The Future of Work
Listening Session Presented by UIDP
at the University of Central Florida
September 24, 2019

Introduction

Technology is changing the way we work, and employers, employees and future graduates need to be prepared for the changes. This was the focus of the Future of Work listening session presented by University-Industry Demonstration Partnership (UIDP) and held at the University of Central Florida on Sept. 24, 2019.

UIDP is an organization of more than 130 universities, colleges, companies, nonprofit organizations, and national laboratories that works to maximize collaborations between university research and industry as well as help to increase U.S. competitiveness in science and innovation. It became an independent, nonprofit corporation in February 2015.

Keynote Address

After an introduction from Dr. Elizabeth Klonoff, vice president for research and dean of the College of Graduate Studies at UCF, and Dr. Debra Reinhart, associate VP for research and scholarship, Mary Czerwinski, a research manager with Microsoft began her keynote address on the topic *Using Technology for Health, Wellbeing and Empathy*. Czerwinski has more than 20 years of experience in the field of human-computer interaction.

She noted some of the trends of the future of work. These include people working with artificial intelligence and robots; an aging workforce that needs to be trained to work with future technologies; crowdsourcing out work; computer-assisted empirical staffing as well as fun work spaces where people can retreat to creative spaces, such as a treehouse outside.

She cautioned that as more people work with technology and as many children grow up today interacting almost exclusively with technology, that empathetic cues need to be built into technology so that people can learn from the cues that would be normally present in a face-to-face encounter.

Mary Czerwinski, a research manager with Microsoft, discusses the trends shaping the future of work

She talked about how Microsoft collects data on its workers while they work, including heart rate and facial expressions. She said people have peak times throughout the day, and suggested technology can anticipate lulls and suggest to people that they take a break or go outside. These breaks have shown to improve productivity more than when people work for extended periods of time with no breaks.

In studies of people working with an avatar, Czerwinski said some people liked it when it had a human face and some did not. She also noted two different conversational styles: highly involved and highly considerate. Highly involved conversationalists speak faster and are generally extroverts. Highly considerate conversationalists speak slower and may be more introverted. Once each type of conversationalist recognizes the "rules" the other one is playing by, their communication with one another can be improved.

Some questions from the audience were related to if negative emotion cues were considered for technology and if diversity of communicators were being considered. Czerwinski agreed both were important and noted that the emotional cues they implement are based on studies that have found seven emotional cues to be nearly universal across cultures.

Panel 1: Augmenting Human Performance

The next session was a panel of university and industry experts who discussed the topic Augmenting Human Performance.

The panel consisted of Roger Azevedo, a professor in UCF's Department of Learning Sciences and Educational Research and member of the Learning Science Cluster; Aman Behal, a professor in UCF's College of Engineering and Computer Science and a member of the Disabilities, Aging, and Technology Cluster; Bob Sottilare, science director with SoarTech; Isabel Nieto, a workforce development consultant with

Debra Reinhart, Associate VP for Research and Scholarship at UCF, introduces the Augmenting Human Performance panel.

Duke Energy; and David Yacht, principal scientist of human performance with Southwest Airlines.

Azevedo is an expert in self-regulated learning and the ways AI can help people become better learners. He said in the future, AI can support research and learning by suggesting to people different ways to analyze the materials they are working on.

David Yacht discussed training programs in Southwest Airlines. He said instead of segmenting out different levels of employees for training, such as keeping baggage handlers separate from other jobs, there's an effort to integrate the trainings so that everyone feels

empowered. They also have people who have taken the trainings become trainers themselves so they can help their colleagues stay up-to-date and feel empowered doing so.

Sottilare talked about the many different ways technology was changing industry, including remote healthcare, sensing in mining and drilling operations, and remote workplaces.

Nieto discussed how Duke Energy was using new technology. One of their success stories was using drones to string electrical wire across rough terrain when they were working to restore power back to Puerto Rico after Hurricane Maria. This would have a been a much more laborious, time consuming and potentially dangerous job if not for the use of the drones. It also was a way to help Puerto Ricans begin the process of recovery faster.

Nieto also mentioned her company uses virtual reality for training, in particular for jobs that require repetitive motion. Practicing these movements creates muscle memory and increases confidence in job performance. An example is training people on the best ways to climb. She said employees also like to do VR training to practice for tasks that they don't have to frequently do.

Behal is an expert in electrical engineering and robotics. He talked about how despite the advances in autonomous technology and robots, they are still a work in progress. He said robots have not been released in an uncaged, unstructured environment. Autonomous machines still depend on guidance and often a human remotely monitoring them or controlling them.

There were questions from the audience about ways to improve training and autonomous machine decision making. Azevedo suggested educators explain the best

strategies to learn material rather than just conveying information. For decision making, it was discussed that hard decisions may be difficult for computers.

Breakout 1: Augmenting Human Performance

In the Breakout Sessions based on the Augmenting Human Performance Panel, cybersecurity, changes in higher education, how can university and industry work together to address workforce of the future opportunities and challenges, and how will augmented reality and virtual reality be accessible to the general public, were discussed in rotating groups.

Some key takeaways related to cybersecurity were that trust in computers could be related to age or generation of the user and that some companies may be better stewards of users' private data than others. It was also noted that people may sometimes trade privacy for convenience of using an electronic service, at least until they have a negative experience.

Participants discuss augmenting human performance with technology during a breakout session.

For changes in higher education, it was discussed that a university degree is a good foundation but that universities should also offer certificates of skills. Students could also do customized work for corporate partners, and internships can be a way to learn from actual jobs and can help students clarify their interests.

For how can university and industry work together to address workforce of the future opportunities and challenges, it was suggested that more partnerships between universities

and industry, including student internships and joint hires, were needed. Also, it was noted that there should be a curriculum alignment with industry needs and that barriers to partnerships should be broken down. There is also a perception that higher education isn't relevant anymore.

For how will augmented reality and virtual reality be accessible to the general public, it was discussed that the widespread use of augmented reality and VR will depend on cost. It was also suggested that the more AR and VR are implemented into everyday lives, such as through entertainment, the more likely it will begin to appear in other places, such as the workplace. Also, not only the initial cost of the technology must be considered but also the cost of content development and maintenance.

Progress in Technology Research that Drives the Future of Work

During lunch, Brad Fenwick, Senior VP for Global Strategic Alliances at Elsevier, spoke about big data, including how "big" big data is and how it can be used to provide snapshots of university research performance and opportunities for collaboration and advancement. The amounts of data being processed are going to have to be thought of in terms of more data than there are stars in the sky. For a snapshot of UCF research, he showed that UCF is a leader in research in computer science, photonics, lasers and optics.

Panel 2: Building the Human-Technology Partnership

Panel 2 began after lunch and focused on Building the Human-Technology Partnership. The panel consisted of Jack Stubbs, director of UCF's Prototype Development and 3D Print Lab; Ron DeMara, a professor in UCF's Department of Electrical and Computer Engineering; Steven

Smith, advanced programs senior manager for Peraton; and James Pharmer, naval aviation systems command fellow and the principal scientist for the Human Systems Department at the Naval Air Warfare Center Training Systems Division.

DeMara said as a teacher he's seen his role change from less as someone imparting knowledge during class and more to one who can help refine knowledge, since technology has allowed students to learn much more on their own outside of the classroom. He said this can also allow for more discussion and active

Dr. Elizabeth Klonoff, vice president for research and dean of the College of Graduate Studies at UCF, asks a question during one of the Future of Work listening session discussions.

learning in the classroom, which improves student education.

Smith talked about how companies adopt new technology. He said if the new technology could cause risks or a loss of profits, then companies would be less likely to adopt them. For instance, some companies may not allow cameras inside their building due to proprietary concerns.

Stubbs discussed how his group works on projects such as customized medical devices for patients and prosthetics that can allow surgeons to examine a tricky surgery through a tangible model before attempting, or perhaps deciding not to attempt, a surgery. He said this is an example of technology not only helping people work faster, but also smarter.

Pharmer discussed the use of VR in warfare training and the need for new graduates and seasoned vets to be able to work together collaboratively.

Questions from the audience included if jobs, such as physician, will one day be replaced by computers and robots and the effects of technology on less developed countries. It was said that at least for now, humans still need to be in the loop in medicine. In less developed countries, it was said that the rate of adoption of new technology may not correlate with the perceived development of the country, as for instance, some less developed countries rapidly adopted cell phone technology.

After closing notes from UIDP president Anthony Boccanfuso, the listening session was adjourned.