Please stand by for real time captions.

Thank you for standing by. The conference will begin terribly.

-- Momentarily.

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Welcome and thank you for standing by. At this time all participants are on a listen only mode. During the question-and-answer session, if you would like to ask a question, please press star one for your telephone. Today's conference is being recorded. If you have any objections you may disconnect at this time. I would now like to turn this call over to Janet --

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Thank you. My name is Janet Culloden are and I'm pleased to welcome you to the second in our series of distinguished lectures on designing disruptive learning technologies. This series is organized by the cyber learning and future learning technologies program working group. The cyber learning program itself is a joint effort of for NSF directors, computer and information sciences engineering, education and human resources, EHR, social behavior and economic sciences.

The measure of the cyber learning program is twofold. To imagine and anticipate the next generation of learning technologies what this technologies might be and how to use them. In school and out of school and by people of all ages. The second part of the programs missions is to advance our understanding is how learning happens, how to foster learning and how to assess learning, with a special focus on the learning that happens in context where learners are having experiences that computers make possible. And where technology can collect data not collected otherwise.

I am delighted today, we are all delighted today, to have as our speaker, Kurt Squire, who will talk up -- about the future of games for learning. Particularly some ways possible to foster games and challenges in the care needed to design games so that they not only engage gameplayers over long periods of time but also systematic foster learning as people applying them. Kurt, stress from the University of Wisconsin, Madison, he is in the education school there in their division of curriculum and instruction. He is more Junior and probably has less gray hair than you would expect in a distinguished lecturer. Is, however, among the most distinguished which is used in the games and learning community. He focuses his research on the potential of videogame-based technologies to make systemic change in education. Welcome, Kurt. And I will turn it over to.

Thank you. Thank you so much for having me. It is a real honor to be part of the series. A lot of the speakers are friending collects. -- Friends and colleagues. Thank you to one of my other program officers.

Today I want to talk a little about what is happening under our lab to try to get people to think pretty expansively about the opportunity and be sober about the realities of doing this work. To give you context, I am in the school of education, but I also run a lab as a part of this which is the Wisconsin Institute of technology. It is a cutting edge facility and it is a bit odd. Our peer groups

are things like systems biology, at the genetics, so coffee time is actually quite interesting. As we try to figure out which of the does. That is done by design. The idea that this group should work together, collaborate and bump into each other and come up with new discoveries that would otherwise be impossible. I will talk a little bit about some of the ways redoing that.

It is also kind of weird, we have a de facto the. 17 full-time game developers. We have about 120 years experience in the commercial industry and then 26 game researchers. It is very much a studio collaborative field. You might be thinking why in the world is a fully functioning game studio do that? [Name Indiscernible] was the first one who recruited us and he is a former director -- area director at NSF . For him, what he was interested is making sure that someone has at the forefront of what kinds of technology and technological changes are happening.

To give you an example, coming from healthcare, there is this thing happening with people and mobile devices where computing is being distributed. This has huge implications for how we organize our IT structure, how we think about -- everything we do in computing. So for him, what he was interested in was less get a group in the middle of this that think this way. Or think in terms of games being able to do the kinds of things where we have different autonomous people being noted in the network. This is the kind of logic that landed to the breakthrough folded. The gamers are playing a game where there doing protein folding were able to produce scientific mysteries that had eluded scientists for decades.

The idea that by having groups in there that are thinking different about technology and about what usuals are then you could have transformative breakthroughs. In this case, there are 50,000 gameplayers as potential scientists I can contribute to the scientific enterprise. Just a fundamental logic.

Another reason, [indiscernible] and also make their work look cool. We work with John yen who is overall a just and said this is a version of the game based on his research. Doctors for caring drugs and therapy. Is another benefit their.

I will talk a little bit about that. The last layer I want to talk about gets to the World of Warcraft part of the title. Games are really interesting sites where you have virtual societies emerging and happening online that lead these barrier best [indiscernible]. So the current director research method is how we understand research changes at the cellular level -- level going to the social level. Games are really interesting side of this. They have this giant data exhaust Burger if I am online clicking pics, all that is data to be analyzed. We can hopefully come up with something like a computational social science is around that.

This is drying from the work of my wife my, my codirector, people playing World of Warcraft and most people know what it is but just to jog your memory, sites where you have 20,000 people online in a virtual environment interacting in real-time. The work that she was doing was what are the intellectual practices going into such communities, trying to make the case that they can besides that are substantial and have it all cultures. But part of this work actually looks not to start the game but the things that happen around game.

Some of this work that she looked at -- were things like water the practices that go into the online forms where they talk about -- and this is a paper that was Brent -- presented a while ago. Just give you sense of this is a culture the game on ways of thinking that could be something were studying. I cannot go backwards on the slides Quek --?

The key part is we can get a data exhaust from. This is a slide from the BP of data -- Vice President of data . We can be using these data as a way to learning.

That is what we do in our overall social context. I will actually jump through these real quick. From our research on games for learning, we have come to see a general trajectory that learners go through. This is one of the threads that we will talk through. When people start coming to again, they come in like a newbie. What people are learning are the basic controls and themes, how you play the game. That is something that games do in general. If you're going to play game, whether it is just or tic-tac-toe, you have to come to that level of understanding.

What happens next is something like a competent player we get a basic knowledge of the game system. Knowledge of control, moves, if you were to take a test on chess, [indiscernible]. One of the real tricks behind this work is can you may games as you are designing games for science and where the basic knowledge and controls on the same thing that you want mastered in the [indiscernible]. From there there is something like a systemic expertise. This work is coming mostly from bodywork of game scholars, what people do when they play World of Warcraft.

You get to the point where people start saying I am in a world of war craft group, we have four players is times that of five so we will all have to change our rules and adjust things on the fly. At that level, you something like a systemic expertise. We can encounter a change in the system or a new tweaking of a variable and you can start to understand and act in concert with that.

Somewhere there is an interesting that happens, particularly with an educator and that is where some people become motivated -- motivated to searching green with the system. Judging online rules, any a number ways you can do this. Involving things like changing interface. Sometimes people do their own rules for the game like you would play Monopoly.

From that there is a judge after he were some people go on to become something like designers. This are designing their own game. When you work with kids, you say I like World of Warcraft but I want to be world of Star Wars I'm gonna start designing my own game. That is something we will talk up.

The last branch is you get a group from games that become interested in something like social organizations. What I'm interested in doing is running a games group or leaving a guilt and World of Warcraft. Some of the more interesting work is what actually motivates and propels people through this. At the beginning a lot of it was curiosity, social participation. The researchers really testate where how was a bunch of mostly guys but Sam's and then within 2 to 3 years, the female player basis 6040. A lot of social participation. I am curious -- pretty some peoples are playing.

From there there is of the called involvement where -- this is very tricky get. This is where his heart. How to get people to say I'm just buying this game but now I actually care. There are a bunch of ways that this can be done and I contact more, not in this petition about that, using everything from storage a character to challenges, a lot of. Six a designer would use.

The next is something that you call investment. How to get -- for some people when games are actually no longer fun, you are invested in a. Sometimes competition is get people there but not always. They can be always -- also social participants. Stomach something that I've done a bit of work on is when the people decide to start 10 caring and changing the rules, wonder the kid who was playing civilizations are changing the variables. Usually it is curiosity, they think they can make it but again, are they are ticked off at the game.

And then from there there's a group that become inspired to start doing their own games. As we talk about this, this is how I think of a general framework for games in learning. You want to do this basic stuff but you also want to get people -- some people in some classrooms or learning environment some of the time moving toward this. So by the time you graduate maybe everyone has been a leader in a social organization or created something for other people use. It does ask a lot of questionable one size fits all but in my mind this is for anyone who is become involved in game that is where you want to see people ending up.

For the rest of the talk what I want to do is pivot a little bit to these two basic questions.-We build games for learning and to me like signs that get this kind of learning happening? But then can we lead games that build in the lead toward participation in science? Said go back to fold it, it's a great game, it is not a game that proposes teach anything about protein folding but it is not like the levels of scaffold is so you are coming to basic understandings about how protein folding works. It is a puzzle game that uses your data to make discoveries.

Similarly, at least to a certain type of [indiscernible] but I do not think anyone is claiming that. It may be leading people to go to graduate school but it may also be protecting a lot of people who are already in graduate school and game design. It may take a fourth-grader where they are right now and give them on a trajectory where they may be developing identities and careers in science.

A couple of reasons, why games. Something they can do, real-time simulation, from a portal, when you look at games that are in the border of science, and the populace fear, you run into things like old and new. What is interesting about it is that physics is your friend in this game and all of a sudden you find yourself saying I can use understanding underlying pencils of physics or triangulation to get ahead. That is what we want to do.

The way this game doesn't and this is where becomes tricky as there's a set of very well ordered problems that have been developed through years of play testing and trial and error where they start with simple challenges and get a more complex challenges where you had to bend around thing and start using gravity and would raise and put spikes and so on. This kind of level design which is how games in the commercial industry develop people's understanding. So clearly someone is going to tackle this level has a more sit -- sophisticated understanding and someone doing something much smaller.

That is the fundamentals of how games work at that basic knowledge level. What we are interested in doing -- coming from academics, there are a family of games that are starting to do this Thomas starting to build conceptual understanding in things like physics which is a good thing. One of our earlier games, supercharged, try to do a lot with visualization. You been charged particles, do these infield minds, people say things they could not ordinarily see.

Along these lines, I want to talk a little bit about one of our games. This is a real-time strategy game where people are interacting among some cells. We are working with John Yan and the systems biology group and what they want to do -- I will give away the trip at the end of the game to see if we ever get the last chapter done. At the end, your viruses attacking the body and you realize you are in a vector for carrying medicine so you're helping the body [indiscernible].

Controlling the virus tried to replicate by itself so there is some basic knowledge on how it works.

I will skip over this part. Give you a sense of of the gameplay looks like.

We have been doing some researchers trying to understand if we can use games to put build is kind of basic knowledge. We are starting to see evidence that we can. This is our research payable affiliate that got accepted, but looking at players playing the game versus diagrams versus people play -- reading in the game versus diagramming. We find people with the game perform -- outperform those who do not.

There is a more recent study and probably the variable is finding that interest in the underlying topic goes way out. So a lot of what is actually happening here of people are reading a much more carefully is actually care. The game is presenting things in a way that does baffle them but a lot of them is building interest as well.

A lot of what we try to do and how we try to rethink what impact means is that trying to build games like this that are just interesting to play and will raise people's interest. This is a game that is on the iTunes Store right now, even in approach of form, Kami get 50,000 users or 100,000 users? Right now we are at about 30,000 downloads which is not as good as we want but not that. There are a lot of futures using it. We are starting to follow-up on how teachers are using it.

That is great and that is a good thing that we should be doing but after that project, we stopped back and said we had the school opportunity being in the cutting-edge research facility, could we do something more than a virus. There is nothing wrong with the virus can but with that we're missing something. What we decided to was contact this guy, one of our peers, Jamie Thompsons, who hated games for the longest time until this kid got addicted. So we wanted to ask him if he could make a game about stem cells.

We started working with him and without what could be more controversial stem cells. And he signed off on this. So in this game what you're doing is designing and engineering tissue and organs to try to stem zombie a complex -- apocalypse that started in his lab in Madison Wisconsin. This is as group of stem cell tissue engineers and researchers in working in close

consultation with them, we built -- with got to the point where the change procedures in the lab they had to call us and we had to change the game in real-time based on the discovery.

It started in Madison, Wisconsin. The FDA you go through different levels annual art using stem cells, called having them, drawing them, cultivating first cells in the tissues and organs and throughout you are stemming the tide of the zombie up -- apocalypse. It is meant to be broadly appearing -- appealing.

As we started working with this, we get very interested in this is the part of our NSF work, if we really is a scam out there in a while and we do succeed in getting 200,000 people, is there a world in which we can start understand? Are people learning anything about stem cells?

So we started working on an underlying system whereby retaining all of the data generated by the game, so the game is online and we get reports everyone to place it. Could we start to come up with what we are calling a learning telemetry? Taking the raw mouse clicks, coming up with an underlying logic that we can start to make a case where we understand what the people who are playing understand.

I give you a sense of what it looks like. We take the individual and then we have to work with it, make a Q, polisher quite a bit. This is a baby step. There's a bunch of other work happening on this were signs can be more advanced. But one of the first things is taking very simple pre-and post-definitions where we can [indiscernible] correspondent with advances in learning. What we're finding is the key variable seems to be the success of -- and -- we were[Indiscernible - low volume] And when they are just doing random trial and error. That was actually the biggest variable that contributed to the game pre-post. So talk a little bit about that.

This is Liz Owen's dissertation. We found three posts games for all players. What is interesting is there is a positive correlation so the better you did in the game, the more -- which made sense. The biggest finding, at the very end of the game if you're shooting at 100% so you think about this curve, you have learned what is teaching you. You are paying attention, you are coddled toward developing a conceptual understanding of how stem cells and tissues and organs relate to one another. By that point, if you're doing well at the end, then you did well at the pre-and post-test. That could be a very interesting point.

We are doing a bunch of other studies that are much more sophisticated with more machine learning kinds of algorithms. This is the kinds of things we can do with games and learning.

This is an advanced messes like. Gives you a general sense -- generalizable process that we can do for one game we can blue -- we are doing it for multiple games. We can take the basic game design is a content and task model. We can put in a try to understand players goals and metrics. We can get the players actions. We have a system for tagging entering metadata around games that we started applying across other games in our lab to see if we could come up with a more generalized model. So we can also start to note if a player did well on progenitor ask, does that predict [indiscernible].

Our first we're guessing this was a big old tenacity. This is funded by the Gates foundation. This is an apt where we are challenging task, build a game for middle schoolers who do not like to sit around and count. Does this is been otherwise correlated with a lot of other positive things. Richie Davidson who we work with, use a close confident of the Dalai Lama, studied brain elasticity. Particular eighth-graders were if you practice [indiscernible] you see a bunch of other stuff you see crazy things. Concentration, games -- rates tend to go up. You'd we had to double check that. Because transfers are Troilus eight hard to get -- notoriously hard to get.

We said we will try to make an iPAQ in the does that. The idea is to try to make a playful meditation that. Gears are great things with game developers. We have not had the Dalai Lama plat yet but he is seen it and is aware of it. Reach you keep saying if we do a good job maybe you we can get his Holiness. That is our goal.

You can see some of the research around it. We are working closely with them. As a side note, that product and project -- I will talk about the research in the second. There is probably a commercial app for adults. There something that having this and this gets me to the question of sustainability. We think we can take that out, these are images of the functioning app, which I have here if you're curious., That would work for other audiences that would have spinoff in them fund the underlying research. We can keep working at academician big things that we want to do but use the money selling to middle-age people like me RS and use it to fund underlying research.

The kind of work we're doing, which is another place where this field gets interesting is during pre-and post test with those eighth-graders of behavioral task during as MRIs. Looking at changes in their brain scans. For some I've ever done anything like this. It is really crazy because it is so expensive and you have to have everything lined up and I thought hours work was where but this is really weird.

Play the game, do the same thing. But we are also able to connect to the telemetry layers. Kazoo players in kind of white at changes in the brain of the sort. We were just finishing the studies now, the results will be in May or June. Our fruit ninja and bastion -- there is some weird stuff that happens in your grip -- in your brain and fruit ninja. It is a very manic game and you see where stuff. If nothing else, my wife is leaving the research part of it. If an if we find no other results I wanted would know what happens in for ninja. So we will know something about that.

I hope I made the argument that we can now in this field build games that scaffold learning through well graduated levels of challenges and we can detect it more or less of gameplay. There are a lot of caveats here. This is a nontrivial task to do. Building games is hard. If you build a game or funded someone or work with someone, I want to underscore this is not an easy thing to do.

There are tens of thousands of games for entertainment that people try to build that do not get finished, do not work, no one likes. One of my pet projects is that I did some work with Sid around the Pirates transfer -- Franchose. There are 3 to 10 Pirates Graham released every year, not very good. I like it because it is a quasi-detaining game. You realize that even a Pirates game

is not inherently fund just because you're making a game about pirates. That one game do very well.

Similarly, building interesting games that people want to play is even harder. They say -- usually want to do your first two or five games will be horrible, for them why. How what you do that? We are trying, but our first games were just horrible.

One of our solutions is to partner closely with people -- I mentioned 120 years of express, people who built a lot of games. It is a really tricky thing. Building games that are interesting where people learn something. You want them to learn without doing more harm than good. We have the games where our initial prototype show that we work Austrian misconceptions. There are some evolution games out there that are older that were not funded by NSF . That actually do reinforce misconceptions. So you have to look. Are you sure that would be about learning is what you want them to learn?

If you are learning something, we really can measure reliably is also hard. You get things like systemic level of understandings. Had he assessed the that? I will talk a little bit more but some of the work we're trying to do but that is also nontrivial. Our standard investment industry the field is built on the from models that were not necessarily built to assess[Indiscernible - low volume]

As we move toward a digital world where you're taking a task on an iPAQ, I think within five or 20 years, you will not be -- we have done some work with Scantron type countries. They want to keep it the same that you will -- you are filling in a bubble on an iPad it makes no sense. Present, why are you even only doing item selection and cenobite in construction? Eight about all the ways you can assess. I think games will be a key part of that. Would you at some level say if you play progenitor ask and do that last level, maybe that is a better assessment than a single recall about -- [Indiscernible - low volume] .

In terms of how even the modest success we have had, I have been doing this for 10 or 15 years, you have 120 is a game experience, even that project of game developers and grad students to work together is not inherently easy. Lettuces put it that way. Hourly developer, Brian [Name Indiscernible], ships tens of millions of games and having someone who can do those things. If you want this game to ship on time or if you want this to be finished unplayable, which is Osseo -- which is also nontrivial for academia, it helps to have someone [Indiscernible - low volume]

Creating a culture where you have interaction across his discipline is really key. And of course a simple playfulness. This is how you help things get paid. This is an arcade machine that they built to put a games on. So if you been to the game society conference you may have Artie Sena. All the games are on that commercial tokens.

If we go back to this framework, I have most of been talking about this stuff. That is all great but none of that should be confused with actually engaging in authentic science. What I will talk about next is some of our attempts to get people moving up in the quadrant.

From my experience, this is where teachers, people, social interaction, designing the environment, and classroom filter becomes paramount. This is game called citizen -- citizen science and this is a game where we had this idea -- could you learn science by role-playing as a scientist? It would be interesting to say what if you learn science by being a citizen activist who is using science to demystify science. We did freshwater and low knowledge a -- with that we would have something little bit different and try to use this as a way to engage kids in doing science.

One of the logic here is that if we had a game where you are a 12-year-old in your doing science in this game maybe would help the teacher teaching the game to say I can study my watershed. We are trying to push his people up that router game. I will talk a little bit more about that.

You mission is to save Lake [Name Indiscernible]. This is a map. It is right in downtown Madison. Steve Carpenter who is one of the world's leading ecologist, he has been setting this Lake for about 20 of 30 years. It is one of the most studied lakes in the world. Is one of the world's leading living [Name Indiscernible].

This is what it is like there right now. In the very near future, Lake [Name Indiscernible] may be time you tropic. This is a picture that is less ideal looking. I will give some of it away, most of that is caused by Saar track farm runoff bias dream so 20 years ago dumping fertilizer in the lake has caused the lake to be so nutrient rich that is on the verge of being you tropic. Is an interesting task eight because you can do some thing about it. In fact, this Lake was even worse 30 years ago.

In this game, you travel back in time and say it used to be worse because we dump raw sewage in error and now we do not do that. This is something that is in the news. It will be on the cover of the newspaper once he or. So it is an interesting case for connecting local events in the classroom.

One of the key components of the game is that a dog dies. That is the beginning of the game. So you travel to 2020 where the lake is entirely and so mobile, horrible, and this is the path we're on. So you go forward in time and see this and then you travel through time tried to understand what happened, collecting data, making arguments to change your, the lake. Part of my real goal here is kids all live in Madison, you're surrounded by the say, maybe you could develop a community of teachers during Lake science runs like.

The gameplay is then talking to people, making observations at person-to-person level, collect evidence and complete arguments. Here's an example of talking to a kid about a no spend a. -- No swim day. You have virtual testing kits. This was designed to get teachers to think about getting more of these testing kits. As you click data, you put them in the inventory.

One of the clever things, this is our shoot of our lab in Madison -- one thing that kind of bothered me is that it is very adventure gaming feeling and I wanted to be a real simulations to go back in time and change a couple variable you would see the lay change. If you give me $5 million I will. Otherwise for $200,000 budget this is what you're getting. So I said all right.

Is a very simulated of thing. Ecology are complex systems. So we came up with this interesting clever design solution. We built the simulation in their that you connect to change variables. So what happens if you plan buffer stress, what happens of the outcome?

And teachers can build lessons plans around this.

This is control experiment group, reading versus playing the game. Some of the work that we're doing -- this is Matthew's dissertation -- during preparation for future learning so Eveline DuPree tests. Some play game summary and taking a mid-test. And then looking at putting it some people play the game and then read. That very being -- the theory being you will be a better interpreter of like science.

We found roughly this. What was interesting in this work is still in revision -- what was interesting is that we ran in about six classrooms and some of the local forming classrooms is what you would expect to see. But in some of the groups, the students were not able to interpret the game as well. There are some interesting things happening here. It relates to some other work in this field have found that tools like this can action make equity problems worse. In a sense if you have a good teacher who knows how to teach and is good at motivating kids, you can make inferences successfully based on the game and they will shoot way up and those who may not be well-equipped may not. We are seeing that sometimes but not always. That is something we try to work through right now.

What is this me when you actually bring anything into the classroom? How could you use it to go and have kids use like science? At the tail end of the grant, I pulled one of our partners, a former teacher, we have worked with him because he has literally raised Amish and when you are doing workshops and teacher is great to have an Amish person.

His sense of when you use technology and ideas are, he keeps the Amish inking of when it is used to help people bring people together. And when not I do not use it. So we are probably doing something right.

So he said he would do that. He teaches in this neighborhood called the Greenbush. It is like Madison is old Brooklyn. And he does -- is a great teacher. He does neighborhood teaching. He said what I will do is help you build a curriculum. So when I started work with him, I thought this is great my kids will design games about the neighborhood. I said don't let me stop you.

So he had kids use the same engine -- what we are talking about now is a mobile device. He took some mobile devices and had kids go out, paint pictures -- there is a slight in there somewhere. Uploading them using an iPhone so you can give guided tours of neighborhoods and games.

Here is one where the kid goes around and I am in an Italian neighborhood. That is not coincidental. It is there for a reason. In this case, Italians were not allowed to live in other sections in the Madison. So the kids learned about that history. It was not coincidence. Learned a lot about institutional racism. It is really imprinted in the environment.

The older Italian gentleman's that are still there let them on tours. And also saying what happens where contemporary issues of -- this is what he does. As a part of this project, -- this is all done research to build a game to help community conference and got it when in town who used to live there to celebrate the town and is now a Madison wide Greenbush day. They made big plans. This is all stuffy did working with us. That is really Mark.

The kids built games. This is a Jewish game, so in 1959 if your jurors could you lived in this neighborhood. This is a map of this game.

There outcome of their class, and this is probably will help me generate this model, was they decided to draft a city Council resolution. Greenbush day. Here's one of the students talking in Madison.

So that is mostly Mark. Could you build something that would help us -- side note, that Jewish game seems to have taken up so the tame -- same tools have been taken up in New York. The idea has evolved imploded. Could you help us build a curriculum? Merck -- work your magic.

We came up with is a basic not model where you start with the first game -- play that game, citizen science. Have your interest raised. Outside again, read what is beautification. They play one of these games will you go out into the world and look at the lake. So this is about a different like in Madison. Interestingly has an entirely different set of issues. If you know the research on transfer, you want to give cases that are similar but different the kids not overgeneralize.

If you think -- if you play only for the science, you might think every dirty lake is due to farm runoff and that is not true. There is a lake in Madison that is due to urban issues and salt one of. So they play a different game to learn about how that is dying and why. Seem to be a lot of dying legs wrapped.

They go out in the world and see plants and birds and listen for indicators. Interestingly, after playing this game, this is the kind of thing we want to see -- it could be called by several rules interacting, but several -- one of our kids spontaneous -- this was not a class assignment. In the class we has to write letter that but one of them one home and seven up to the capital times.

This is the kind of thing that we want to see happening. On day three -- in the third part of the unit, this are starting their own lake so the teachers and one of the district started their own lake. Interestingly, this could not have been pretty good. In the citizen science game there's a muskrat. One attention the things that muskrats actually hurt the conditions of the lake because that you'd shoreline vegetation which increases runoff so thereafter Baffert. A muskrat moved into their local community and then a few of them building models from scratch to represent that idea.

This is a case study that we are working on but this is to me the golden standard of what you want to have done. Special if you can say -- and the kids were participating in authentic community act in using science to use stuff locally.

This is great but it is still locked in school. The current work we're doing is can we built games where the kids in school and applying just with kids in school but was signed is another folks. So

we have a version of -- this is a very similar kind of game but it gets into more -- much more complex. Benjamin who is now a test is leaving this version where you have loggers, conservationist, and one of our goals is in northern Wisconsin where this is a hot button issue, these people will actually play this game engage in arguments. We have a simpler version for iPad that I have with me today that is tailored slightly more toward young kids.

This is built on actual data, accurate down to about it an acre building new game about your own watershed is very tough so we built one on the iPad where you can build one that is realistic in a pretty quickly. We are hoping next year to have that part working.

This gets into and observed level of detail -- absurd level of detail where you manage your budget, tells you about that [indiscernible] and. We did pilot work and brought it into classrooms. And you build a game about real stuff you do see kids going to Madison going to real things and they go back and forth from the game to real life.

I will skip how it is made other than to say we built it this way so that scientists can build [indiscernible] in Boston. There has been one paper where an ecology was using a simulation to present the paper on American Martin mammal species where the assimilation measures for basic science, which is pretty cool.

What we are trying to do is present new kinds of learning in place basis. I'm running at a time so I will go through this really quickly to give users the power think about this.

This is a game that we've been building and working on where we are using oncology and treatment to try to build a program network around image detection. This is a 20 year project. We are working with rock Mackie who invented a company called [Name Indiscernible], most radiation therapy techniques. If you're using lasers to get rid of cancer came from rock Mackie. He's trying to cure cancer.

One of the things that frustrated him was the ways that we -- I will get to it -- when you have cancer, you have systems, you go through the process of imaging, diagnosis and treatment. As rock says we have to cut it out, ports net or burn it. To get a series of images, CT scans, pictures of the body. And then you get a diagnosis. So your circle where you believe there are anomalies in conjuring. There a bunch of research on this and it turns out there's not universal agreement about I do this. In the case of breast cancer, there are about 17.5% variation. If you line of five different doctors, you will get this much variation about where they think the cancerous.

Lung cancer, is about a factor of two. Cervical cancers about three or four times. This is scary and really bothers rock a lot because he build the technologies that she lasers based on wherever it is. His argument is if we could build a pro am community they got a conversation around this like how should we be conjuring. Maybe a Kami -- maybe it can improve medical practice.

A younger generation that grew up on 3-D games was better able to put together the body this way and think in 3-D. So he believe that we could probably train a generation. If nothing else, one of my workers went in for testing during this and said we would all play this game for 40 hours and be able to go any revisit images.

Than the treatment changes, imagine instead you have this diagnosis and a doctor is working with 2 million opinions. One of the challenges of this work is because this is somewhere between health and science, it is hard to do. This is pro-am and what we are doing is building a game architecture to do all this were together. So imagine a game where the general public Liza, maybe kids play up for science class, maybe along the curve I built in school you are doing baser work but if you want to play at home, you can keep playing.

Medical professionals are already in that upper curve. So we built a single player prototype. You have symptoms, you go to a doctor, he does imaging, shoot up lasers, -- the short answer is they would play, they like it, it was interesting.

So we found higher pretest games but not surprising because kids do not know anything about cancer. Sawchuk to this.

What we do from there was started building enterprise on Facebook that were used in medical classes with Lonnie Socastee who teaches medical imaging. She said what I want to do this is a collaborative supported tool, not doing on design, but said the letting them -- simply diagnosed together to argue about where it is. This is better than what they do. So they said we would make that for you.

Augment medical education, connect images to the body so what you're saying is where the scans are in the medical browser to help get a database of what people do their that is meant to get more of the professional premedical and medical professional community. All toward building different emphasizes toward this underlying infrastructure we can somehow get there. This is what we are doing in the next couple of years, hacking and piece by piece. It is been a lot of fun. We are funny people like your five medical will bias this from us -- DeVry medical will buy this from us.

So we get them to pay us to build more of it. So we are building virtual cadavers and things. It looks kind of like contract work but it is actually for is a way to get at the professional side of it. They do not really know of a master plan and that is okay.

In general, we think about going from saved sandboxes where it is not authentic, not doing size, moving toward it that the participation. And starting were you are consumer playing to where you are making things. Making models, making studies.

The last thing demo there are budget challenges. Things that we think about a lot are how we get sustainable and scalable -- have -- how can we get into the marketplace to augment funding and get is going at a scale that we could not otherwise achieve.

A couple of other things. I want to leave you onto things. One, this learning analytics thing is really big. One of my big fears is that we will develop a lot of very powerful analytics techniques of study things that are not very interesting. So these games -- we can already do [indiscernible] but they are more interesting the reading entering multiple tests. A lot of what is happening them a particularly I would argue, on the West Coast with -- with this kind of work. So we are trying

to push ourselves to be more constructive this -- constructionist. Ensuring that we are having people do complex tasks. That is our current mission.

Applying analytics to those tasks does that logic will be very important.

The last point are things like from our program officers, this is giving our community at ARA -- one thing I really want to push and I hope you completion people to do it to be more open. So we did put Gerland out there. There are people in South America are running studies on environment right now that I do not think happens enough. When I was a student in Indiana and wanted to do games there was no way I could work some of the lapse out there. We tried to do that and be as open as possible and I were a to encourage your people to. Trying to share aggregate data. With our underlying get info structure, one of our goals is to have our games -- and we are starting to do this now this year under Matthews direction, calling our collects if we get a data construction together maybe we can do a joint study where we actually see you have a water quality gaming you have one as well and can we do things together so we can understand what they do well what they do not and try to get [indiscernible].

This is not a new problem. Even trying to do this for 20 years. But maybe we are at a point where the tech did not -- technologies will support it. Those are things I would ask you to ask of us.

That is it. I think I have time for questions. Sorrier I want a little long.

[Applause]

[Participant comment indiscernible - not within range of microphone]

Absolutely.

[Participant comment indiscernible - not within range of microphone]

Have you had any other experience it and more diverse areas range Mac

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Range Mac -- [Participant comment indiscernible - not within range of microphone]

Ben Shapiro and David have to load a paper where they made the argument that there and they data collectors are analyst. They are analyzing things. I share that. In terms of -- yes, we did a major project in Milwaukee was some of the community-based stuff. It was interesting and sobering in many ways. One of the big -- the average teacher in Milwaukee last about a year. It is about nine or 11 months and then he moved to the suburbs a quick.

Something that is interesting and [indiscernible] has done work in Milwaukee on this, it was a really -- it was a wake-up call. I was talking about next year -- the other thing we found was that -- I am a convert in that sense of using playspace education for two reasons. One is that there is usually a group, that is not going away. Even if they called a class and said we have this thing, we work with and urban ecology Center and said Laster, every year,, district, maybe that new

teacher will keep using it. I was shocked by being outside and connecting science to what is happening in the environment. We saw a really big interest gains in the committee. I would say as big as games would be. So one of the grooms to work with, we took them to Lake Michigan and about a third of the class a Milwaukee had not been to Lake Michigan. There asking questions about the beach rock. They were fascinated. I grew up -- aggregate electrician so I thought it was crazy.

I became a real advocate of that and a lot of what we try to do and are curriculum work is getting to [indiscernible]. We have done a lot of that kind work. One thing to say about gender is our biggest games was with girls. This is consistent with other findings that science has presented a social context toward doing real work in the world I can help people. You do see it is girls who start dying off at that middle age level.

My question is also along the lines range Mac -- [Participant comment indiscernible - not within range of microphone]

I notice in the images that showed people in the games that there was diversity. I do not know --

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That is IRB. Madison IRB --

I'm talking about the characters. Representations of the game.

That is a great question. We had an argument about that. It was a lengthy argument we decided that in 96 or seven there were only white men scientists.

Range Mac -- [Participant comment indiscernible - not within range of microphone]

The main character in the game is vaguely Asian. We generally have a relatively body pension. Certainly that is up there,. Some of our better games, I will say -- windward game is an example where we deal with it explicitly. That Lake is a microcosm of Madison. There is a section where African-Americans coefficient, Mexican-Americans fish and immigrants fish. We actually talked about the roles on the lake in each community, which people are eating fish in the biggest thing we got was there was a student in the Southeast Asian population and we had official person and he started freaking out. And he said there's a guy in a game whose mob.

Definitely sat in terms of cultural relevant -- we saw in space on that project. We have because of that tried to bring it in explicitly and probably could do more. Certainly with environmental issues.'s --

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Maybe we will go here.

I am very impressed by what you're doing. Your diagram about -- there are different ways that people relate to games, although it is not just a matter of one way being based on an earlier one being based on an earlier one. My question starts with your slide about World of Warcraft. The approach to education that we mostly see -- and I managed some of these grants myself to a variety of programs, is instruction oriented. We know something, we want them to learn it and

learn it well. Intellectually as well as just conversation. It often minimizes the expiration us back -- inspiration aspect. I've only received a couple of proposes during the year and how you use something like war craft or dozens of other online games as educational settings emphasizing exploration. And yet, they learn map reading, math, economics -- maybe not biology but sociology. There is a lot of anthropology and them that were built into curriculum. One example, the picture you showed was the entrance to [indiscernible], --

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You knows.

[laughter]

When I held the first nature scientific conference in World of Warcraft in 2008 we created an [indiscernible] Guild which still exists in my level XC character --[laughter]

The point is that is part of a curriculum could set themselves their own typical goals. How to get into [indiscernible] Cathedral is you have to do to prepare to get there. And there are general cognitive lessons about planning, alternatives, had it come back from defeat and other things that are part of a science and aging education. What is your comment about that other us about it?

My education was on civilization dairies, model that music for teaching world history at my own peril I was told by some people. That will not play well when you are on the job market. It is different though. So I am very open or sensitive to that. My instinct would be that there are also some ways that that could go wrong in the sense of -- there are people have done some of that and teachers teaching world of work that Ashok were correct -- war craft -- there are people that do it well. So maybe there -- one of the labs that arguably pioneered that kind of research and paid attention to commercial games would not many people were, we never saw a place where you could do that. If we were to have that supported, figure out what the right kind of paneling process would be, support who is doing what already with those in understanding what is working what is not.

One thing I would like to see is grassroots communities around things like [indiscernible] and ways that some of them I using for things like electric circuits and so on. I think that is a good place to go. I guess my only caution would be -- I, see the headline, NSF funding World of Warcraft. I could imagine it going back. So how do you create the right structure for that to be a good thing would be some of the challenges.

It might be that they do not pass a school test but they go on to be the Microsoft of the future something.

But I think that were curt is meaning it is not so much what concept [Participant comment indiscernible - not within range of microphone] --

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And systematically figuring out what will that will play in the curriculum and when you do it.

Whether we agree or not, this conceptual distinction between the delivery of curriculum and instruction and other kinds of learning may be worthy of research pico

Absolutely and one thing I'm trekking through, if you are curious, my wife, Constance, did a two-year [indiscernible] -- I want to find the kids.

I did not just -- I did not mean to distract you.

There was a version of this presentation the whole bunch more the stuff.

It is hard not to jump. Forget it. She ran a two-year afterschool program taking kids were failing at school and building curriculum experiences around World of Warcraft so she had them run their own guilt, build on Guild charter. The big thing she found from that, most were kids of color, involved in games, she showed their commitment. They showed up at Madison every week. The more you try to sync it at the school it utterly failed. But running in interest driven community where you say what you interested in. And then backing stuff in it to get more systematic and learning. It is also entirely -- entirely possible to play the game and not plant mindfully.

I can get document that over lunch.

I want to thank you very much, thank everyone for being here. I want to remind you that between 2:30 PM to 4 PM, you can play some of these games and we will have reflective discussion on how you actually make learning happen in the context of these games that are fun and sustain your engagement and how to get the learning to happen.

Come back at 2:34 PM in this room. We would love to have you.

The next one in the series is on March 17.

[Applause]

Thank you. This concludes today's conference. All parties may disconnect at this time.

[Event concluded]

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