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Introduction

The Mixed Reality Design Studio (Xr Studio) is an experimental educational initiative that incorporates virtual reality (VR), augmented reality (AR), and artificial intelligence (AI) tools into the design process of a 3rd-year, interdisciplinary studio consisting of architecture and interior design students. The Xr Studio approaches design problems from a technologically and physically blended process of design, with the understanding that the computer and the programs used can become an extension of ourselves, and we can leverage these tools to influence how we think about and create a design. The studio also challenges young designers to question the role of emerging technologies in the the design process, professional ethics, scale, proportion, and architectural representation while fostering a more immersive, collaborative, and interactive design experience.

The inaugural ten-week digital studio was born out of the COVID-19 pandemic, and challenged students to interact, design, and present entirely in virtual reality. This studio was designed to be inherently flexible, resilient, and evolving, which enables the course content to adapt to shifting needs and new collaborations. The convergence of a digital design studio met with the global pandemic underscored the importance of utilizing digital technologies to augment and adapt the way we work. The studio utilized VR software and physical equipment to simulate users' physical presence in multiple virtual environments, enabling them to interact with, construct, and critique their designs in an immersive digital environment. Although the utilization of VR was meant to develop into a hybrid mode of studio where we could all gather and work, it was not a completely distributed event; software limitations, access to hardware, and access to reliable Internet connections prevented the entire class from gathering collectively into one virtual space; instead, only a fraction of the students could gather in one space simultaneously, with the rest observing from their screens across the state. After exploring the pros and cons of the first year, it was apparent that students were better served in a studio that met in person, rather than one that met in virtual reality, as the technology currently exists.

In the following year, recognizing that much of the VR experience exists inside the interior environment, a more holistic project could be achieved by incorporating the interior design discipline into the studio, thus creating the Mixed Reality Studio (Xr Studio). The Xr Studio brought new challenges such as collaboration and teamwork combined with the introduction of the emerging technology of VR and AR. Understanding that there is currently little precedent for teaching students how to design in and for virtual and augmented reality, we found ourselves with an

unprecedented opportunity to re-think the traditional design studio.

In the third year of the Xr Studio, we began to explore AI as another way to augment and blend together digital processes with human experiences and interpretations of the built environment. The use of AI in the studio allows students to question not only the immersive experience of our bodies navigating the solid void and geometrical relationship of architecture but also to consider architectural environments at the perceptual and cultural levels.

Architectural Scale and Biometrics

Architectural representation has always relied on scale and proportion, with a strong connection to the human body's biometrics. Traditionally, architectural understanding relied heavily on physical models, mock-ups, sketches, and drawings, but the shift from a physical to a more digitally immersive world has had significant implications for our understanding of scale and its representation in architecture.

> The visual perception of architecture, as with any other visual perception, is a two-dimensional image mapped on the surface of our retina. [...] Creations of architecture are three-dimensional solid artifacts generated by the molding of space. Nevertheless, the final perception is a sequence of two-dimensional images that generate the identity of a certain architectural space. In the act of seeing we not only create an objective image of the external world but also bring our subjective background, coming as cultural and psychological impressions. (Bertol, 1997)

Our understanding of scale is ingrained in our bodily experiences and our interactions with physical objects in space. We use tools like scales and measuring tapes to quantify and represent scale, and we understand the relationship between scale and proportion as it relates back to our bodies and minds, the interpreters of form, space, and light. However, in a digital world, our understanding of scale may be more fluid and abstract, as we are no longer bound by the physical limitations of our bodies. With the increasing use of digital tools in academia and the profession, students may come to view the digital world as infinitely scalable or scaleless, which can create challenges for those who do not have a command of scale as it relates to the body or the built environment.

VR and AR technologies are increasingly being adopted in architectural and interior design practices, both in academic and professional settings. According to the 2020 AIA Firm Survey Report in 2019, 'only 9% of firms were using virtual reality for design/project services.' (Baker, n.d.)

These tools offer designers the ability to immerse themselves in digital environments and combine digital and analog processes for a more comprehensive design experience. As VR and AR technology continues to advance, they offer a new way to question the creation of space as well as offer clients or those outside of the AEC profession, a more approachable way to digest and/or interact with design concepts, and schemes, which has the ability to enhance the overall design process.

Xr Studio; Year II - A Journey to the Dinner Party

In the second year of the Xr Studio, students were divided into teams of 2 interior design and 2 architecture students. Each group was given a character from *Alice in Wonderland* as their client. Each character selected appeared in the novel and films. The character's backgrounds (or lack thereof) were the most important aspect when deciding who would be chosen – characters who had established homes or grounds were excluded from selection (Alice, Red Queen). Similarly, characters that only appeared in one or two of the media, or did not play a substantial role interacting with Alice, or whose fates were known, were also excluded (White Queen, The Mock Turtle, Jabberwocky). The list of clients was then allocated to the White Rabbit, the Mad Hatter, the Cheshire Cat, the Dodo Bird, and the Caterpillar. Each of the characters selected had enough backstory and idiosyncrasies to become a client with specific needs, wants, fears, ambitions, et cetera, for students to craft a strong narrative around.

Fig. 01. The Caterpillar's Dinner Party Building.
Source: 2022 Xr Studio

The teams then researched their individual "clients" by reading excerpts from the novel, watching the movies, and surrounding themselves in lore, while simultaneously investigating the character's background, and researching time periods from the original novel and the three film adaptations. This research enabled the teams to create an in-depth narrative from which to design. Analog mood boards and storyboards pulled key scenes for reference. Out of the large network of intricately linked scenes, historical events, and cultural trends, unique worlds began to emerge, formed around each character.

> Hence, designing the time in which the building exists requires understanding "time" as a history to be made, in which we as designers and as world-makers, must be active participants. (Castro, 2022)

The teams then expanded outside of the movies and novel to design a current-day dwelling, a space for a dinner party (separate from the dwelling), and portals that would transport characters from their dwelling to the book in 1865 and movies in 1951, 2010, and 2016. Equal to the narrative and time aspects of the project, the ability to manipulate scale and orientation with ease in virtual reality keyed into the design of the projects. As Alice grows and shrinks throughout the story, she eventually meets the Caterpillar at a robust 3 inches tall. The Caterpillar is well known for his sitting upon a mushroom, and the realization of the onlooker also being of similar height recalibrates the observer's perception of space. As you can see in (Fig. 1), the approach to Caterpillar's Dinner Party may not seem to deceive you at first, until you register the building as being roughly the height of the adjacent cattails.

The back and forth between the real "constraints" of the characters and the program with the fictitious environments in which they were placed created a duality of existence. The Dodo - purveyor of the nonsensical Caucus Race in which there are no rules, no directions, and everyone wins - seems like a slight character. However, through developing the narrative of the Dodo's history (both real and imagined) the dwelling and dinner party for the bird illustrate the idyllic conditions it once inhabited and its ultimate demise as a species living on a remote island. (Fig.2)

Fig. 02. The Dodo Bird's Dwelling and Dinner Party.

Source: 2022 Xr Studio

Xr Studio; Year II - Presentations

Basic guidelines and requirements consisted that each group must include a set of VR images or a walk-through, interactive AR drawings or QR code links (Fig.3), and physically printed boards. Beyond those few requirements, each group determined what they needed to tell the narrative they had crafted throughout the 10-week quarter. Including the required materials, each group displayed a variety of sketches, models, material samples, graphic design collateral, as well as costume design, and a movie trailer. This concluded with an exhibition that conveyed the conceptual and narrative goals of each group in a curated vignette.

Fig. 03. The Mad Hatter's Dwelling.
Source: 2022 Xr Studio

Xr Studio; Year III – Create Your Own Adventure

The inaugural year of the Xr Studio helped to uncover many lessons in the development of the class. Developing a detailed narrative for the "client" proved to be an important step in the process of design. First, it developed a deep understanding for whom they were designing. Secondly, it pushed students outside of their comfort zones and allowed them to open up to their team to play and explore, leading to more interesting projects. Lastly, it created a detailed storyline and "rulebook" for the teams to design from.

Collaboration between architecture and interior design proved to be beneficial to the students, the projects, and the programs. Students were forced to create spaces that were designed from the outside in as well as the inside out. Often students were required to redesign certain aspects of the building based on the decisions and actions of the counter-discipline. This led to a deeper appreciation for the allied disciplines that they will work within their future career.

Building upon knowledge assessed from the previous years, the next iteration of the Xr Studio brought new opportunities and challenges to aid in the development of

the class. With the advancements in AI and the introduction of the OpenAI's language model, ChatGPT, we embraced the new technology as a digital team member and a way for the students to engage the schematic project narrative and imagery sooner with less resistance. In Steven Pressfield's book, *The War of Art*, he discusses resistance as the metaphysical enemy of our conscious minds, constantly tempting humans to give up and do what is easy instead of pursuing the creative goals that make us nervous. "Most of us have two lives. The life we live, and the unlived life within us. Between the two stands Resistance." (Pressfield, 2012). We recognize that many students suffer from the fear of starting a new project, and began to explore if the use of AI would augment the creative process by acting as a collaborative partner for researching basic information and generating preliminary concept art and narratives.

Students were tasked with creating a short story using a combination of prompts given to each group. (Fig. 4) They then took portions of the generated story and began to enter them into image-based AI tools, such as Midjourney and Dall-E, to create preliminary landscapes and environments that would become the future site for the buildings they would develop during the remainder of the quarter.

Fig. 04. AI-Assisted Environment and Character Creation.
Source: 2023 Xr Studio

This exercise in AI led to the exploration of professional ethics and discussions about creation, ownership, and the role of AI in the design process, ultimately challenging students to navigate the complexities of integrating artificial intelligence into their creative workflows. The incorporation of AI in the design process sparked critical discussions among students regarding the ethical implications of using AI-

generated content. Questions of ownership, originality, and the impact of AI on the creative process emerged as central topics of debate. Students were expected to push the limits in order to see where AI stops and human creativity must interject.

> Simple activities adopt a mystical and cybernetic quality once the means of their operation are conducted via a silicon chip. Embedded in such apparently basic operational changes exists an essential paradigm shift, one that forces us to question our relationship with others, the structures that constitute our community, and indeed the nature of our existence in the world. (Pearce, 1995).

Students grappled with the notion of authorship in a world where AI tools can create stunning visuals in a matter of seconds. They questioned whether the use of AI-generated content diminished the value of their own creative contributions, and if relying on AI could ultimately stifle their growth as designers. Additionally, the students considered the broader implications of AI on the profession, as well as the potential for AI to disrupt traditional design practices. They discussed the importance of understanding the underlying algorithms and biases within AI systems and the responsibility of designers to ensure that AI is used ethically and effectively in the creation of built environments.

As AI continues to evolve and become more integrated into the design process, it is essential for educators to expose students to these emerging technologies and to foster critical discussions about their ethical and practical implications. By doing so, we can better prepare future designers for a world in which AI plays an increasingly prominent role in the creation of our built environments.

Conclusion

In an era where digital technologies are transforming the way we perceive and interact with the built environment, and in accordance with the conference theme "Envisioning Architectural Scales in the Analogue and Virtual Representation of Architecture", we have challenged students to rethink traditional notions of scale, representation, and storytelling. By integrating VR, AR, and AI tools into the design studio and using narratives as a catalyst for creative thinking, educators can empower students to develop innovative solutions that transcend the boundaries of conventional architectural design.

By employing narratives as a central component of the design problem, students are encouraged to harness the power of storytelling and familiar contexts to inspire creative digital thinking processes. Extracting ideas from their written narratives, students are pushed to think beyond traditional design methodologies and create new strategies tailored to the unique requirements of both the analog and digital worlds.

The fantastical and surreal aspects of the narratives provide students with a platform to test the limits of what is achievable in virtual or augmented reality environments. By venturing into the realm of the extraordinary, students can challenge conventional notions of space, scale, and proportion, investigating new

ways of manipulating and representing these fundamental design elements in both analog and virtual contexts.

As students immerse themselves in these digital environments, they gain a deeper understanding of how to create compelling and engaging experiences that push the boundaries of traditional architectural design. Experimenting with impossible geometries, non-Euclidean spaces, and other-worldly aesthetics that defy the constraints of the physical world fosters a sense of wonder and curiosity that fuels their creative endeavors.

Incorporating VR, AR, and AI technologies into the design studio paves the way for a new paradigm in architectural education that embraces both analog and virtual worlds. By harnessing these cutting-edge tools, educators can empower students to develop a diverse set of skills and a more expansive understanding of design possibilities.

These new approaches prepare students to be adaptable and versatile designers, capable of tackling the unique challenges that will arise as technology continues to evolve and shape the design landscape. By nurturing a mindset that embraces experimentation, risk-taking, and continuous learning, we can cultivate the next generation of architects who will push the boundaries of what is possible in the ever-evolving world of analog and virtual architectural representation.

Bibliography

Baker, K. e. a., n.d. 2020 AIA Firm Survey. *Polygraph, 101.*

Bertol, D., 1997. *Designing Digital Spaces.* New York: John Wiley & Sons, Inc..

Castro, E., 2022. The Digital Archive. Virtual Aesthetics in Architecture,, pp. 187-190.

Pearce, M., 1995. From URB to BIT. *Architectural Design,* Issue Architects in Cyberspace, p. 7.

Pressfield, S., 2012. *The War of Art; Break Through the Blocks and Win Your Inner Creative Battles.* s.l.:Black Irish Entertainment LLC.