**Project Completed by:**

EDUCAUSE

How AI and Machine Learning Shape the Future of Teaching

Tuesday February 5, 2019

1:00PM – 2:00PM Eastern

**EDUCAUSE**

**How AI and Machine Learning Shape the Future of Teaching**

**Tuesday February 5, 2019**

>> Welcome, everyone. This is Malcolm Brown. I'll be your moderate rater for today. We're very pleased to welcome today's speakers from the Pennsylvania state university, Kyle Bowen and Jennifer Sparrow. I'll be introducing them more at length in just a moment. Before we get to that, let me give you orientation. this online room is divided into several rooms. Our present taters are showing in the presentation win toe which is the largest of the windows. The left box is the chat area. Feel free to use this chat to share comments, share resources, or post questions to our presenters. We'll be holding Q&A today until the end of the presentation. We encourage you to type them in the chat window and we'll save them until the end. If you have any other audio E. or -- click the top right corner of the chat window to open down the drop-down menu, then select start and then final select post. You can also click the link in the lower left side corner of the screen for quick troubleshooting steps. I'd be very prized indeed, if anyone in this room are up aware of the rapid ingrowth that A.I. is making. I don't know about you, but when I think about it, it strikes me as being a double end phenomenal.

>> What new innovations and improvements might A.I. make possible. Finally let's not forget to ask this question, what should we do with our time and resources once the aids is all in place. These are Seminole questions for us, plans one of the most important we can pose today. It's hard to imagine colleagues better suited to present these to users today. Kyle Bowen is the director of technology services at Pennsylvania state. He oversees a portfolio of services, including structural design, faculty learning support, learning spaces, digital meeting development and the emerging technologies. He is coauthor and edited more than 20 books in the area of web design, and his work has appeared in the "New York Times," "USA Today," "Time" magazine and the chronicle of higher Ed. Jennifer Sparrow is the teacher -- she was previously of he measure gent technologies at the junior technical before her current projects involve the technology and learning spaces to create interactive and engage learning opportunities. Jennifer has a batch Cher's degree from Smith College -- she was the winner of the 2013 learning award. Welcome back to the webinar. Please begin.

>> Thank for that introduction. As we launch into this conversation, the first is kind of a way to start off the conversation by saying, as we talk to a lot of ideas today, there are some of these you might find really objectionable. They challenge certain topics. I like to lead off by saying embrace that. It's an entirely okay way to feel about some of these things because part of it is to remain skeptical around these technologies and ask hard questions, what is the value of what this brings to us. Part of that is the experimentation to look into the way A.I. can begin to influence in some of the teaching that some of the challenges our instructors face. As part of this, what we want to do is start with an activity. In this activity we're going to use the chat boxes as our response tool. The goal is to help us all think like a machine. To think about okay, what is practically happening as we have a kind of A.I. -- or using an A.I. tool, what are we using. This was based on something developed in the '60s called Bongard problems. This is what a traditional Bongard problem looks like. You can look at this and come up with rules that describe change. Here is an example. Our example we're going to use today is a variant of this to help facilitate in understanding around how do we look at how A.I. looks at a problem and begins to provide a response. So in this activity, what we want to do are we want to identify the rule that applies to each figure. In this case as you see in each of these three examples below, what we want to do is describe the change that happens that gets us from the left picture to the right picture. In the first one that says move, the figure has kind of gone down to the right. In the scale example it's gone from large to small and in the rotating example we can see it went from up right to upside down. We have three rules. Move, scale, and rotate, so these are the only rules that we can apply to try and transition from one -- to describe the change from the left side to the right side. Here is a quick example. We can look at this. We can say in this example, the rule we would apply is that we rotated it and we scaled it, right, so we see it's turned counterclockwise and it's gotten smaller. So again, we have the move, scale, and rotator that are the three rules. As I bring up the next figure what I want you to do in the chat box, go ahead and type in what you think the rule application would be. Here we have this figure here. As you kind of remember, we have the scale, move, and rotate are our three rules. Go ahead and type in that chat box. Rotate and scale. A change from the left to the right. Here is the next figure coming up. And again, apply our rules of move, scale, and rotate to scale, move and rotate, so we've gotten all three rules, how do we get the right side from the left side. Here is our 3rd one. Again, applying our rules of move, scale, and rotate to describe how we get from left to right. Somebody asked a question, does it matter the order of the action. No, it really doesn't, not in this particular example. So we have some people that say, well, it's moving scale, a few people say it's breaking some of the rules, somebody has written their own rules and well, you've cleared out the color. Therein lies the challenge. This is what we would call an expert system. This is applying a degree of expertise that has been given to you. In this case, we have given you the three rules and those three rules get applied uniformly but because these rules are already kind of dictated it doesn't give us the flexibility to create rules. As you can see in that last example it moves fidelity. There's a difference there that our rules don't begin to capture. This is the limit of an expert system. As we see A.I. based tools, begin to apply these kinds of Expert Systems and the algorithm gets enforced part-time the limit, is it can't describe what it has the expertise to describe. Let's do another activity. In this case, you get to make your open rules. As you look at the figure you create whatever rule you would like that changes -- again, describes what happens when you go from the left image to the right image. Here is an example. In this case, we might say, well, it shrunk down, moved, and duplicated, things like that. Those are the rules we might make up to apply to this particular situation. Here is our first one in the make your own rule description. So what rule would you make up to describe how you get from the left image to the right image? You're reduced by half. We can all basically kind of generally agree on the notion of what has happened as we transition from the left side to the right. Let's bring up our next example. Here it is here. Go ahead and I don't the chat box to kind of make up your own rule or rules that help describe what is happening to move from the left side to the right side. It describes the object moving, being centered, being turned into an outline or being turned into dots. We're getting a lot more variance in terms of how you're describing that change as we go from left to right. And then let's bring up our last example here. so what is the rule you would apply to get from left to right here? Thank you, Kate, for the best description of jiggler for that description. That's a new one. But, yeah, it's a squiggle, a child's trace, it's abstract, it's drawn. So in this case, as we read this, we have words to describe these things, and we can draw essentially from our past experiences things we've seen in the past to create rules that we can help communicate to other people. And so in this case, this is what we might describe as a machine learning example. So essentially what you've done is kind of taken all the training of your lifetime, right, so all of the other things you've seen and had to describe or had described to you, and you've taken that and you've used it to try and interpret what you're seeing on screen and then using those terms to describe them. Now the challenge becomes and the limit of this is what is that description? In this case, we can all kind of generally understanding what it means to scribble, but at the same time, what is the actual definition of scribble and how would we apply that to any number of things. And so that kind of introduces some of the limits of what we see in American -- machine learning. As we talk about the applications we're looking at with one or two exceptions today are really machine learning examples. They're designed to develop and learn from a body of work rather than take an expert set and enforce them based on.

>> How we can look at this environment. In the what we want to do is frame this in terms of how does a machine think about consent, how does it think about material, and how does it help us move through and take on even more complex problems. Here's an interesting one you might think about. As you move left to right how would you describe the difference between a Chihuahua and blueberry muffin. We begin to clearly identify A.I. a little bit more clearly. With that, let me turn it over to Jennifer.

>> Hello, everyone. I love that, Chihuahua and blueberry muffins. Still get the giggle. As we're talking about A.I. and learn about the machine pieces I keep thinking how I want to develop my own A.I. bot that will develop hallmark Christmas movies. To my great delight hallmark actually does this for value Tyson movies as well. Fair and reasonable value type's movies. If you're a hallmark fan give me a shout-out in the chat room. The first part of the story is a woman generally owns some sort of store, it might be a cake store, a bookstore, card store, or some other business that may or may not be in jeopardy tee. There's a love triangle that often happens here. What you'll see there's a woman and man she's generally composed to be with, but generally there's some other love I want that is playing along here and then the woman leaves town and the man loafs town and far enough away that they've begun to realize they shall be together and they go back and the two from the very beginning, they come together. If you haven't marked it and any movie you have you will see this both being applied here -- bot. This is so typical of the applications of A.I. These sort of silly apps that take things from how we see them and generate something new. We see this idea that there are things we do on a repeated basis that can be augmented, but not replaced by the faculty member. With that, I'm going to hand it back over to Kyle.

>> So among the things that we see every day that help kind of influence how we interact, as we can look at things with all correct on our phone. As we time it in it offers what other terms might be useful in those cases. It's trying to interpret something we say or the I don't of together like Netflix where it's making recommendations based on things you've watched in the past and what you may be interested in watching going forward. So we are interacting with these kind of tools on a nearly basis now. So -- but one of the challenges we're facing, the term "A.I." is actually a very broad reaching term. It's really become kind of a marketing term. It's migrated from what was once being a scientific term to -- I would describe it as the term organic. So organic is a scientific term, but now been co-opted as this marketing term. When you go to the grocery store you look at the bananas. There's the regular banana or organic banana, which is more expensive. In reality, they're both organelle Nick, just they've been raised in a different way. It's co-opted through the science. We're seeing this through the creations of these special secrets or sauces to differentiate a product inside of the market. What is important to understand and which is why we kind of led off with the activity is to understand what does it mean when somebody says A.I. How does a machine actually think about some of these things or what are some of the limitations we think about. The other part is to think about all of the different applications of data. In this case, we can think about -- [ indiscernible ] -- a marketing term to describe large datasets, but to realize it doesn't have to be big data in order for you to derive some kind of meaning. So for example, if you've ever seen the Facebook quiz, which Disney princess are you, this qualifies as artificial intelligence. It's an experts systems, takes a Disney princess and tries to for the which one you are. Time in the chat box, which princess you think you are and I'll move on to the next slide. With that, let's talk a little bit more about the teaching journey.

>> We think about the tools we're thinking about here at penetrate strait and we'll explore -- Penn State. We'll think about that more as we go through the slides. We think about how these can enhance how we can make the teaching journey. We're not saying this is a framework everyone has to follow when they think about the tomorrow evening journey, but these are the kind of things we think about from a faculty perspective. The classes I teach, these are the things I go through in terms -- in terms of the work process I'm doing. I start with Ideation, I teach a course, we're thinking about what is it the course will cover, the learning outcomes, what are the most interesting pieces of information right now, what is currently happening in that particular area, what don't I know about this even though I'm supposedly an expert in this system. I don't specifically know everything that's out there. Then I go through the next phase of my process, which is this design piece, so I want to sit down and take that I'diation and start to -- fingerprint week semester, twice a week for 50 minutes. What will that look like. , am I going to buy a textbook, look for appear reviewed articles. Please don't take this as a framework and knock us in the chat room. Certainly this isn't a one-way journey. It can be very circular and there can be different pieces interjected throughout. The next piece is assessment. How do I know the students learned what I hoped they would learn. For me the most interesting and exciting piece is this facility tags part of this journey. How do I interact with my students in the course, as a new took tee -- or teaching a new course within a college that maybe is brand-new to me, if I'm coming to Penn State, new to the college of education, how do I make all these pieces work together, how do I work with student behaviors within the classroom, what are the additional pieces I knowed to include to make sure my students are engaged in the course. Now I've taught this course, gotten feedback from my students, I've understood what went well and what probably didn't go as well as I hoped it would and I want to think about what do I change for next time, what do I do it differently. What is the research that supports how to move forward. We're going to talk about these things and talk about the tools we've developed at Penn State and how are you utilizing them.

>> A big part of our expiration is how do these tools begin to -- some of the challenges our teachers on. Many of these are -- are deeply rooted in long held traditions in teaching and designing course materials and assessments. So part of our goal is no not only understand that process, but then where are opportunities to help add dwellings quality, provide a release of time for our faculty, to be more creative in terms of their engagements.

>> Think about the identification that happens -- Ideation in the course. We bring an idea together. At work I get to sit with Kyle, get an idea, throw it up on the whiteboard. As somebody said, the back and forth between us to make that idea better, deeper, more rich, address all the challenges around that idea, how do we make it as broad as possible with making sense with how we want to teach. However I get to do that on a daily basis, but Kyle it not always available or doesn't appreciate phone calls at midnight or 3 a.m., so I've learned to scale back my needs to engage him at those hours. As we think about how do we leverage A.I. tools, to become this jazz band that I could riff on even if Kyle's not available.

>> So as a challenge we take that on and think about what are the ways that some of these tools can help facilitate this. The idea of creating a jazz band of one. In other words what we're looking for here is in a thee saw rest for ideas or what we call a ThoughtSaurus. What are thoughts like it, a way to iterate and cycle through different notions. As we think about this, it's a different process than what we've seen than basic search. Search is a part of that. When you do a Google search you put in terms and get a response. In this case we're talking about a search that learns by what you mean by the terms you're using so that you can kind of continue to evolve. And so we have been experimenting with something called Eureka. It's a machine learning tool that works like a brainstorming agent, that you give it an initial idea and what it does is it reflection back to you ideas that are like yours and allows you to kind of explore through there's. As you select and pick different ideas, then the machine learning tool means what you mean by these terms. Unlike something like a Google search where you have to change the terms to get the responses that you want, in this case, you're clarifying. No, no, these are the terms I'm using. I just need to help you better understand what terms I'm describing. So throw this you create this shopping cart of content and you can begin to ideate through these different notions. What this allows us to do is begin to create a collection of ideas that it can be translated into course designs, into writing prompts, into a number of different tools. The idea here is to have this kind of instant, always on kind of collaborative brainstorming tool to help explore some of these new tools and really support ideation in a whole new way.

>> Thanks, kill. Kyle. I do love that, get an idea, make it better in a time that is convenient for us. I'm going to be utilizing that tool as I begin my next course, which is a first year seminar in our college communications. I had a discussion with the dean and was talking about two different documentaries that I watched over last weekend, which were about the Fyre Festival. I don't know if anyone has watched it. There's one on Netflix and one on Hulu. Two different perspectives. I gotten together because I taught it was the friar festival. If any of you participated in that. This really interesting notion, we work in the it's field, I also have teenagers, so I feel like I'm hip to technology. As I watch the two documentaries, the flowers and the impact they had, sort of pre and during the ex execution of this lack of execution at this Fyre Festival. Thinking about this and how I'm able to explore that idea. The dean said, wow, that would be a good first-year topic for the seminar. So as we think about the breadth and depth of this, she made a good point, this is how you learn more about a particular topic. Thinking about -- as I start to develop this new course, being able to have a place where I can go to start to generate content around that and start to explore what I didn't know about this particular content and we've doing it through a project here called BBookX, which I'll let Kyle talk about.

>> BBookX is the most mature kind of experiments with these types of tools. It was really borne out of work with a professor here at Penn State, Lee Giles who has been a scholar in that for a long time. The goal is to take on how does a book come to be. And so based on the idea of there's a world will, there's a future, where a machine could construct a textbook with the leadership of a knowledgeable learn. And so with that we kind of work together to explore this idea of the b book or what we call a bionic book, a machine and a person working happened in hand to design a text book. So in this case, it very much uses a kind of book met for where you can start the creation of a new text and from that you provide keywords and phrases that help describe what you money. I've created chapter 1. The keywords and phrases can come from anywhere, lecture notes, presentation material, other texts you've used in the past. From there BBookX begins to recommend or make recommendations about what topics may be relevant based on your experience or based on the material provided. From there you identify what should be excluded -- or what should be included over excluded. Based on what you bring in or out further defines further narrows, what it is you're meaning about these terms as saying you want to make them be part of your text. It makes it possible for the instructor to cycle through a set of ideas and begin to construct a textbook. In this case, we heavily leveraged Wikipedia as a base of knowledge mainly because it is a huge store of open content. In reality we can kind of leverage any parseable text. Because of licensing issues we focused on this as a -- you can make as many as you need, and then you can begin to move that out as kind of a pro type textbook. In this case, we can bring to -- bring not a Google document and bring it in further. You can add more, take-away. Kind of lay in case studies of their own or other materials they have. We have a few examples where faculty have taken and replaced the traditional textbook with an alternative. They were able to kind of surface new material through BBookX. BBookX is a highly experimental idea, but it's something we're seeing -- what it did was it produced a lot of new ideas around how this kind of A.I. can be used to create now tools. And so as kind of subsequent research coming from BBookX, is the Eureka example we just talked about and also a couple more examples we'll touch on going forward.

>> So I love this because as we talk about these tools and how we explore them it is often the least interesting question or the most interesting of the uses that becomes the least interesting as we move forward. So if you think back to the first slide, where we talked about the teaching journey, we talked about ideation and -- ideation and how A.I. can help me with my own jazz band, the design piece, taking a deeper dive into what is the topic and how to move forward. Now we're really at the assessment piece. Which for me as -- me as the FC tee member is the least favorite things to do. Maybe I shouldn't stay this out loud. It's really about how do I understand about getting my work done and for me that's the assessment piece. I've got the content, the idea that got the content. How do I do the assessment. One of the ways I can do this that aren't necessarily the most traditional ways of doing them. We think about the least interesting things I can do, a multiple choice quiz. I would prefer not to be spending my time setting up multiple choice quizes and generating questions appropriately, but doing rich assessments and spend my time focusing on that. As Kyle mentioned, as we come out of this BBookX project, we've had several other of those projects that have come out of this based on the knowledge we've gained from this particular piece. I'm going to hand it over to call to talk about our InQuizitive tool.

>> For anybody who has ever had to construct a multiple choice midterm or final knows just kind of how challenging that process can be and how complicated it can be in a number of different ways. So that's where we continued our research and began to develop InQuizitive. The idea with InQuizitive is to really use these machine learning techniques to help build assessments, and how do we help our faculty do this more quickly and do this more effectively in a number of different ways. This is kind of our first take on InQuizitive and something we're continuing to experiment in and evolve. It takes a text entry. This is a snippet from an open text textbook. You can drop it in. Then what InQuizitive does is it looks for phrases in that that have what appear to be kind of key terms. And then makes the suggestions as possible questions that you may want to include in your assessment. From there you identify the phrases -- I'm sorry, the sentences had a make the most sense as a question and from there you can identify what term in this stents is the one that kind of requires further explains or PBS the subject of this question. So based on that you can further drill in and you pick those -- that term, and from there it begins to generate distracters for that question. If you ever designed a test you know the complication it is to create a distract Orr. They need to be not too easy or hard. As we first designed the tool one of the things we discovered is machines are really, really good -- now we have a machine that we've trained to be -- to humans. We figure out how do we take this and make the questions not so hard and define that place that exists between easy and hard. It's beginning to generate detractors as words you're looking at. As a traditional area of research we're also looking at kind of profound fixal answers. So using the machine learning to create new terms that are fictional, but sound like that subject, to continue to honey, to create effective distracters. From here, pick your distracter, constructing your question that can then be moved outside of the tool and then brought in our question we can bring it into the question bank or canvas and use it as part of a class. It becomes a way to cycle through this. Through our experimentation, we're finding there are a lot of different ways of looking at this. Some people like the idea of identifying concepts that come from texts. Others like the notion of being able to help generate distracters. You might I don't this to create quizes, create reflection material. So one of the challenges that happens when adopting a -- an open textbook, that often it doesn't include the assessment questions. So we're looking at this as a way to help the facilitation of those questions from open textbooks and also the -- creating quicker questions, things like that. These are all different applications for this type of InQuizitive functionality. So.

>> So thanks Kyle. I love that. I love that one of the demos I saw in the steps was the word tiger woods. The machine was smart enough not to know it wasn't tiger and woods. It didn't give me options likely 81. Jack Nicholson would be a good distracter. Take me to the next slide, Kyle, would you mind clicking me there? The second to last pieces is really thinking about your presence within the classroom and I love thinking about -- the work that the team has done here in talking about it because this was an item that a faculty member came to us, she teaches preserves teachers, so these are students here going to be going out into the classroom for the very first time to practice what they have learned in the classroom, so it's a really great idea to think about how do we take them and immerse them in something and make sure the students get an opportunity to practice the kind of classroom management skills they learn, but don't always get an opportunity to do in real life. If you have a student teacher coming into the class, the students are generally more present, they're paying attention better, they've been threatened by their regular teaching to be on their best behavior, so we can't necessarily duplicate or ask the students to do things like punch their neighbor or fall asleep, drool on their desks, for example. So we wanted to take this idea, how do I take what I do in the classroom better, how do I process it in the space with actual students or a do no harm effect for our students as they're thinking about going into the classrooms and being teachers themselves. So we've taken the idea of our artificial intelligence, machine learning, and provide it with on robots. I'll let Kyle FutureCast -- talk about our 1st class project.

>> One of our goals is how can we create an environment where students have repetition, practice. If you think about the classroom appearance, the first time you're talking to a roomful of kids is the first time you're talking to a room full of kids. That's a pretty high-stakes experience. How do we reduce anxiety that goes into this and provide more opportunity for our students to begin to experiment. By extension we look at this as its own professional development tool for teachers that already have experience. We developed something called first-class.

>> first class is a marriage between a virtual row at environment and the use of A.I. based students that exist inside this environment. This is an environment, where the user puts on a headset and they can interact with these virtual students. The students you have, kind of A.I. powered algorithm EMS that sit behind them to interact with how teachers are react with them. We've given the students a series of traits that traditional students may have. They'll do things like get bored and fall asleep or they'll be engaged inside of the classroom. They key off a different set of invariables, line of sight, different tools that help teach and provide the opportunity to experiment with presence inside of the classroom and then that can be extended into taking on a number of different kind of classroom management skills that can be applied in a lot of different ways. So this is really an experimental around how do we use these types of A.I. technical nominations and manifest them in a visual form and whether or not them to create these simulations or environments that are otherwise kind of impossible or unlikely or difficult to create. And it's an opportunity for our students to kind of practice and experiment in different ways. What we found through this is there are actually a lot of applications for these type of interactions going forward.

>> Thanks, Kyle. That really takes us through to facility tags and reflection piece of this. How do I take the four things I've done before, the ideation, creation, the assessment tools and bring them into a classroom and actually practice them before I get in there. But the big piece for me is this last question about the research. How do we get to a point where we're able to take all we've learned and leveraged machine learning, A.I., and the data we're collecting and use it in really interesting ways. Where else could this go? I've got a list of things that I'll throw out there. The folks on my team, if you're listening, don't panic, this isn't mandates for work that needs to be done for tomorrow, but I do think as we think about what the power of this can do for teaching, learning, research in institutions is thinking about this hyper learning. We Taylor the activities. We know that virtual field trips are more effective for some students than others. Is there data about ahold that be more effective for or, which types of engagements would be most effective for which type of students. How do we tailor the assessments. I'm not in a vision class where every assessment is a multiple choice assessment, but maybe someone would benefit from doing an option like a writing assessment or a video or a project. What do those options looks like, how do we tailor the assessments, tailor them that are meaningful to a curriculum that changes relatively rapidly if we're thinking about things like flowers and micro influencers. The idea, what do we already know about our students and how can that be brought into this idea and I want to take a pause. I think Malcolm talked early on in this situation about what do we need for wary of. I think back to the winning of online learning. So 2006 or 2007, there was a lot of buzz that online learning was going to take the place of faculty members, it was going to take all this work I did, going to put it online and then they won't need me any longer. We have seen that hasn't come to fruition. That has not happened. We still need the human piece of what we do in an online course, the interactions, the feedback, all of the things we know make for a positive experience. So this is what we're thinking about with the use of A.I. today. It's at least a way we're looking at it right now is it allows us to leverage the tool for that ideation, for the content development, for the assessment pieces and allows the faculty member more time to be human, to have more creativity, engaging with their students, and have more time for conversation and spending less time on those other things or the time they have set aside for those things can be spent with office hours on campus and the development tools that we showcase here can be utilized at home at different times of the day. Kyle, did you have anything else that you want to add to this?

>> Sure. I think as we continue to look at this, the big opportunity is what are the way these tools can be used in combinations and also pulling in additional insights from different areas. One of the areas of research we're looking at now is how does that intersect with the classroom experience, how do we make those tools a part of the reflective teaching process. Imagine taking something like the quizzing tool to be able to generate the questions from classroom conversation or from different areas of discussion. And beginning to look at how different types of modality can benefit in different ways from the use of different types of A.I. tools. As we kind of wrap up today I did want to close out with a note. I know there were a number of questions about this topic, how do we make use of some of these tools. That's one of the challenges we have is kind of providing these types of tools, is that one of them is they're very computationally intensive. Some process through entire copies of Wikipedia to try to generate responses. They're highly experimental. As we engage with faculty on a surface level, we can kind of work through and begin to explore the different ways that these tools manifest. They're kind of in a constant state of flux. Many aren't available yet, although we have interest in doing that. What we realize is that in order for these types of tools to be the greatest amount of benefit, really the broader applications are certainly useful. So if you have interesting kind of -- exploring research, or have people working in the same areas, we'd certainly like to talk to you so feel free to reach out if you'd like to engage in these in more depth. With that question mark open up for questions earlier than we planned.

>> This is fascinating. There's all sorts of questions here I think we need to -- I'm going to just look at the ones still in the chat window. This is really what has a lot of us freaked about the March of A.I. I'm thinking about alpha zero, the machine from Google, give a game 100 times and see if it can beat a human champion. How are we going to get displaced by these machines, particularly when they get really good. Any comment on that in terms of the teaching and learning context?

>> Sure. So I live with an it's security person and I wore -- it security person, so I worry about those things. I don't think that this would reduce the amount of faculty or I saw an alternative that will increase the number of students per instructor. I'd like to think we're smart enough to know that, gosh, what makes this academic experience for our students particularly personal, right, is that access to the instructor, is the access to time with the FC tee member, engagement with the faculty member an engagement with our fellow students as well. Several years ago, five or six years ago I was with Malcolm out in Seattle at an ltl event and had a conversation with one of the leading technical providers, I won't mention names, but it rhymes with schmoogli, a potential to I don't technology in interesting ways, so the big thing, how can we leverage high data. So there was a lot of hesitancy to be thinking about what would this omnicient, all knowing being that can exist on your machine, so when a student came in, you'd be able to say this student is Kyle Bowen, he's come from west Lafayette, Indiana, I know he's a first generation college student, this is how he's performed before this. This is the way in which he does his best learning. Last minute, cree creative, don't make him write a paper. Whatever -- surprisingly accurate, Kyle said, as we're sitting here. Thinking about that from the perspective, it could tell the whole story: this. What would that allow me to do as a facility tee member or advisor -- advisor to respond to Kyle. I think we need to be aware of it, ledging A.I. in interesting ways. I think like this, to help the experience. Particularly at our campus it's been a challenge to fight the tide of this idea that Watson is going to come in and answer all of our problems both from a research perspective to an operational perspective. It's going to help our very searchers find appropriate appear review journals for their cancer research and it's also going to solve all of our problems we have with the transfer credit process here at Penn State. So there's this hype associated with it that is being pushed by the vendors when the reality is we're at a pretty immature spot and we're going to see this continually evolve, but we need to hold this how it is a supplement and not a replacement.

>> Another question is I would just echo what has been said already, that pep state is to be congratulated for these Pioneering and explore rotations. Can you give us a sense of what resources are required to create these applications?

>> Sure, Malcolm. I think it's been a number of different things. So each one of these we've explored in a different bay. BBookX was really kind of our first major exploration in this area and that was done as a kind of joint research project with a faculty member. That stemmed from a conversation with him about how could his scholarship be used to kind of transform teaching. These stem from his initial ideas. We've had a joint interest in exploring. So then from there we kind of matured into more complex tools and from there we have a data scientist on staff, we have somebody who specializes in ui and we have drawn additional uio data science people as needed to help explore this. We also kind of leveraged graduate assistance. It's hard to say this is what it takes to really do this. But in reality, to affectively appear sue this, you do need people who are skilled in data science and even realizing that the field of A.I., like many others, have its Onyx expectations. There are people who focus on data, science and analytics versus machine learning. The other part of it is and another area we focus a lot of attention is really on the user interface or the user experience because that is where a lot of the complexity comes from. Once you provide kinds of new kinds of interaction, you don't really know how people are going to react to this, you don't know how they're going to think about it because it was never possible before. We found that with the creation of an assessment question. The way you fight create that is different with a machine than if you do it all by yourself. There's a lot of work into understanding that work flow and that interaction.

>> Okay. I'm --

>> Malcolm, can I jump in for twelfth?

>> Yes, please.

>> I want to respond to Jason and Roxanne, I've been watching the chat and talking about the -- how this will be a disrupter. I was thinking about A.I. being a disrupter and what this looks like. I want to talk about one example at Georgia Tech. They had a course that was actually a bot. Jill Watson. This was a ta within a course and students could ask this ta questions and she would respond. When students were asked twee end of the course, how were the pas, Jo got the best rankings, the student didn't know she was a both until after the end of the course. I would say yes, it could be a disrupter, but I can't envision any time in my lifetime, and I'm 47, so you know, front of more years maybe, hopefully, that we would have a school that would be accredited without any actual real faculty, that they were they were all Jill Watsons. I think we're all a long way from that. If you were going to talk to see sci-fi authors this would be a good story, how they could be manipulated by the nefarious forces all around.

>> What has been the reception or reaction, I'm sure you've shared these applications with folks at Penn State, how have they been received?

>> Sure, we share them through a number of different avenue. These targeted one-on-one conversations, we've hosted a number of different workshops. Over the summer we hosted learning design with A.I. shops, designing new courses for the first time, Troy to use some of these tools to learn about how do they fit into that work flow and it's interesting because in many cases the reaction is they see the tool, they understand what it's doing, and have a lot of other applications for what it could do. You've designed the tool, so we started with BBookX, you're tike I see you designed to build box, but I could also use this to create other types of materials. So from that, that's where a lot of these ideas come from. And then the other thing it does, is it Stokes really good conversations around some of the ethics that surround these. There are some really complicated ethical questions that begin to come up as you begin to interact with these types of tools. One of the more interesting ones we've come to is the something is written by a machine, then who is the author. You have to grapple with that at some level. So these are a big part of the conversation that we have with faculty is around how does this fit into how you use things, what do you think:this, how do you respond to these, and then what are the other potential applications or issues that stem from their use.

>> Interesting. So can you share with us any plans for continuance of these explore rotations in this space?

>> Sure. So the project we're actively working on right now, we have an experimental teaching room on campus, we've created -- we have a series of microphones that are capturing the conversation, and then what it does is it creates a sound scape in the room of what happens during a conversation and what we can do is apply analysis to that conversation in an effort to provide a reflective experience back to the faculty member. In the same way you might use a fitness tracking watch or something like that on a regular basis as a way to get feedback on your fitness, in this case, think of it as a Fitbit for teaching. After your teaching experience you could reflect on how much of the time was spent in your class on direct structure versus group discussion versus watching a video or something like that and begin to reflect on that experience and think about, to what degree did this provoke the conversation that you were looking for. As an extension of that, looking at the D.C. looking at the -- what are the subject of those conversations. So what are the topics being introduced that aren't being discussed or vice versa. The is an i RV approved study. In this case, the students who grant permission to allow us to capture that, in this case, it's non-identifiable information, we can continue to do this analysis with. This is our big project we're working on now and we're working on property types and doing analysis on creating the training data. So in this case that's a fairly complex process of taking these recordings of classrooms and beginning to train the machine learning wrists on what is the difference instruction versus group conversation, for example, and that it can begin to help identify that in classes going forward. Then through that process, as you work that process throw, we'll engage faculty in a conversation, learn more about how they see this as working, their teaching work flow and what information can be derived from that.

>> Okay, I'm going to end it with one question. We only have a couple minutes left here. I think it's an important one. We back in Socrates, the advent of writing, because it would signal our recall powers. If we fast forward today, one could argue we're already seeing a decay in writing stills amongst the general population, if these programs start writing for us, even start writing our books for us, won't we see a further decay of our writing skills, but the question is, is that a good thing or a bad thing. If anyone wants their way into the chat based on their question, please do.

>> Malcolm I'm only going to

>> LEFT1: Respond with a smiley face emoji.

>> Is that the zen master who maintenance taken a noble silence when you ask him questions?

>> It's a good question. That is one of the things is why we engage in these types of experiments, which is to ask these types of questions. That's where even with BBookX there was this really fascinating point of what is writing. Is it the construction of a narrative or is it the putting of words to page. So then based on that, then how do we further define what writing is. Part of it is in the same way we use on line, is this met forever for instruction. Does it replace all our courses, does it replace all writing. What it does is it influences and disrupts how we think about that. True, it does have these effects, things like emojis or other types of non-pro additional kind of communication. We'll have to see how that plays out, but it's questions like that that really are the driver for these types of experiments, to see what kinds of influences we have. We turn cruise ships, these wide lumbering terms. Through small -- we can begin to understand the issues a little bit better. As the industry comes into it we can better understand what the implications are and how to have the best possible experience for our students.

>> Jennifer, any last words? For the webinar?

>> I am so lucky to work with Kyle Bowen.

>> Yes.

>> Can you hear me?

>> Yes, I think we all appreciate why you said that, very much so. Sadly we are out of time, so I'm going to have to with some regret draw this to a close, but thank you to Kyle and Jennifer so much. This has been a fascinating and a great opportunity to begin thinking about these important issues facing us so thank you so much.

>> Thank you so much.

>> Thank you, Malcolm.

>> So and on after of Educause I want to thank everyone for participating. Thanks for a lively chat experience also an important piece of to any webinar. Would you please click on the brief eval on the screen. It's important to us. It will posted to the website later today. Please feel free to share it with your colleagues. Finally just a couple quick programming notes, we invite you to join us for the website on Tuesday, February 12, at the Eli webinar covering the 2019 top 10 issues. A second note on Tuesday, February 26, we'll have an Eli webinar, this one about reading and digesting scholarly researches, tips to save time while increasing understanding. We hope you'll join us for those events. Thank you again for joining us today. A shout-out to Adam and Jody for their support. Thank you for joining us. I'm Malcolm Brown.

**End of Webinar**