Mixed Reality and its Future in Design Education

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In today's information age, we are witnessing the collision of social media, internet of things, artificial intelligence, big data, cloud computing, virtual-, augmented- and mixed - reality. This raises the question "How will designers be able to process relevant, large amounts of information with limited time in the future?"

Mixed Reality (MR) describes a reality that is augmented with various levels of overlaid digital information (Billinghurst, 2017). An enhanced MR environment might enable us to speed up the filtering of information, thus saving time that could be used to navigate through increasingly complex design projects. Moreover, with MR, people can collaborate in a 3D augmented space without the need to physically be in the same room, another dramatic time saver. Reality can be augmented with the use of a smartphone, tablet computer or a head mounted display (HMD), which is a wearable computer that allows hands free operation. The Microsoft HoloLens is a state of the art, untethered MR HMD device capable of scanning the physical layout of the user's environment, displaying three-dimensional digital content and recognizing gesture and voice commands.

As we know from the past, new technology will affect the design process. For example, the use of computer aided design (CAD) software was reserved for upper level coursework. Now, we are frequently seeing incoming freshman with CAD modeling skills gained in high school. When conducting a SU IID Tech Survey in our program, out of 19 participants, 57.9 % attended a CAD course in high school. Similarly, in the near future, MR devices are likely to become a fundamental feature in design education.

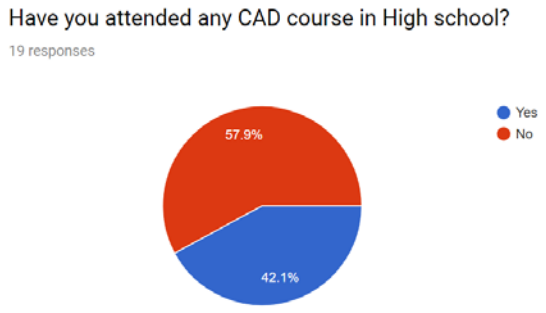

Figure 1: CAD Survey

When CAD was becoming more popular in design education in the 1990's, access to SGI workstations with Alias/Wavefront studio software was limited. Multiple students competed for few workstation

seats. At Syracuse University in the Industrial and Interaction design program, MR has been introduced to students in upper level courses. In striking similarity to CAD in the 1990's, students had to arrange access to just one HMD device, a Microsoft HoloLens. The advantage with the HoloLens, however, is its portability. As the market for HMD devices will become more competitive, the cost will presumably come down thus allowing access to multiple devices in the future.

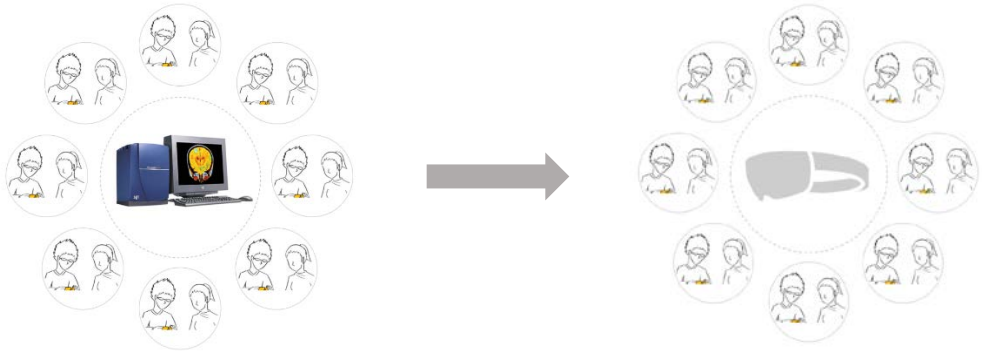

Figure 2: Tech scarcity: Enabling students access to high-end tech

To implement MR in a design studio course, a project based learning method was selected (Brown, 2010). Thirteen students were tasked to explore and identify a design opportunity around a specific theme in which mixed reality is a game changer. Embedding the MR topic in a design thinking process added value to the student learning. The project focused on three areas of exploration, each one framed by a central question:

1. How could mixed reality impact machinery solutions for industrial process automation and integration?
2. How could mixed reality improve the fuzzy front end of the design process?
3. How could mixed reality benefit the stakeholders of a Fire Department?

Figure 3: Students working with the HoloLens

One of the barriers when engaging in MR using the Microsoft HoloLens is a rather steep learning curve in regards to testing ideas on the device. Programing skills and a fluent use of the software Unity is required to create an app and install the program on the HoloLens. In a 15-week semester, this could

be an obstacle for design students, depending on the students' technical background. As an alternative, the students experimented with Thingworx, an MR authoring software that lowers the barrier since programming skills are not needed.

While interacting with the HoloLens and experiencing some app examples such as HoloTour, the students quickly grasped the current limitations and technical possibilities. Sketching ideas in sequences, creating comprehensive visualizations in Photoshop and short video clips proofed to be an effective pathway to communicate their ideas.

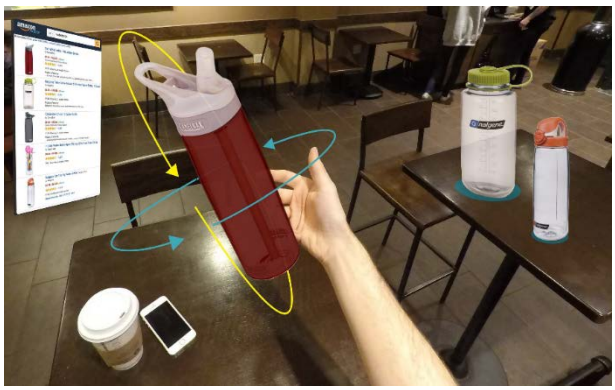

Figure 3: Future HoloLens scenario imagined in Photoshop

The 3D interaction is a critical component of the user experience in any MR project (Kruijff, 2017). The pervasiveness of traditional 2D interaction of computers, smart phones and tablets presents a challenge to the students. Although industrial design students practice the ability to design in 3D, extra steps should be taken to encourage the exploration of 3D interaction possibilities. The use of existing VR apps such as "tiltbrush" or "gravity sketch" supports the ideation process in three dimensional space.

At this time, integrating MR in design education makes sense in higher-level design studio courses. As the digitally native generation enters college age, their fluid handling of digital tools will support the use of MR technology in freshman and sophomore courses. For design educators it is important to be prepared for this transition and to support students in playfully working with digital content and tools.

References

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