THROUGH THE HOLOLENS

Experiencing the Creative, Communicative, and Collaborative Processes

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“Students in the digital age need to understand the potential of the materials and tools that they will be using in the future. They are very creative and I can imagine why Microsoft would be interested in what a young art student might bring to their new technology and so that seemed like a perfect partnership to us.”

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ABSTRACT
The spring of 2016 may well be remembered as that mystical moment when the concept of augmented reality crossed over into the collective consumer consciousness through the PokéStops and “Gyms” of Pokémon Go, a location-based game developed by Niantic.

For a select group of college students, that same period brought an unprecedented opportunity to create their own augmented reality experiences when the Microsoft HoloLens team approached the Design Department of the Cornish College of Arts, an accredited arts college located in the Pacific Northwest, with a unique and collaborative opportunity. The HoloLens team offered pre-release exposure to their mixed reality HoloLens technology and the creative opportunity for a select group of innovative student talent to generate unique, mixed reality experiences through design, dance, and theatrical performance.

This innovative collaboration resulted in the creation of two select groups of creative content – live performances recorded on a 360-degree soundstage and rendered as holographic, volumetric videos, as well as illustrative and animated work created with the use of 2D and 3D renderings produced for viewing through the HoloLens.

Jeff Brice, Chair of Design, and Robin Avni, Assistant Professor User Experience, supervised the mixed reality creative project. Both are full-time Cornish faculty with creative, research, and professional technology experience. The Microsoft team was led by Ben Porter, Director of Business Strategy for HoloLens.

This paper showcases the creative results of the Cornish and HoloLens collaboration and shares key learnings from the creative interaction between a large company and a small arts college.

AUTHOR KEY WORDS
Mixed reality; virtual reality; augmented reality; HoloLens; creativity; communication; illustration; dance; theater; ethnography; visual culture; education; arts.
“Cornish has a great reputation in the arts community for being cutting edge and pushing the envelope. We really wanted to see what they would do with this new medium.”

BEN PORTER
Director, Business Strategy at Microsoft

INTRODUCTION

Artists are atypical problem solvers and are naturally pre-disposed to the disruptive language of creative transformation as they instinctively explore, and comfortably experiment, at the margins of social conventions and technology. Given that these tacit and distinct qualities are embedded in arts education, Cornish College of the Arts felt uniquely qualified to answer a proposal in July 2015, issued by Microsoft Research, inviting academic institutions to apply to create new experiences for the HoloLens, a mixed reality product to be released by Microsoft in Spring 2016.

Cornish, an accredited arts college founded by Nellie Cornish in Seattle in 1914, is one of a few visual and performing art schools in the country providing top-tier educational curriculum to students who aspire to become practicing artists; preparing graduates to contribute to society as artists, citizens, and innovators.

The school has 760 undergraduate degree students enrolled in their multi-disciplinary arts program, with plans to grow enrollment to 1,200 students in the coming decade; they offer undergraduate baccalaureate degrees in the visual and performing arts; including Dance, Theater, Music, Performance Production, Art, Design, and Film + Media. The academic program was at that time managed by Dr. Moira Scott Payne, who was the Provost and Vice President of Academic Affairs.

The college has a rich history of innovative creativity counting luminaries such as dancer Martha Graham; the avant-garde choreographer Merce Cunningham; and American Master composer John Cage among their constituency. In 1952, Cage created and first performed his ground breaking 4’33” musical composition at Cornish. This piece was considered Cage’s most important achievement as it invited the audience to recognize and appreciate the environment as an aesthetic experience. “Cage gave musicians aesthetic permission, spiritual encouragement even, to go beyond the tonalities of standard instrumentation and engage with the infinite possibilities of sound.” (Hermes, 2000)

Given the school’s provenance, it was extremely relevant for Cornish to explore a modern-day environmental experience at the frontiers of technology and artistic expression through the HoloLens. Perhaps even more appropriate as the campus is located in the heart of the South Lake Union technology community of Amazon, Facebook HBO, and others; literally placing the humanity of the arts right in the middle of a STEM environment.

Fortunately, in retrospect, out of the huge volume of applicants for the five available grants, Cornish did not receive one of the Microsoft HoloLens Academic Research grants but rather was offered a different and more challenging option.
A Microsoft Proposal Followed by an Open Call

In December 2015, Microsoft approached the Design Department of the Cornish College of the Arts with an alternative collaborative opportunity for their students, one that involved the Microsoft HoloLens Product Team. The challenge: leverage the creative, problem-solving disposition of designers and creative artists, and encourage them to explore the artistic possibilities of mixed reality with pre-release exposure to their holographic technology — as well as technical support. Cornish accepted and engaged a select group of innovative student talent to generate unique, mixed reality experiences through design, dance, and theatrical performance. As a result, Cornish became a member of a select group of early HoloLens partners including NASA, Cleveland Clinic, Autodesk, and Trimble.

In the months that followed the Microsoft project proposal, members of the Cornish | Microsoft HoloLens Team worked directly with a juried group of Cornish students chosen from a multi-disciplinary “Open Call” to develop compelling content; over 25 submissions were reviewed by the team.

The process resulted in nine student projects with two select groups of creative content — performances to be recorded on the Microsoft soundstage for holographic viewing, and illustrative and animated work that would be created through the use of 2D and 3D renderings — all to be produced for viewing through the HoloLens.

The creative outcomes of the collaborations were showcased to industry, faculty, parents, and the community-at-large on April 28th, 29th and May 14th, 2016 through three public events held in conjunction with the Cornish College of the Arts BFA Showcase. Microsoft hosted the event which included transforming a large Cornish performance studio into a high-tech HoloLens viewing gallery with over 25 HoloLens headsets available for viewing of the individual projects at ten different stations; over 750 people attended the three events.

As part of the project, the Cornish Project Team used a combination of observational research methods to evaluate student creative behavior and explore learning curves and outcomes, and track new and emerging visual codes that might surface through the collaborative exchanges.

As a foundation for the research participating students were required to engage in interviews and written analysis highlighting their process and creative challenges, as well as exploring how the HoloLens impacts and influences their creative innovation. The Cornish Research Team worked with the Microsoft HoloLens Team to film/record/photograph student interactions, creative reviews, and brainstorming sessions; as well as engaging student filmmakers and photographers to assist in the documentation process. A website hosting the HoloLens projects was created on the Senior BFA website.
The Cornish HoloLens Project was supervised by Jeff Brice, Chair of Design, and Robin Avni, Assistant Professor User Experience; both full-time Cornish faculty with a depth of creative, research, and professional technology experience. The Microsoft team was led by Ben Porter, Director of Business Strategy for HoloLens.

A Crash Course in Realities

Trying to explain nascent technology has its challenges; attempting to understand a groundbreaking product like the HoloLens and how it differs from other virtual reality devices, is something else entirely.

Microsoft HoloLens is a mixed reality device where the user experiences both the computer-generated and the natural world as a hybrid construct. When wearing the headset, virtual objects are placed alongside actual physical objects to create a unified environment of physical and digitally created experiences. This mixed reality experience creates an experiential relationship as the lines between real and virtual begin to blur.

In contrast to the mixed reality environment, there are completely immersive virtual reality environments. The viewer wears goggles and visually enters a digitally manufactured world and is able to virtually move around within the fabricated world. Devices such as Samsung’s Oculus Rift and HTC Vive support these types of immersive experiences.

Augmented reality is another type of virtual experience that offers information and insight into the environment. These experiences access information from the web as the technology, i.e. mobile phone, layers the information on top of the user’s visual field while not interfering with the experience of the environment. Pokémon Go is a simple example of displaying data in the environment while the user is still fully engaged in the real world.

In the case of HoloLens, the novel interface has digitally produced, full-color virtual objects — holograms — that appear on lenses in the headset right in front of the viewer’s eyes. The user’s brain responds to the combined virtual/actual environment as a unified experience. Think Princess Leia in the original Star Wars.

For the Cornish students, the challenge was to create viable proposals while the HoloLens product itself was being developed. The technology and creative parameters were in a constant state of evolution as new development was being made on the engineering and software teams on a daily basis.

There were over 25 original proposals from students across a variety of creative disciplines including design, art, theater, and dance. The projects selected were based on several factors beginning with the quality of their overall concept coupled with the feasibility of executing the idea in a two-month timeframe and within the technical capabilities of the current iteration of the HoloLens device.
THE CORNISH PARTICIPANTS

All interested students submitted an abstract of their HoloLens idea, sketches/images, their bios, and portfolio of their previous work in their creative discipline. Each of the following student projects were vetted for creativity, novelty, and viability for producing within the tight project timeframe.
STRANGE WORLD by Majesta Vestal

Strange World is the story of a young character named Mint and her journey of personal growth and exploration through her odd, confusing, and curious world. The metaphorical tale takes the viewer through the five stages of grieving: denial, bargaining, sorrow, anger, and acceptance. Each represents a different obstacle for her to overcome as she grows up. The Strange World is designed to make viewers feel wonder again, even if it’s just for a moment, and experience a children’s picture book in a way that’s totally new and unexpected.

“This project positioned me really well to work in an environment where many agencies are currently as they are growing and expanding in this new technology. I feel like I have a lot of knowledge that I am bringing to my current company.”

CHALLENGES + TRIUMPHS:

Majesta’s piece was unique in its exhibition presentation as there was a physical cube that served as a back drop for viewing her narrative. The background for each scene was placed on a side of the cube, as the viewer walked around the table another scene of the story was revealed. This became one of Majesta’s biggest challenges: Maximizing a single texture map and scaling the holographic scenes to accurately match the physical tabletop box.
“The process started with what can we do with this new technology that we can’t do on the stage and that we can’t do with film. ...With new technology and new media come new effects and new ways to surprise the audience.”

Warren Haney, Nicholas Vogl, and Spencer Funk, all students from the Cornish Theater department, wanted to create a comical, dramatic performance involving three characters playing a simple game of keep away with a colorful ball. However, the game transitions in a series of short cuts where each new snippet displays a new set, or action by the actors. Each moment uses the ball as a fixed point while the action moves around it.

**CHALLENGES + TRIUMPHS:**

The Core’s theater background was instrumental in approaching the project and infusing their scene with new ways to think about the intersection of space and story. They brought a refreshing new perspective to the what others might see as the size restrictions of the sound stage, and worked hard to block and choreograph their story accordingly.
The is to take several animations from a virtual reality space and place them in a mixed reality space, where they could be scaled as moving art pieces sitting on a coffee table, pedestal, or stairway. The user can walk around each of them while viewing through the HoloLens.

“The experience has made me think more about interactivity and purposeful design. Creating things that are meant for this kind of environment.”

**CHALLENGES + TRIUMPHS:**

Nida had several animated sculptures that were possible candidates for the project; ultimately it was decided that four of the animations worked well together as they were animating positions of small spheres. The timing of the loops became an important consideration in the final piece. Nida provided the models intact and refined the color, scale and animations until they worked in unison. Nida also learned a new workflow that is more efficient for mobile-based rendering.
ELECTRIC LIQUID by Juju Kusanagi

“The most amazing thing that I saw was a woman dancing with my hologram. That was so sweet.”

JuJu is a Seattle-based visual artist who creates body-based conceptual art works. Born in Sydney, Australia, she spent her youth in Tokyo before moving to the United States. Her art practices and explorations include dance, music, film, photography, visual art, and illustration. A BFA graduate in Dance at Cornish College of the Arts, JuJu has augmented her education with independent studies in 3-D sculpture, visual art, technology, and multimedia arts.

Electric Liquid is part of a longer sequential movement, emerged from somatic and breathing exercises of JuJu’s personal body research. Through repetitive movements, she explores fulfillment of the breath and continuation of the rhythm.

CHALLENGES + TRIUMPHS:

Juju’s performance on the 360-sound stage, along with the other dancers, was restricted by an 8-foot circular filming area. For those used to freedom of movement in their performance this became a challenge they needed to manage deftly and gracefully. She only needed one take as she had choreographed a dance routine that took into account the restricted area. Juju was enchanted that for the first time, as a dancer, she could see herself from all angles.

Link to video
Link to download HoloLens
Scuff explores unique, wearable solutions for the B-boy. As the future of Breakin becomes more dynamic, so should the design of the clothing. Through research, interviews, and testing, Bobby works with the needs of the dance community balancing style, function, and culture. Scuff has experimented with solutions to make B-boys look good, feel good, increase performance, and protect them from impact so that they can stay healthy and dance longer. Scuff’s goal is to address the athleticism of the dance through contact points, impact, angle of movements, spin areas, flex of material, breathability, durability, and style.

CHALLENGES + TRIUMPHS:

Bobby’s performance on the 360-sound stage, along with the other dancers, was restricted by an 8-foot circular filming area. For those used to freedom of movement in their performance this became a challenge they needed to manage deftly and gracefully. It only took him a few takes to adapt his performance and successfully create a memorable HoloLens performance.
In high school, all Terri wanted to do was create art but she was told “art is OK for a hobby but you need a “real” job”. So, she found a “real” job; one she did not like. So, when she lost her job in 2010, after the tears, instead of being upset, she was happy. Terri doesn’t see life the same way she did back then. Her time at Cornish College of the Arts taught her skills and, now she sees the world differently because she embraces that she is an artist, an illustrator, and a designer.

The Windmills project is a unique adult coloring book that provides hours of stress relief, mindful calm, and fun, creative expression. For the HoloLens, the concept is to create a series of circle images from the coloring book and place as a hanging mobile twisting and turning in and around each other. If you want to feel like the clouds are parting and the sun is shining again, the first thing to do is unload your burdens. Here’s a strategy for doing this: In a world where stress and anxiety are the norm, break free with coloring books.

CHALLENGES + TRIUMPHS:

Terri is a beautiful illustrator and she creates intricate pen drawings and adult coloring books. However, she has no affinity for digital translation. Microsoft’s Melinda Rose and the HoloLens team translated the drawing by cutting apart several shapes and animating them to rotate inside each other. The addition of color helped to produce a dimensional aspect to the extruded lines.

Link to video
Link to download HoloLens
RISE by Erik Hall

Erik Hall is an interior designer currently living in a 100-year-old house in the heart of Seattle. His design work focuses on sustainability, upcycling, and improving the lives of people. Erik believes it is the responsibility of a designer to find the problems that exist in the world, and design solutions for them.

Upon graduation from Cornish, he transitioned to working at a design firm in Seattle, before ultimately moving abroad.

**Rise: An Adaptable Living Unit**, is a project that aims to find solutions for people living in impoverished coastal slums of Bangladesh, India. The area faces constant flooding, and monsoons and *Rise* seeks to develop a system that adapts to the flux of water levels and keeps its inhabitants safe and dry. *Rise* also aims to improve general living conditions for those living in slum communities by providing a living unit with proper plumbing, electricity, and sleeping components, all sustainable and self-sufficient within the unit.

“There wasn’t really a way for me to show the physical rise without the HoloLens. This is a whole new glimpse into what I was thinking... a whole new way to show people how the mechanism would actually work. Which is why I was so interested in using the HoloLens as a tool.”

**CHALLENGES + TRIUMPHS:**

Erik’s idea of houses along the coast that could rise and fall with water levels required some clever conversion of point-level animation to bone-based animation. The Microsoft HoloLens team helped to make this a very exciting piece with animated waves and a looping water level showed the rise and fall of the water. The dynamic waves created an unexpected detail to the final exhibition.
OPEN/BOX by Marcella Sweeney

Open/Box captures a re-construction of Marcella’s BFA solo Open/Door. It is a modernization of the classic music box, in which the traditional symbol of the ballerina inside the box is replaced by a modern dancer. This project unites long-standing custom with expansion of artistic boundaries through new creative mediums.

Music: “Song Without Words,” a classical guitar solo by John Williams
Choreography: Originally by Michele Miller, adapted by Marcella Sweeney

Marcella is a dancer and scholarship dance student. She apprenticed with Agieszka Laska Dancers in Portland, Oregon for two years, performing in two major works (Lamentation and Broken Flowers). Marcella studied trapeze and acrobatics for several years and has trained intensively in ballet, jazz, contemporary and modern dance. Her interests in the dance field include interdisciplinary collaboration and dance science.

Link to video
Link to download HoloLens

CHALLENGES + TRIUMPHS:

Marcella worked to adapt an existing performance piece to the 360-sound stage. As with the other dancers she was restricted by an 8-foot circular filming area. For those used to freedom of movement in their performance this became a challenge they needed to manage deftly and gracefully. She approached the challenge by using the motif of the music box ballerina to constrain her performance.
APPAREL SHOW by Natalia Montalvo, Yoojin Beag, and Ciprian Ortiz

The HoloLens captures highlighted the designs in a 360-degree fashion show and showcased the design work of several senior students and their studies in apparel design.

Models (left to right): Lauren Hall, Stavroula Tsantilas, Yoojin Beag, Ciprian Ortiz

Natalia is a graphic designer who focuses on product and packaging, corporate ID and apparel design.

Yoojin is a visual designer with a wide range of creative skills. Expressing strong simplicity in her design is one of her expertise. Yoojin is experienced in branding and identity, web design, object design, layout design, fashion, and typography.

Ciprian’s work is illustrative with themes that include race, sexuality, and gender binary issues.

Link to video
Link to download HoloLens
OBSERVATIONS

Art Students at the Cutting Edge of Technology

With the vetting of the student projects complete, it was necessary to get the participants up-to-speed on the HoloLens technology, both the potential as well as the technical limitations. These initial meetings were significant as they helped define the creative challenges as the student concepts evolved from initial ideas and sketches and into viable mixed reality works. The students had the opportunity to work directly with the Microsoft team as they considered additional opportunities and newly-understood parameters.

The overall Microsoft HoloLens team was composed of 3D artists, animators, product managers, Cornish faculty, and the Cornish student collaborators. Design Chair Jeff Brice and Assistant Professor Robin Avni divided tasks along their respective skills, Avni acting as program management and Brice acting as technical management. The team was responsible for creating and delivering the student work within a three-month timeframe to culminate in a HoloLens exhibition on the Cornish Campus produced by Microsoft and their events team. The student deadlines were further complicated by the fact the Cornish Design seniors were in the final phases of their year-long BFA capstone projects; Dance and Theater were in end-of-year critiques and performances.

It was very clear from the beginning there were two distinct type of creative content: performance art (dance, theatre, and apparel) that would be recorded on the Microsoft 360-degree Holographic soundstage; and illustrative and animated work that would be generated through the work of 2D and 3D renderings. In both content cases the collaboration between engineer, programmer, producer, modeler, faculty, and student was highly interactive.
Working on the 360-degree Holographic Sound Stage

The biggest challenge for the Cornish students performing on the soundstage was to successfully adapt their performances to work within the parameters of the capture technology. For example:

- The 360-degree sound stage had a cylindrical capture space, 8-feet in diameter and 8-feet tall. Movement can be captured from all angles but only within the designated capture space. For the dance concepts, Electric Liquid, Open/Box, and Scuff, the choreography was adapted to the space constraints; while the theatre performance of The Core used the prescribed capture space limitations as an opportunity to enhance their narrative by having the characters appear and disappear from the capture space while an object -- a ball -- remained within the capture space the entire time.

- It was necessary for all participants to keep a space between their bodies and the floor, their arms and their bodies, and to be aware, with more than one person in a shot, how the blocking appeared in 360-degree view, not just on one or two sides. Otherwise, their figures would blend with the floor and each other.

- While the preference is to capture a single person on the soundstage, the technology can simultaneously capture multiple people which The Core took advantage of in their performance of Keep Away.
• To help the students, Microsoft provided two professional make-up and hair stylists, as well as a costume stylist, to help achieve optimum holographic results.

Microsoft hosted an informational meeting on the sound stage with the students, allowing them to tour the set and discuss the execution of their proposed concepts. Then, all participants were assigned call times for the upcoming two days of filming. During the filming, there was a full crew on set to support the students including a producer, director, cameraperson, and various technical staff to produce a quick render of the captured footage to review quality. The Core needed an additional day of filming due to the complexity of their project and their inventive approach to the technology that literally turned a restraint into a feature.

Once the performances were captured, members of the studio team from Microsoft took over and rendered all the captures and prepared them for viewing in the HoloLens.

The Challenges of Translating 2D and 3D Renderings

The translation from the students’ original illustration and animation concepts to 3D virtual objects required a very different approach. In 3D modeling and animation there are different workflows for the different channels of distribution, video, VR, AR, MR, print, and gaming. Creating the projects in 3D software and translating the models into the specifics of a device-level rendering for the HoloLens required a workflow similar to the creation of game assets.

Add to the mix a pre-release device and these projects became a daunting task for the grant recipients. Given the tight deadlines for the project, students were technically mentored by Cornish Design Chair Jeff Brice and Melinda Rose, a design member of the Microsoft HoloLens team. Design Chair Brice also created an online tutorial video for the participating students. However, many of the students did not have the technical skills to produce the 3D model for translations to the HoloLens and the support of the Microsoft HoloLens design team was a critical component to the success of this project.

Those projects that were produced in 3D modeling software were uploaded into the devices and viewed using the 3D Viewer app. In late February 2016, the translations of the projects were created in 3D modeling software were mapped out for each person through interviews with Microsoft 3D artist Melinda Rose and Microsoft 3D animator Dedipya Laidlaw. Then Cornish Design Chair Jeff Brice and Rose worked together to close the technical gaps between student concepts and the new technology presented by the HoloLens.
COLLABORATIVE OUTCOMES

The Exhibit and the Experiences *Through the HoloLens*
“Art at its most significant is a distant early warning system that can always be relied on to tell the old culture what is beginning to happen.”

MARSHALL McLuhan
Prophet of the Electronic Age

Through the HoloLens Exhibit at Cornish

The culmination of the months of collaboration between students, faculty and Microsoft came on April 28th and 29th, 2016 with the opening of the Through the HoloLens installation in the Notion Building located on the main campus of Cornish. A professional events team from Microsoft, led by Executive Producer Jeff Lepine, transformed a small rehearsal studio into an interactive art gallery for the two nights which coincided with the opening of the BFA exhibitions of art, film, and design seniors. There were over 30 HoloLens devices onsite at Cornish requiring overnight security, gallery guides at each of the 10 HoloLens exhibits located in the gallery during viewing hours, and regulated access to the gallery by the Microsoft events team who managed to gracefully shepherd over 300 visitors through the HoloLens gallery.

Those security concerns, the need to accommodate a large group of participants, and the specific HoloLens requirements needed to enable the optimum viewing of the projects created many last-minute challenges from the need for 10 matching tables to last-minute space adjustments. Not surprisingly, these things ended up requiring Design Chair Brice to engage in additional negotiations with Cornish colleagues, IT, and other departments to move already scheduled classes and secure a dedicated network specifically for the HoloLens exhibit. Not to mention, several runs to a local big box store to acquire additional lighting!
In the end, the two-night show successfully highlighted the creative interaction between a large tech company and a small arts college, as well as how the engagement of a select group of innovative students could generate unique, mixed reality experiences through design, dance, and theatrical performance and, indeed, push creative boundaries with a nascent technology.

The Meshing of College + Corporate Culture

The HoloLens funding provided great resources for upgrading and expanding the Cornish’s hardware and software for digital practices.

However, some of the greatest takeaways from the engagement were the experience-based learnings of the students themselves, as well as the knowledge gained by both corporate and college culture when engaging in a large-scale project with an ambitious timeline.

The learning included the following:

- **Bridging the interpretation gap of academic vs. business deadlines and deliverables.** Key to success is having liaisons on each side (Microsoft and Cornish) who understand one another’s culture and can balance the push-and-pull of corporate needs and student needs. This includes items like email and communication protocols, the ambiguity inherent in a project working with pre-release technology, and knowing that much of the project will be figured out as the project progresses.

- **Finding the right campus partner for the corporation’s goals.** In the case of the HoloLens project the ability for Cornish, as a small arts college, to be nimble in getting things done than a larger academic institution enabled the project, and exhibition, to literary turn on a dime to accommodate venues, website design needs, as well as align student academic goals accordingly and to successfully leverage the benefit of cross-disciplinary creative interplay.

- **Acknowledging, utilizing, and respecting the skills each party brings to the collaborative project.** This includes assessing academic and technical proficiency on the student side with the corporation realizing the level of technical support required. In this case, Microsoft understood what Cornish could - and couldn’t – do technically and provided technical assistance accordingly to bridge the gap. On the flip side, Microsoft trusted the Cornish faculty to judge and accurately assess student talent, ability, passion, creativity and ultimately – project potential.

- **Exposing students to the professional environment can cause unexpected results; sometimes painful.** Students do not understand what a corporate deadline means and are much more comfortable with the concept of pulling it all together the night before individually rather than being part of a larger workflow and team product. Thus, one student dropped out, and another student was unable to meet her deadlines and was dropped from the project. All along the way, students are learning how a creative project gets managed in the real world. Even learning simple protocols like confirming receipt of an email becomes a critical part of learning about the collaboration process.

- **Remembering that they are students.** No matter how talented they may be, corporations need to remember that they are still dealing with students which means they need encouragement (to participate and to deliver), that they are balancing this project with their regular load of school assignments and papers, and that feeding them, as well as paying them with stipends, helps tremendously in keeping them engaged.
FUTURE DIRECTIONS

As we are quickly being pulled into the future by this series of nascent technologies, we see the Through the HoloLens project as the first phase of a larger, more extensive exploration into the intersection of art, technology, and communication. With HoloLens, we see technology breaking down the barriers between the virtual world and the physical world as artists blend these two realms into an aesthetic experience. The new environment of actual/virtual artistic creation habituates new perceptual patterns, generates new visual codes, and offers fresh ways to tell empathetic stories and narratives while creating shared experiences.

We are not alone in our perceptions of this technological adoption. A recent industry survey by Sketchfab.com on virtual and mixed realities yielded several interesting attitudes among its respondents. According to the survey:

- 53% of users believe virtual reality has potential, but not for everything, while 43% believe that virtual reality is in fact the future.
- Most of those taking the survey were more interested in virtual reality (64.4%) over augmented reality (35.6%).
- Almost 70% have not purchased a headset due to cost with 30% who believe the technology is not quite ready. Only 45% plan on buying a headset in the next year, indicating the coming of a tipping point in the next 2-3 years when content and low cost will create the conditions for mass adoption.

For artists and designers, these new forms of expression offer new challenges in creating the languages and symbols that will shape our future technologies. The evolution of these languages will be multi-modal as everyday experiences move from visually-centered interactions to encounters that include body-oriented experiences. We will engage in a more specific way with an emphasis on location-based
interfaces including the haptic quality of digital tools like Tilt Brush. Designers will be the leaders who create these new virtual, augmented, and mixed reality experiences.

Creative artists enjoy their existence at the chaotic boundary between the stable and the unstable, between the known and the unknown, the virtual and the actual, between the stratified past and the unfolding future. This mosaic of different forms of engagement will create environments that not only define who we are -- but more importantly who we are about to become.

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ABOUT THE AUTHORS

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Assistant Professor of User Experience at Cornish College of the Arts. Her research focuses on visual communication, social media, and user-centered creativity tools and technology. She recently presented Captured Moments: Defining a Communicative Framework for Social Photography at the ACM Creativity + Cognition Conference 2015 at the Glasgow School of Art in Glasgow, Scotland. In July 2016, she delivered the framework for this paper at the dmi Academic Design Management Conference at the Massachusetts College of Art and Design in Boston. Prior to Cornish, Avni has successfully managed award-winning design teams and high-profile projects at Microsoft.