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>> The keynote is going to start in just a second. If you could all take a seat. Please clap if you heard that. Not a lot of claps.

(Clapping)

(Silence)

>> JEREMY ROSCHELLE: All right. Good afternoon, everyone, good morning P. Welcome to our webcast. Welcome to everyone for our keynote. I'm Peter Brusilovsky. I'm one of the members here. My job is to (Off Microphone) which is Mike Sharples. Mike is a very good person to present here. He has a career in educational technology. Recently he was the professor in the university. But as I said, he's about to start his retirement. He's been working on making sure that technology and people connect well in technology. Human centered design technology, I would say. I'm excited to have Mike here because I was working with him as a co-editor at a major technology journal. We both retired this year. I'm excited to hear what Mike has to say. Welcome.

(Applause)

>> MIKE SHARPLES: Thank you, Peter. I'm delighted to be here because I've heard a lot about the Cyberlearning community but haven't had an opportunity to meet and to interact with you. I'll be staying for both days, so I'll be happy to have lots of discussions. There probably won't be much time for questions at the end. So I'll be glad to meet with you later.

I'm from the university in the UK. I wanted to say a little bit about the logo in the top year. 50 years. That's 1969. 1969 was a momentous year. The US -- it was a culmination of a huge amazing engineering program to put two people on the moon, to bring back moon rock. And in the UK it was the start of an amazing educational program which was to build a completely new type of university that would be open to all, that would engage people in high quality education at a higher education level. And 2 million people have benefited from courses at The Open University since then. It's still going. Just a few words about The Open University. It's mission is to be open to people, places, methods, and ideas. We take that very seriously. It provides access to higher education for anyone who has a desire to learn. So there's no prior qualifications. We take people with no prior qualifications and at all ages. The youngest graduate is age 14. The oldest is 95. There are 170,000 current students. So it's the largest university in the UK and one of the largest in Europe.

Because it's open to anyone, then we have special interests in supporting people with disabilities, 24,000 students with disabilities. And right from the start the aim was to provide the highest quality teaching and learning. So it wasn't a sort of low quality correspondence education institution. It was a full university and still is. It provides what we call supported open learning.

So every student has a personal tutor. In that sense it's like Oxford and Cambridge, small groups of students work together with a personal tutor but they also work at a distance. It's a research university. Right from the start, we've had a partnership with the

BBC, two great institutions in the UK, the BBC and The Open University. It's also the first Cyberlearning university.

So the teaching and learning methods were based on work from an education technologist and education theorist called Gordon Pask in developing learning as a network and as a conversational process. Right from the start it's been a Cyberlearning university.

I work at the institute of educational technology which was also founded 50 years ago to support and to research into the practices of teaching and learning with technology.

In the 1970s, because we wanted to engage people at all backgrounds in their own context, then for science learning we sent out home experiment kits. We sent out laser through the post so students could develop their own holograms. We sent out geology kits through the post. You can see a student working with an open university geology kits, rock samples. We realized in the mid 1990s that science was becoming more digital. Good quality science was being conducted online. We started to develop digital tools for learning. One of the most successful is the virtual microscope. The principle behind our tools is using virtual science with real data. The virtual microscope provides a way to look at and interact with real geological data including geological data you couldn't look at in the lab such as moon rock samples. We have high resolution samples taken from the Apollo astronauts and you can zoom in and look at them under different magnifications, under polarized light. So you can interact digitally with real information but in a virtual world.

And in 2012 we set up future learn which is Europe's largest [mook](#) platform with over 9 million learners. That's a bit of background from The Open University and institute of educational technology.

But since 2012, we've had a particular focus on pedagogy, I mean the theory and practice teaching and learning and assessment. How you can use theory and practice of teaching learning and assessment to inform the design of innovations in education. We published a series of reports one in each year, in 2015 the report was published in collaboration with SRI. It's been our most successful report. We've had over 300,000 downloads of those reports. They're free. I have a few copies here which you're welcome to look at and to take.

Also, a book that I've written that summarizes and extends the work of those innovating pedagogy. It should be put on the same level as technology. Technologies alone are not going to transform education. It's that combination of pedagogy and technology which will bring real transformation. I put up -- I can't put up all 40. I'm going to concentrate on a core of pedagogies there. Each of these can be supported by technology. You can take any one of those that's taken embodied, wearable technologies can support embodied learning. Any of those pedagogies can be supported and enhanced by technology.

But that list can be used in two ways. One way is to look at existing teaching practices and to say, what are the pedagogies underlying them? What goes on in my classroom? Is it primarily K space learning? Is it primarily delivered context? Is there an inquiry learning element? What goes on in my classroom?

It also can be used in a generative way. You can ask the question, what would game based inquiry learning look like? What would informative collaborative learning look like if it were in the classroom or online? You can use it to generate new ways of teaching and learning. You can also use it to inform the design of new educational technologies.

That's why I want to go next -- there's something wrong with this screen. Can somebody come up and have a look?

So you can use pedagogy to inform the design of new ways of learning with technology. So this is a standard approach now for developing new technologies, an AGILE design process. Many of the new forms of learning technology are developed using this method. You start off with an idea concept, something that you want to be able to embody in a technology.

You go through a process of design and development, which leads to a release, which is then tested. And you provide feedback to the design team. Now with AGILE design processes this is usually very quick. The cycles can be as short as two weeks. So you go through rapid cycles of design, release, testing, and feedback.

But informed by an idea concept. Now pedagogy-informed design in Cyberlearning is to say, how can we take those pedagogies as the initial idea concept? So we can start an AGILE process of educational technology development from one or more of those pedagogies. I want to give you an example of that, which is to take inquiry-based learning and state how can you then inform the design of Cyberlearning starting from inquiry-based learning? Also, what we've been interested in is how can you do this at scale? So which sorts of pedagogies can work at scale?

Now, just quickly about learning at scale. There's some pedagogies that just don't work as you get larger. So let's say sports coaching. It might work coaching two, three people. 100? It would be pretty difficult. There are some methods of teaching and learning that are pretty impervious to scale. What I'm doing now, lecturing. It works for a room here. It's also working online for the people who are watching. In fact, it's probably working better for them because they can pause. They can rewind if they want to. But what pedagogies get better with scale?

One of them is learning through conversation and networking. The more people who take part, the richer the conversations become. And it works better in scale. That was the principle behind the development of the future learn platform. It was based around learning as conversation.

What we wanted to do recently is say, can you do the same with inquiry-based learning? Can you design an inquiry-based learning that will get better with scale? Why inquiry-based learning?

Inquiry is central to learning. Because once students learn how to ask good questions and find valid answers, they can become active learners in any subject. It's asking the good question and searching for answers to those questions individually or together that allows them to become active learners.

Now, we've been looking at a scaleable version of inquiry learning that we call citizen inquiry. It brings together the benefits of citizen science, collaborative inquiry learning with a dash of crowd sourcing. So citizen science is science enabled by people, by citizens. But with citizen science the starting point is the scientist. The scientist who has a question to ask, which then is carried out by members of the public. So the scientist recruits members of the public. What we've been interested in doing is flipping that round. So it's members of the public. It could be students in a classroom. It could be community groups. They ask the question and then get scientists and other people involved to try to answer it. It involves collaborative inquiry learning, answering a question by working together with many other people online.

That's where the crowdsourcing comes in. So instead of trying to raise money through crowdsourcing, you're trying to raise other people. You're trying to get other people engaged in your project. So that's the idea behind citizen inquiry.

It starts with a question, with an investigation from an individual or a group. You then recruit as many people as you can to try and answer that question. In doing so, you form a community of inquiry.

So the learning through citizen inquiry is first how to be a citizen scientist. Citizen science, large scale scientific research has become a favored model. You can do large scale investigations when you get many people involved. You learn to become a lifelong learner, because active learning starts by asking big questions. You learn how to form and sustain a community of inquiry, questioning, reasoning, connecting, deliberating, challenging, and developing problem solving techniques by recruiting other people to try and help answer your big question, you're developing and maintaining a community of inquiry.

As John Dewey said many years ago, the environment in which human beings live, act, and inquire, is not simply physical. It's cultural as well. Problems which induce inquiry grow out of the relations of fellow beings to one another. So you're creating a culture of inquiry through large-scale citizen investigation.

So at The Open University we developed a new platform called nQuire. You can go to www.nquire.org.uk. Many years ago the BBC was extensionally a way of transmitting as expects of learning to members of the public, TV programs that were broadcast late at night that anybody could watch. Now the relationship is much more but we work in partnership with the BBC. This is a new form of partnership.

In the past they have had mass experiments starting with TV programs and involving hundreds of thousands of members of the public, something called lab UK but they've never had a platform for doing that.

What we've done in partnership with BBC is develop a platform for those mass scale experiments. It extends citizen inquiry to mass multimedia surveys and other investigations. The platform offers two sorts of investigations, confidential survey type missions. Think

about something like survey monkey but think of how you would develop the ideal survey monkey for scientific investigations with built-in consent forms, having multimedia images, for example, the respondents can upload. So it's a kind of souped up extended version of a survey platform but also open social missions where all of the data is open for anybody to see. So all of the responses can be seen by anybody else and can be the basis for communication and collaboration. That's where the benefits of scale come in. You can interact with other people around the data.

I'll give you some examples of that. The front page of nQuire, four examples. The first one, earlier this year was a collaboration between the BBC, The Open University and the British trust for ornithology doing a national survey of British gardens. There's never been one before. There's more land, more green space in Britain in our gardens, private gardens than all the national parks put together but nobody's ever surveyed them because it was really difficult to get each individual person to talk and to give data about their gardens.

We, through primetime BBC TV programs, carried out an investigation. There were over 200,000 people contributed to that survey. So we now have a massive amount of data on British gardens.

The second one is a feel good test which is an investigation with university college London in creativity and well-being and provided each person that took part with personalized feedback. There were 43,000 people that took part in that with 70% completion rate. Open social missions one down there in the bottom left, people who were interested in clouds, cloud spotting, ranging from people who just like posting pretty pictures of clouds, up to semiprofessional meteorologists. You can post pictures of clouds. Get other people to help you identify cloud formation and discuss unusual cloud formations. That's an open social mission. The last one students at the university are doing investigations into online and offline learning.

So that garden watch, I'm particularly pleased with that because it's a survey of UK gardens, primetime TV, the people who took part are not your standard scientists. The age was around 40, the median age was around 40 to 45 years old. Most of them were women and they were interested in their gardens, not in the technology. So being able to provide a platform where they could survey their gardens, provide the data, was really important. At peak times we had 10,000 people accessing the platform a minute, 65% on mobile devices. So it's not the case now that you design for desk top and then some people will use mobile devices. The majority of people are accessing that on mobile devices.

And these are some of the responses not on our platform but on social media around it, people posting pictures of their gardens, their wildlife, engaging in discussion around the investigation. So it became not only a platform for providing data, but a context for building a community around that investigation.

Now nQuire is multiply open. We're university. We make

platforms that are open. So the source code is open. It's open for anybody to participate in any mission. You're welcome to join any of the missions but also it's open for any person or organization to create a new mission. We call them missions on the platform. If you want to create a survey, if you want to create an investigation yourself with students in your class, with your university, you can use the platform to create a science investigation and get thousands or tens of thousands of people involved. It's open for discussion of visible data. So it's multiply open.

The thought of learning is learning by asking good questions. Learning by engaging in good science together, particularly those open missions, learning by analyzing and sharing results. So you can also publish the results because you've got huge amounts of data. You can publish those results. So you've got multiple ways of learning on the platform. I just want to finish off by summarizing some of the issues that we've found with developing inquiry-based learning at big scale.

Because with great scale comes great responsibility. What sorts of responsibilities? Firstly, a huge diversity. If you've got 200,000 people taking part in an investigation, you're going to have a huge diversity of abilities, cultures, and locations. And you want to support people from those different backgrounds. You've got big data. That big data can be used for good or it can be used for real. We want to make sure that the big data is used in responsible ways. There's tension and part of the theme of this event is trying to resolve tensions. There's a tension between open data and personal privacy. So, for example, that garden survey, we wanted to have the data open so that anybody could post their data. They could discuss it. But we couldn't. For example, one of the questions there was -- you can see it there, which of the following enclose your garden, wall or neighboring building. You're asking people to provide information about the security of their garden. It was needed for the scientific purposes of that survey. So there's a tension between open data and personal privacy.

There's a similar tension between robust science and social learning. For robust science you want stratified samples, you want representative samples. For social learning, you want everybody to take part, no matter what their background and ability. There's a tension between open access and bad science.

So if you provide an open platform for anybody to contribute or anybody to create a new mission, you're going to get people wanting to do missions on ghost hunting or missions on strolling. Do you put them on the platform or not. What we've got is a three-stage process. Where you can develop a mission and preview it, where you can open it to a small group of people and then open it more broadly. Each stage you've got a review process.

Finally research ethics. I like acronyms. Ethical design of Cyberlearning. An acronym mission. Firstly, multiple media, devices, partners. To have good Cyberlearning, you need to engage multiple media. You need to choose a media that are appropriate for

the task. You start with the pedagogy, and then you choose the media.

Secondly, independent verification. So verifying the data, but also verifying that the platform is robust and secure. So we have external validators for both the platform and the data. A secure environment. We make sure that all the data is stored locally. We don't send it off to a cloud platform. Support for learners. It's not enough just to provide a platform for people to come to. You need to look at ways in which you can engage scientists, engage educators in supporting the learners. And inquiry learning process starting from learners' needs. Open access, so enabling access and learning for all. And lastly, analytics because you've got this huge amount of data, then you can use those data, that analytics to support learning.

So I want to leave you with that as a checklist if you like for ethical design of Cyberlearning.

The final slide, technology alone is not going to transform education. We need to focus on pedagogy, methods of teaching and learning with new technology, not just the technology alone.

Thank you.

(Applause)

>> MIKE SHARPLES: I don't know if there's time for questions. Probably not. See me at lunch time.