turn that around. We got approached by the Gates Foundation to create a game about language learning. Learning language, research tell us: It sucks, no-one likes it, there are people that do well on those kinds of tests but they can't actually speak it. So I tried to interrogate my experience, and this is the question I tried to ask: What's the game? I went back to my experience with 3 years of French and then working in Paris after a 20 year gap. I built up a game idea around how long could I talk before someone realized I was an American. What was going on there was, it was an identity issue. It mattered to me to be someone who was not bound by my language, and so when we started doing the language game I brought that back. Could we give people the opportunity to take on a new identity, and see the empowerment of beginning, whatever stage you're at, to master new things? That's what games are good at after all.

We designed a series of games, in which your goal is not to say or do anything perfectly, but to keep incrementally in contact with other players and become more capable. To interact in the world, and become more capable. Over time we hope to work in a narrative about identity. To go back to this, interrogate the objective. Each of these stories started with an objective. IT wasn't about putting a set of facts together. It was about where was the truly game like experience that matters to us as people as we engage in these areas. That's always the challenge and always the learning curve.

ADDITIONAL STORIES FROM PARTICIPANTS IN THE SESSION

DAVID GAGNON: Director: The ARIS Project

Hi, I'm David Gagnon and I work at the University of Wisconsin directing the development of mobile educational games. I'm going to try to combine two of the ideas that have come out in a single story: First, avoid picking a genre up front. Second, learning objectives need to be challenged, and the subject expert's first take may not be best.

I had the opportunity to work with a really amazing subject matter expert, Teri Balser, a professor of soil science at UW. She is an avid gamer and a really great professor, winning the "Professor of the Year" award a year back. As we began a project, she said, "I really want to get people in the soil, I want people to get in there and look around." this was a great way to start a discussion, and we began experimenting. After a short run of doing some white-board storyboards, the design quickly became a real-time, top down game. The players will manage bacteria and explore these underground worlds, find resources, multiply their units and claim new territory. Everything was fine until we realized that the scope of the content that would fit this genre was REALLY small. It would end up being only a few weeks worth of the class. As we tried to expand the design by throwing more content at it, scaling from micro to ecosystem-level contexts. It was becoming obvious that we were doing more work than the players ever would - a bad sign. The design was broken and we realized we needed to try a whole new approach.

So, throwing out both the learning objectives and the genre,, someone on the team asked Teri, "You teach a class in this, what's the hardest thing to teach? What lecture do you dread doing?" She had a near instant response, "The nitrogen cycle!" The topic was taught in a number of courses and is a complex mix of biology and nasty chemistry. Within the hour we had a sketch of the nitrogen cycle, with cows pooping and fertilizers running off up on the white board, a graph of possible states, paths and actors. It looked just like a board game. Within a few more hour long meetings we had a functional board/card game that was fun to play, we'd shifted genre and totally redefined the thing.

It has remained my favorite game to create. It isn't even computer based! Cross player collaboration and banter came for free and everyone from middle-schoolers to graduate students love playing it. The majority of the budget was spent on art and play testing instead of software development. We had to totally throw out our learning objectives, we had to ask the basic questions about what is worth teaching and hard to understand. As soon as you start thinking about games you've already played, they color things you see in game design. It's hard to break out. I don't know how, but I think it's important.

LUCAS BLAIR: Educational Game Designer, Little Bird Games

My name is Lucas Blair; I'm an educational game designer at Little Bird Games. A couple years ago I was a PhD student at a game lab. Clients would come to the lab with pretty random subject matter and they would always want us to make games because that is what our lab was known for. During one meeting we had a new client that wanted to teach continuous process improvement and our source material was a series of excel spreadsheets.

These were things like charts which were like tools used to crunch numbers and optimize processes in factories. I immediately said I don't think I can make games out of this but I think I can make the learners think it's a game. So we split the material into two simulations that taught when and how to use the tools.

As part of the simulation we created a fake factory. I wanted to make it seem bigger and more fun than it really was. So the factory made ammunition that would prevent an impending alien invasion. The player had to optimize the processes in the factory. We used comic book style art and incorporated things like TVs and radios that gave updates about the aliens getting closer. We used effects like panning across magazine racks to give a snapshot of what's going on in the world. To remind the player that while they are in excel spreadsheet they are doing something that is important and it affects the outside world. We even themed the tools so the learners could see the progress of the machine, called the Alien Fossilizer, which the factory built. After the project was completed, everyone enjoyed the playtests even though anyone in the lab would have said what we created was not a game. If I had a takeaway from the whole experience it would be that a game isn't always the answer, and a game is not the only thing that can be fun or effective.

ERIC CHURCH: Game Designer Breakaway Games

I'm Eric Church of Breakaway Games and the University of Baltimore. Mine actually is the scary story, there's no success here so far. There may be some time in the future. We responded to a proposal that was a request to teach paramedics, and to teach high school students STEM. The idea was to have people be paramedics, and when they encounter something that was a physiological system, it would be a simulation that would give you high-level abilities. We made the mistake of asking teachers what should we make the objectives. They were all anatomy and physical systems. There was no game in any of them. If you take objectives like this, try and cram game ideas into it, all you're doing is making a boring process take even longer. It became trying to steer the educators toward our process, not just things that were their objectives. It's not done, so it's a bit scary.

ROGER TRAVIS

One thing I need to get out there is that learning objectives are verbs, they're not just nouns. I think it's what a lot of us were talking about is trying to figure out what the best verb is that will encompass this taxonomy and get something to be more playable. My little story is I had a combat mechanic in an RPG, you try to guess someone's secret passage. What I wanted them to do was recognize it and know that this was from Oedipus Rex again they would know what it was from Oedipus Rex. It was much better in the end to make this a tabletop RPG, so students could discuss directly, and that got at the analysis we wanted.

BRENDAN TROMBLEY: Game designer: Institute of Play

My story is related to changing learning objectives, but it's also about changing the goal of your game around the learning objective. It's about math and formulas. My job is to work with the teachers to make games that work inside of the classroom. I was working with a teacher who was making Pythagorean Theorem games. We were trying to get across the grid, so you had to make diagonal movements--manage your resources to move. But it became apparent that it's not fun to sit around and do the Pythagorean Theorem while three other students sit around and wait for their turn.

So we totally reframed the game, as a pre-activity, not about the Pythogorean theorem directly . You're making estimates and seeing how accurate those estimates are, with the idea of creating a vacuum for the learning. Once the teacher could teach the theorem, the kids could say – here's the missing piece I could have used in this game.

When the kids were playing it, they were all, “Oh we can use the Pythagorean theorem for this!” it was moved from a teaching game to a pre-activity.

SCOT OSTERWEIL

It’s probably worth mentioning that everyone in this room should be reading ‘Preparation for Future Learning’. Most games are that, they’re not the product of ...It creates the interest or the gap, it is learning, but it is also preparation for the formal learning that comes later.

BARBARA CHAMBERLIN: New Mexico State

I’m Barbara Chamblerlin with New Mexico State University’s Learning Games Lab. several speakers have noted an unfortunate trend, where — if the learning objective is to learn X, designers create a game where players practice doing X. It’s one way to go, but it may not really be where the magic is. Sometimes, the most effective game is one where, if the player has to be able to do X, they first have to do A or B instead. Even better would be for the game to place learners in an environment where they discover on their own that doing X is the best solution.

The trend isn’t just on the part of game designers who create games, but sometimes our end users, or our gatekeepers, assume that games must look like what they are supposed to teach. Therefore, if they want kids to learn multiplication, they believe the game should be full of multiplication equations. The problem with this is that if a game helps the learner in a more gradual or conceptual way, it can be difficult for the gate keepers to understand how this approach leads to learning.

For example, one of our Math Snacks games is designed to help learners with concepts in pre-algebra. In “Gate”, players build numbers in a variety of different combinations, using place values. You can see the place values on screen — the ones, tens, hundreds, hundredths, etc. When some people look at it, they think it is a game to teach place values: it isn’t. Until they’ve played through several levels, they don’t see how it really helps kids construct numbers in different ways.

We’ve learned the need to communicate what the game is and particularly, how it leads to learning. As we design games that lead to learning in new ways, in more conceptual or inquiry driven ways: we also have a responsibility to communicate to teachers and parents how and why that learning works. We want our gatekeepers to expect more in games than straight content delivery or practice, so we need to help them see how learning can happen in ways that aren’t immediately obvious.

FRANCISCO SOUKI: Game Designer, Schell Games

I’m Francisco Souki and I’m a game designer at Schell Games. Something we found that helps a lot was our transition from educational to transformational experiences. Project goals are usually communicated as verbs - and the verbs are tied to the game mechanics, so it’s mainly the responsibility of the developer to figure out the semantics of the goals. Our approach is more about player transformation: what does the player look like before and after the experience? The client is usually great at answering that question, and we craft the goals as the project progresses based on their answer. HaH