IT Forum Panel on Augmented and Virtual Reality

January 26th, 2018

Introduction

This panel is a part of the IT Forum's Teaching & Learning Functional Collaborative. Over the course of the research process, members articulated interest in VR / AR and sought guidance on how to determine whether these technologies are a good fit for their campus. The IT Forum felt that these questions could be best addressed through an opportunity to speak with experienced peers in a moderated panel discussion. Four panelists (representing Suffolk University, The New School, and Washington and Lee University) shared their experiences adopting VR / AR technologies and answered questions that audience members submitted live.

The Panelists

Mr. Dave Pfaff: Dave is the Academic Technologist for Washington and Lee University's Integrative and Quantitative (IQ) Center. In the IQ Center, he helps faculty find innovative ways to integrate a wide range of technology into their classes and research. The mission of the center is to make technologies, including virtual and augmented reality, easily accessible to the widest audience on campus. Mr. Pfaff and the IQ Center staff have helped to integrate Virtual Reality into classes from a variety of disciplines: for example, by building virtual environments for visualizing 3D objects and animations in the center, including mathematical visualizations, GIS information, and architectural models. He has also designed standalone virtual projects that can be entirely student-run. Recently, he has worked with the Art History department to re-create portions of the city of Florence in 1490 as a VR experience.

Ms. Maya Georgieva: Maya is the Director of Digital Learning at the New School in New York. At the New School, Maya leads innovation in the design of technology-enhanced learning and VR, AR, and Mixed Reality initiatives in the new XReality Center. She works to provide strategic leadership in creating institutional capacity for innovative design with emerging technologies. Maya works closely with the CIO, the Vice Provost for Curriculum and Learning, university academic groups and faculty in the design, development, management and evaluation of new digital learning initiatives. Previously, Maya was the Associate Director of the Center for Innovation in Teaching and Learning at the Stern School of Business, New York University. At NYU Stern, Maya spearheaded the implementation of educational design and technology, experiential learning, and learning space design. Her research focuses on global education, AR/VR, new media narratives, immersive storytelling, AI, and the future of everything.

Dr. Tom Lynch: Tom is Chief Information Officer of Suffolk University in Boston, Massachusetts. He is responsible for the management, leadership, and vision of Suffolk's IT Department and Academic Technology Units. He and his IT team are supporting the work of Professor Walter Johnson in the creation of a Center for Multiple Realities (CMR) at Suffolk University. CMR is a cross-disciplinary AR/MR/VR collaborative effort among faculty, students, and staff across Suffolk's College of Arts and Sciences, including the New England School of Art and Design, the Sawyer Business School, and the Suffolk Law School. CMR's mission is to radically enhance human learning, teaching, and collaboration through the use of emerging and advanced AR/MR//VR technologies. Immediate focal areas include architectural design, the modeling/visualization of physical phenomena, 3D GIS visualization, and project-based creativity/innovation courses.

Dr. Walter Johnson: Walter is Professor of Physics at Suffolk University in Boston, MA. He teaches a variety of courses ranging from introductory to advanced physics. He served as chairman of the Physics Department, founded the Electrical and Computer Engineering department, and was co-founder of the Radiation Therapy and Medical Dosimetry programs. His most recent efforts have been in the area of augmented, mixed and virtual reality. Using the Microsoft HoloLens and the Oculus Rift, he and a group of physics majors have been working with faculty in different departments to find new approaches to the curricula using these emerging technologies. In particular, the HoloLens has been used at Suffolk's New England School of Art and Design to produce holograms of buildings designed by graduate students, and the Oculus rift will be used with a Google Earth VR application in a GIS course. With strong support from the Dean of the College of Arts and Sciences and the information IT team, Dr. Johnson is pursuing establishment of a Center for Multiple Realities on Suffolk's campus.

Questions & Responses

Panelists' responses have been edited for brevity and clarity.

"Why did you initially bring VR / AR to campus, and what teaching and learning needs did it address?"

DP: I am the academic technologist for Washington & Lee's Integrative and Quantitative (IQ) Center. A portion of our work involves scientific visualization. This includes generating and visualizing 3D objects. There is a stereo display room that has dual stereo projects. We had already been experimenting with visualizing 3D objects on our stereo display, so moving to virtual reality was a natural progression. We already had classes generating 3D content, such as biology considering protein structures and geology looking at rock outcrops. We use photogrammetry and various 3D computer animation packages for creating this content. So, when VR goggles came out, and were cost effective and worked well, we decided to try them out. We started off with Google Cardboard, but it was impressive enough a technology that we soon acquired a true VR headset (we started with HTC Vive), and the results were so dramatic that we started repurposing all of our projects and materials to fit with VR. We built test platforms for faculty to get them interested.

MG: I recently took on the role of Director of Digital learning at the New School, but previously at NYU I conducted research and consulting on emerging technologies, so I will bringing in perspectives from both roles. Here at the New School, we've seen pockets of activity related to emerging technologies throughout the university. Last fall, the CIO launched an initiative with the endorsement of the Provost and the President and started the XReality center. The idea was that we wanted to create a platform for all of these projects and activities related to emerging technologies, and a place where we can talk about these new technologies, promote them, and learn from one other. It furthers the mission by acting as a vehicle for innovation, encouraging interdisciplinary instruction and research, and ultimately developing new models for education. We want to be a leader in this space and determine how VR/AR technologies can impact fields like design, new media, and storytelling.

WJ: The work at Suffolk ties in directly with our strategic plan's components, and specifically the goal of increasing student success. It became easy to justify how VR / AR technologies tied into the mission of our institution; for example, being able to show chemistry students a 3D model of molecules strongly affects how quickly they understand the material and how engaged they were in the course. Another part of the strategic plan emphasizes pedagogical innovation, and innovative teaching has taken off since the arrival of VR / AR technology on campus. Last summer, we received our first piece of VR / AR equipment, the [Microsoft] HoloLens. As the physics majors and I started working on HoloLens projects, we realized that this tool could be used in other disciplines. Thinking again to the strategic plan, which encourages us to recruit a diverse group of students, we brought the HoloLens to a Physics Open House, designed to introduce our department to prospective students and parents. Usually, the Physics Open House only has a few people, but this time we were overrun with students wanting to try out the new technology. It was a great experience. Since then, we've acquired the Oculus Rift, and found ways for these technologies to work independently and together.

TL: I met Walter five years ago when I started at Suffolk, and at that point he had already virtualized several of his physics labs and worked on hybrid and flipped courses that were very successful and interactive. We chatted about a year ago, and I asked what's next for him, and he articulated his interest in VR / AR technology. We recognized the benefit of this technology for visual learners, and know that more interactive courses are better. You can see the student outcomes immediately when VR / AR is integrated into the curriculum.

"How do you communicate the impact of VR / AR to campus and community stakeholders?"

DP: VR is one of those technologies that people have to interact with directly to see its impact. It becomes immediately apparent to them when they have the VR Goggles on, whereas it's difficult to show them a video of what is, in reality, an entirely immersive experience. We created opportunities called Faculty Academies a few times per year, and W&L's academic technology teams put together a series of courses and trainings for faculty and staff. We have brought VR headsets to these sessions for the past few years, and faculty try them out and start to ask how they can incorporate the technology into their course. We demonstrate some of the VR content that we have already created, too, and faculty can see the benefit and applicability of this technology immediately. We also have VR nights that our work study students organize where faculty as well as students can try out headsets.

MG: I agree with Dave that the way to win campus partners over is to help them experience the technology, rather than just talk about it. But I think one of the best ways to communicate VR's impact is through student stories. There is no better way to demonstrate VR's impact. Here at the XReality Center we host VR days. Other institutions have done Hack-a-thons with students or worked with local designers, artists, or other professionals who have come to campus and demonstrated how they utilize VR / AR technologies as an expert in the field. This is a very new technology; no more than 5-10% of students are aware of VR / AR technologies and even fewer have tried it. This will continue to increase, but having as many opportunities as possible on campus to build awareness is a great place to start.

WJ: Ours was not exactly planned. I went to a conference about emerging technologies, came back and articulated to Tom that I'd like to purchase one Oculus Rift and one HoloLens, without much clarity on how I would use them. I was working with a group of physics majors, the equipment arrived, and I had no idea how to use it; but the students began playing with it and just went ballistic. About seven students were working on a neutron scattering projects, and very quickly students started showing up on weekends to work with this technology. I realized that VR / AR might have application outside of physics, so I took the HoloLens to the Deans and faculty across campus. Soon, faculty were coming to me to ask how they could become involved with VR / AR technology and use it in their classes. Word got around, and the Public Affairs and Marketing offices here at Suffolk caught on and began documenting our work with virtual reality on Suffolk's website. The publicity is great, but in some ways it is a problem; I have no space, no staff, and no money except for the equipment that Tom has brought in through IT. We're at the early stages, but already up to our eyeballs.

"Do vendor partnerships exist to make VR / AR technologies more affordable?"

WJ: If the technology had not grown in popularity as quickly as it did, we likely could have stayed with one HoloLens and one Oculus Rift. However, with only two devices, there is a limit to what you can do. In our conversations with faculty outside of the Physics department, we spoke with a graduate student in the Art and Design School at Suffolk who was designing a building for her thesis project. We realized we could use the HoloLens to essentially teleport ourselves inside the building and take tour. The Art and Design School just loved it, and I went back to Tom and told him that we needed to order two more HoloLens. This was an incremental decision; we didn't spend $50,000 upfront on several pieces of technology that we weren't sure how to use.

MG: I would suggest starting with something like Google Cardboard rather than the [HTC] Hive, for instance. In programs like new media studies, journalism, or liberal arts majors, using low-cost VR tools first can set the stage for advocating for more expensive equipment later. The companies that make these technologies – Facebook, Oculus, Microsoft, HTC, Google even – have some grants and programs for funding small projects, and those still exist but less so, and normally in specific research fields. I've seen a few companies, Google and Samsung in particular, who are lending equipment and have opportunity grants to lend their equipment for a year or so to permit students and faculty to interact with the equipment. This field is changing so much, so quickly, and the price is dropping, particularly with Oculus Rift and HTC Vive; a project conducted last year might cost $1,000 less today. Now, for $1,000 to $2,000, you can put a VR / AR technology in a common area on campus to get campus partners excited. It's probable that later this year a standalone VR headset might cost just $200, which will open the door for higher education to bring this technology to campus.

"What kind of physical campus space is required to bring VR / AR technology to campus for widespread use?"

MG: There are different ways to approach this. Particularly in STEM fields, institutions are starting to develop a specific space or center for VR / AR technology to inspire development of these technologies. But even without a dedicated VR / AR "center," it is possible to use these technologies in spaces that are designed thoughtfully to encourage collaboration and creativity, complementing the workflow of this technology making sure that more students can have access to it. This doesn't mean a specific course needs to meet in a dedicated virtual reality lab or space 24 times over the course of a semester; even the opportunity to experiment a few times has benefits to augment the curriculum. I do find that this technology requires space for students to walk and roam around, so that it is most interactive. As VR / AR technology continues to get cheaper, the conversations about bringing this technology to campus will be less about cost and more about space, because that determines how students and faculty interact with the technology.

DF: At Washington and Lee, we've settled on the HTC Vive, which is 'room-scaled' [i.e. permits individuals wearing VR headsets to move around safely]. Right now, the HTC Vive can have a play space of 16 feet on either side, so aside from the cost of the technology itself, Maya is right that physical space is also at a premium. What we've done in the IQ Center is spread them out: right now, each of our VR technologies is in a different physical space. However, I think this will continue to change. Right now, our HTC Vive headsets are tethered, with lighthouses to track where you are in the room. In the future, they will have what is called 'inside-out tracking,' which allows you to move in and out of a physical space without being tethered, which will make it easier to fit additional headsets into the same space.

WJ: Space is definitely an issue for us at Suffolk. Our dean found us a space that used to be a kitchen and has been allocated for us to move into sometime in March. But right now, we have our Oculus Rift technologies in a shared space, and it's working out – we make do, as we go along!

"How are VR / AR technologies used outside of a specific course or course time?"

DF: As far as students consuming this content and working on projects, we've had a couple of different types of assignments. We've had assignments that we've built that are stand-alone, in that they are executable files that can be run at any time. In those cases, we have a sign-in sheet. Other assignments we've done with VR include students developing their own VR content, which is usually run by a course and requires all students to come in at the same time, which is trickier to schedule. Our center is open 24/7 for students, who just swipe in with their card. The technology is available at any time, and students work on these projects around the clock.

WJ: As I mentioned, when we first started using VR / AR technologies at Suffolk, we were in a physics lab and while we still do some work there, that space is primarily used for development. For example, we learned how to make holograms of specific molecules. But this semester, a chemistry professor wanted to be able to utilize this technology to show students specific chemical structures in VR, and we had to physically move the HoloLens technology to another space for the chemistry students to experiment. This coming semester, we have an even greater challenge with Oculus Rift. For one course with thirty students, the faculty member is using Google Earth VR with the Oculus Rift. Tom recently helped us acquire four more Oculus Rift machines, all of which are in a relatively small room (20 x 20 feet), with a sign-up sheet. When it's time for students to work with this technology, they let us know, and then a physics major assigned to each project group accompanies them to the lab to address any issues they may encounter. This ensures that students can work on projects outside of normal class hours.

"Has your institution created a course on how to use VR / AR technology?"

WJ: The Dean has suggested that we offer such a course, but we're already so busy working with the Art and Design School, the Business School, the Chemistry department, the Urban Ecology group, physics classes, and so on. Everything is evolving very rapidly. In a year, I'm not even sure what equipment we'll be using – things may be very different. As a result, this type of course is fairly low on our priority list at this point in time; we're mostly focused on supporting research projects using AR / VR and professors who want to incorporate the technology into their pedagogy.

MG: At the New School we have a minor in Immersive Storytelling under the Parson School of Design, and this helps students better understand nonlinear storytelling methods that are reflected in these new technologies. The Program of Arts and Technology has courses that permit students to explore these topics creatively**.**

"What staffing is necessary to provide required support and scale VR / AR programs?"

DF: When we started, it was only myself and a visiting professor of geology who was particularly interested in the technology. We stumbled around and finally figured out how to use VR / AR on campus. Our biggest success has been in teaching students to use these technologies themselves with Unity, which takes a significant amount of work to do. But, then the students realize that they are very good at manipulating VR / AR technology and take off on their own, working with the technology independently. Right now, we still don't have many staff dedicated to supporting students in the IQ Center here at W&L, but they are able to use the technologies on their own.

MG: Obviously there is huge learning curve with technologies like Unity, Unreal Engine, and Google Blocks; I think that those are becoming user-friendly visual interfaces, and I'm optimistic that these technologies are more accessible to students and faculty who lack a technical background. One of the ways that we support courses at the New School is by assigning them research assistants who have already taken courses that lean on VR / AR technology. We allow students to book one-on-one time with these research assistants, and on a repeated basis, to learn how to more effectively use this technology and apply it to thesis and capstone projects. In addition, I've seen other institutions host events in the evening and on weekends to connect in a space where they can learn from one another. VR / AR is certainly investment with regard to faculty time, because it is usually a faculty member who first ventures into this space while conducting their own research or developing their pedagogy.

WJ: I agree with both Dave and Maya. Once students learn some of the features of the VR / AR technology, they will simply be able to use it independently, with minimal guidance. We also have students working with Unity now. We have been able to learn from how other faculty are using VR / AR in different disciplines. For example, in the School of Art and Design, they used a piece of 3D software called SketchUp, and this platform works well with the HoloLens. We were able to collaborate and learn from one another about how to best use these technologies together. We also work with students from a variety of disciplines. One student who had taken very few science courses checked out our space during a class project and realized she really loves building holograms. Even though she is no longer in the course, and she doesn't get paid, she is now part of the group of students that meets regularly to experiment with VR / AR technology. But the problem is staff: we don't have one! There are students, and some are being paid through work study but others work for free because they enjoy it.

"What metrics do you use to evaluate the efficacy of your VR / AR technologies?"

WJ: It's a timely question, since we just got started. We'll likely include questions into our normal end-of-semester evaluations that ask students how they enjoyed VR / AR technologies incorporated into the courses. I think the strongest indicator is the interest inside the university; if it weren't working, so many faculty wouldn't be seeking me out, trying to learn how they can incorporate these emerging technologies into their courses. We're sort of maxed out! There are individuals that I am deliberately not approaching because I know they will be enthusiastic about using VR / AR in their courses. Hopefully we'll be able to include them next semester. Overall, I think that the interest of our campus partners is the greatest overall indicator of the program's success.

MG: The reality is that most of our VR / AR projects are in early stages, with some exceptions at research universities where this kind of work is more advanced. It's new terrain, and it's changing rapidly. Engagement of students and faculty is one metric used to demonstrate VR / AR technology success. For institutions that have already brought VR / AR into the classroom, some are doing ethnographic analyses of the technology's impact, but this is only in the case of larger-scale pilots. At smaller institutions, we're asking ourselves, "How does this technology have an impact on student's understanding of course material?" Another way to measure success is through accessibility. Can a variety of students use VR / AR at any time, in multiple places, and in several different ways?

DF: Our evaluation is mostly anecdotal at this point as well, particularly due to our small class sizes. I can say that engagement is very high in courses in which we've added a VR / AR component, and I can give you one concrete example. We had a Molecular Mechanics of Life class, which has been run twice, and in both cases the faculty member gave the students the option for their end-of-semester project of completing a literature review, a video, or a VR / AR model to create a stand-alone learning environment. Most students chose the VR assignment, and those students ended up spending more time on the project, developed more creative projects that included voice activation, audio, and animation. The faculty member also offered students that participated in a VR / AR project to continue on in an independent study course to continue to refine their learning environment, and almost all students took advantage of this opportunity. It's clear that the virtual reality component significantly increased engagement in this project.