6 Building Student Capacity and Disciplinary Identity in an Immersive Media Course at a Small Liberal Arts College

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	Columbia College Chicago—Private Small Liberal Arts College
Course title	Immersive Environments I
Course description	A 100-level course examining historical and contemporary uses of immersive media. Students generate various work using augmented reality, virtual reality, and 360-video technologies. They explore 21st century alternative modes of spectatorship, particularly immersive and interactive ways of experiencing visual spectacle.
Format	Face-to-face, 3-hour lectures, once a week
Enrollment	18
Context	The course ran at Columbia College Chicago, a private small liberal arts college with an M2 rating under the Carnegie System that enrolls 6,500 undergraduates across three schools.
Source, origin, purpose of VR	Over three years, I expanded two upper-level classes on eXtended Reality (XR) into an Immersive Media Bachelor of Arts. As part of this curricular work, the administration asked me to develop an introductory survey class for first-year students on immersive media.

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Objectives	The motivations for this course were straightforward. First, the course gave students a basic understanding of the immersive media space. This motivation meant producing a survey-level course for first-year students that could be accessible to multiple disciplines across the college. Since the course was part of a new degree program, accessibility went together with enrolling as many students as possible. The hope was that enrolled students would join the new major so that it would grow. The learning outcomes centered around gaining introductory experience with XR theory, design, and development skills to facilitate that process.

Introduction

I began a new faculty role at Columbia College Chicago in the Fall of 2019, just before the onset of the COVID-19 pandemic. The college leadership tasked me to create and implement an Immersive Media Bachelor of Arts program. The institution had run a series of loosely designed immersive media courses, but there was little structure in place and the curriculum shifted with each new instructor. It was my job to formalize the courses and make them accessible to students across campus.

Immersive media is a rapidly evolving multidisciplinary field that intersects the areas of computer science, visual arts, design, and storytelling. This field is defined by the development and application of technology and techniques designed to immerse users in digital or simulated environments, providing an enhanced or completely new perceptual experience of reality. Developing a curriculum for this kind of an emerging medium and discipline with measurable learning outcomes is challenging (Bernardes et al., 2020; Çamcı & Hamilton, 2020). Unlike established disciplines, immersive media does not work under a governing body that accredits these outcomes, which are also not formalized in industry. Further, obstacles to learning—material, social, cultural, or otherwise—regularly emerge in the classroom. My first two years developing the program presented challenges related to student capacity, privacy, accessibility, and inclusion. These ethical concerns touched and influenced every aspect of the final course development and implementation. This chapter provides examples of these types of ethical concerns and describes ways in which I built the course learning outcomes around the goal of addressing them.

Part One: Designing the Course

Honoring Identity

After two years of development, in 2021 I was able to begin teaching the first course, a 100-level foundational survey course for the new program, Immersive Environments I. The course was designed to be open to students across campus regardless of level or major. This open enrollment policy, established by the department, aligned with my belief that augmented, mixed, and virtual reality—collectively eXtended Reality (XR)—experiences must be built and developed by a plurality of diverse voices and identities if immersive media is to be an equitable and inclusive space. Inviting the entire campus to take the course created that opportunity. It signaled that students were welcome and invited to learn. That said, such openness came with challenges.

The first challenge pertained to what Kwame Appiah (2010) calls an ethics of identity. Students enrolled in the course did not share a set of core skills associated with a singular department. For example, first-year theater students sat alongside senior game design students. I needed to build a space where the students could respect the skills each individual brought to the course. It was critical that I demonstrated respect for each student's disciplinary identity and taught their class members to do the same.

Appiah argues that individuality is a cornerstone of one's well-being (Appiah, 2010). How a student chooses to direct their studies and how they practice these studies informs their identity as a practitioner. This deliberation and selection process is an exercise in their autonomy. Appiah reminds us that "developing the *capacity for autonomy* is necessary for human well-being." My course needed to integrate students' varied experiences and traditions to respect this autonomy and their chosen disciplinary identities. Respecting the ethics of identity could be baked directly into the first learning outcome:

Outcome One: Develop a Historical Perspective and Understand the Developmental Process of Immersive Media

Respecting and Cultivating Autonomy

Beyond respecting individual contributors' identities in a general way, my course needed to provide students with a strong understanding of the emerging field to help them create effective deliverables. Understanding

the multidisciplinary nature of immersive media is critical to designing compelling XR experiences. While some historians may mark the start of this media history in the 1960s, it stretches back centuries to classical Rome and the immersive frescoes developed during that period. Understanding the multiple historical media threads, from panoramic painting and magic lanterns to the first phone AR games, provides students with the context they need to grow and shape the emerging discipline. Further, demonstrating how the fine arts, theater, engineering, programming, and the perceptual sciences inform contemporary immersive media makes space for multiple disciplinary identities.

Students were encouraged to utilize the situated knowledge drawn from their identities to inform their work in class. Often, this meant augmenting their skillsets or integrating them into XR's iterative design and development cycle. At times, demonstrating to students the value of their practical skills was necessary. The class needed to discuss how they applied those skills as part of an immersive media practice that was either self-directed or negotiated with a group of peers. Again, the goal here was to build capacity within the students to do this work while also maintaining an ethics of autonomy. This capacity building was intrinsic to the second learning outcome:

Outcome Two: Construct Multifaceted Artistic Samples and Exercises Using Best Practice and Artist-led Techniques

Building Personal Capacity through Collaboration

Columbia College Chicago is an arts college, and production is a crucial curriculum component. Producing immersive media experiences takes a fair amount of training and practice. There is a barrier to entry connected to technical literacy. Many students do not come to a 100-level class with that literacy. Accordingly, I assigned students to begin their work to create VR experiences using drag-and-drop creative suites such as Adobe Aero and Mozilla Hubs. These two tools are familiar to many media students because they resemble Adobe Photoshop and Roblox. This familiarity also supported students' capacity. Through their understanding of an interface, students could measure where they were in their production process and appreciate what they needed to do to complete an assignment. As expected, how students exercised their autonomy impacted how well they did in the course. Occasionally, challenges

concerning production were too complex for students to surmount. Students who reached out to their peers for assistance capably did finish and achieve their assignments. Those who did not often struggled.

Addressing Accessibility

However, these struggles were not solely related to work ethic or familiarity with tools. Accessibility to the VR headsets and the capacity to experience VR generally also presented ethical challenges. For example, students with visual impairments could not wear VR headsets for long. There are several reasons for this accessibility challenge. First, a lack of foveated-rendering—rendering the clearest image where the user is looking—creates eye strain. As human beings, we do not perceive our world with 100 percent clarity. Instead, we see clearest where we are looking; everything else is blurred so we can focus on the subject of our gaze. This natural mode of seeing is not rendered in parallel for contemporary consumer VR; everything is rendered at the same clarity. Subsequently, it takes more mental energy to perceive and process images in VR. Second, VR's ideal of 6-Degrees-of-Freedom movement, wherein the user can use their natural locomotion and the full capabilities of their body to interact with the virtual experience, does not extend to students with limited mobility. Experiences may require students to lift their hands above their heads or to use controllers in a particular way. This movement can be an excruciating physical challenge for disabled students. Generally, there is a lack of accessibility technologies that integrate with VR experiences. However, groups like Microsoft, Samsung, HTC, Meta, and Unity are working to address the issue.

Considering Material and Economic Concerns

Outside of these accessibility issues, there are issues related to material and economic concerns that challenge students' participation. For example, at the time of the course, Columbia College Chicago did not have a laptop policy. As a result, students came to the course with a wide variety of computers. Some students did not have a laptop they could bring to the course. Others lacked access to an XR-capable desktop at home. Additionally, students brought their mobile devices, primarily cell phones, to the class and thought they could use those for immersive media work. This lack of standardization caused issues when it came

to installing mobile apps on their phones or software on their laptops. Some students did not have a powerful enough phone or laptop to run the creative tools for immersive media. Additionally, students with limited home space found they had trouble capably producing, testing, and implementing VR work. Students living in the dorms had a smaller play space than the recommended six-feet-by-six-feet area. This lack of space-constrained, quite literally, their design thinking. And while Columbia was generous enough to purchase enough VR headsets for students in the course to use at home, some students did not feel safe traveling with this equipment in Chicago. To protect the students and equipment, staff purchased smaller hard cases that could be put in a backpack or put the hardware in Dunkin Donuts shopping bags, which are ubiquitous in Chicago and do not draw attention. These kinds of concerns might not be obvious to a typical faculty member but were critical for me to consider as I designed this course for my students.

Creating an Equitable Learning Space

Students who could not actively participate in technical tutorials and assignments intended to build capacity fell behind, as the material was scaffolded. For example, 360-filmmaking helps students understand how a skybox works in Unity. Similarly, learning the fundamentals of web development helped students appreciate WebXR. These different and overlapping technologies can overwhelm new students. Further, these technologies are constantly changing. The sheer volume of tools and changes obfuscates entry into the immersive media space. Making awareness of these tools into a learning outcome was meant to help in building capacity. This reality led to another course outcome:

Outcome Three: Recognize the Complex and Multifaceted Toolset Available to the Immersive Media Practitioner and Design Artwork as Required

Teaching Tools to Support Intellectual Agility

Students in a course like this must realize that immersive media is just emerging; it is not established like traditional media disciplines. As a result, there are a diverse number of tools, techniques, and media

grammars that are consistently evolving and changing. The course is designed to encourage students to seek out the latest developments and design strategies developed in industry and academia and to report and reflect on the newest tool, engine, and experience releases in an early module. In the course, I presented three separate tools to students: Adobe Premiere and Insta360 cameras, to learn 360 filmmaking and editing; Mozilla Hubs and Ready Player Me, to learn how to devise multiuser WebXR environments; and Adobe Aero, to experiment with AR design.

Literacy in these creative suites was uneven. Some students had significant experience using software in the Adobe Creative Suite. Others had never opened the tools before. I provided support so students could access the necessary production tools and offered scaffolding outside the classroom to train them. Tutors were on hand in the department. However, many students did not take advantage of them when access was provided.

Seeking out help and guidance is critical in an emerging space. Due to the number of tools, processes, and different protocols promoted in industry it is easy to get frustrated during the development process. Being intransigent in the face of an ambiguous design and development environment does not help students find solutions. For example, when encountering bugs in Adobe Aero development suite students would give up on their projects instead of finding workarounds. While working within Mozilla Hubs, students sometimes struggled to build upon the affordances of templates, instead sticking rigidly to tutorial videos. Accordingly, I encouraged students to seek out help and inspiration when needed as part of the broader curriculum. In an emerging media space, this kind of cooperative learning is critical. All the same, it was frustrating to the students who expected clear-cut and direct answers.

This stubbornness was exacerbated by technical limitations and issues with students' workstations. The college provided many VR-ready machines and a lab where students could work outside of class. All the same, students resisted installing the required software on their devices. Some stated they had no room on their hard drives and could not do the work. Others said they did not have access to the labs or equipment. Of course, most of this runs the usual gamut of undergraduate responses to the challenges of college-level work. However, some of it was unique to an immersive media class where creative suites and software often require the latest technologies to run well and where experimentation can lead to ambiguity. Critically,

the disciplinary identity of an immersive media professional, at this moment, requires a capacity to move between shifting media suites and practices.

Creating an Equitable and Inclusive History

The previous three learning outcomes intersect with ethical issues around disciplinary identity, autonomy, and accessibility. For the students to act autonomously, they needed to recognize their capacity with immersive media and nourish it. As an emerging field, Immersive Media is still writing its history and canonizing its pioneers and foundational artifacts. While there is a general moral obligation to write this history to grow the field, there is a more crucial moral obligation to write an equitable and inclusive history. Previous media histories have needed to be revised in recent years to include marginalized voices and people (Willems, 2021). With our contemporary awareness and obligation to write a just history, Immersive Media as a field can and should promote and canonize creators, scholars, and practitioners representing a plurality of identities. This inclusion does more than recognize an ethics of identity and autonomy. It valorizes all people who have contributed to the space. This work was present in the following outcome:

Outcome Four: Analyze and Interpret Core Practitioners of Immersive Media Design

The Immersive Environments I course sits in a department focused on game design and development. The demographics of the department and the field within which is it situated skew male. The course presented a broad and diverse range of practitioners to encourage the students to expand their thinking and elevate diversity, equity, and inclusion principles in the curriculum. One module focused entirely on VR in the 1990s, during which time women primarily led the way in exploring VR media practices (Laurel et al., 1994; Morie, 1994; Davies & Harrison, 1996). As immersive media matures as a discipline, the opportunity to write an inclusive history of the media presents itself. This opportunity allows immersive media historians to write a more equitable and inclusive history that places marginalized voices and peoples on the same foundation as those in power. Including these

perspectives and voices is an ethical approach to the emerging history and the media's contemporary practices. Their inclusion can empower and inspire marginalized students to participate in the field's growth.

Recognizing Students' Ethical Reservations and Privacy Concerns

Despite the ways in which ethical frameworks shaped the design of the course, students brought personal ethical concerns to their participation in the XR space. Before 2016, students generally were not antagonistic to Meta (Facebook). However, after that election year and the subsequent disclosures, class action lawsuits, data manipulation, and unethical activities of the company, students' perceptions of Meta changed dramatically. Many refuse to create Facebook, Instagram, or other related platform accounts (Dwoksin & Lerman, 2022). This resistance, which is understandable, can make it challenging to use Meta's XR services, which include Spark AR, their AR creative suite, and their Oculus headsets. Since Meta runs a closed ecosystem, they require students to have an account with them to access their platforms. Some students preferred to create anonymous accounts, fearing Meta would exploit their data and privacy (Butler, 2021; Baker, 2021; Lang, 2020). Others used a friend's existing account to access the platforms. And while in the summer of 2022, Meta allowed users to create an account separate from their social media accounts (Meta, 2022; Facebook, 2020), several of my new students are still wary of the company, their intentions, and how Meta might exploit their data.

Further, as Meta adds gaze-tracking to their platforms and undoubtedly uses that data, there are privacy concerns related to exploitation (Buck & McDonnell, 2022). Students have an expectation of privacy using devices in their homes. However, the capacity of devices to track surroundings and how users interact in virtual spaces generates a wealth of personal and spatial data (Gómez Paloma et al., 2022). Meta and similar companies can use this information to target individual students but also departments with increasingly focused advertisements for goods and services. Further, as this data can be used to identify a user, there are increasing concerns about securing this data and maintaining our students' privacy. Any breach could result in unintended consequences for students, professors, and administrators.

This concern with spatial privacy is underscored by a recent Ohio court case where room scanning for remote testing was declared

unconstitutional (Calabrese, 2022). Room scanning is a practice that developed during the pandemic for remote testing. Students would be asked to scan their testing space with their camera on so the instructor could check to make sure they were not potentially acting with academic dishonesty. The Ohio judge deemed that the practice was an invasion of privacy and a violation of the Fourth Amendment's protection against unlawful searches in private homes. Such a legal decision should give educators pause when using VR considering the amount of data that the new headsets can generate about someone's personal space. At the very least, it should encourage educators and institutions to only pursue headsets developed by VR companies that uphold strong privacy protections.

With each passing year, I have seen the antagonism toward Meta among students grow. Their stance is political: they do not want to give Meta more power over their lives. In a strategic move, HTC, creators of the Vive headsets, has positioned itself as a company that promotes a privacy-first approach to XR. Their open ecosystem makes it more attractive to educators and students. Their platforms, hardware, and experiences are also more accessible and can be accessed using a Steam account. Many students are familiar with Steam and use the platform for gaming and entertainment.

A vital component of the ethics of autonomy, directly related to capacity, is the student's ability to deliberate and draw a rational conclusion. While most of the class focused on technical production, it also requires students to reflect on what they had learned either through written or recorded analysis. The process of analysis helps students synthesize their knowledge and encourages them to enter the marketplace of ideas surrounding immersive media with a critical eye. The final learning outcome outlines this desire.

Outcome Five: Articulate a Written and Visual Response to Core Immersive Media Practices and Performance

Promoting Effective Communication

Educating students to expand their writing and analytical skills is essential for an educator. Unfortunately, many first-year students who enrolled in the course did not have much experience with formal writing and composition. As there is no writing pre-requisite for the course, students' skill levels varied dramatically. To produce constructive reflections, students

first needed to understand the design principles that make an excellent immersive experience. I presented this material in the first third of the course. This was critical to honoring a student's desire to develop a disciplinary identity regarding immersive media. To be considered an XR practitioners, students needed to express in writing an authentic and reflective critique of immersive media practices. I asked the students to analyze and reflect on a piece to assess their understanding of these principles. This approach meant teaching them how to write a thesis, construct an argument, and compose a formal essay. Even then, many students wrote simple reviews instead of solid analytical pieces.

Part Two: Implementation of XR in the Course

The section above describes the conceptual framework within which I created the course and associated learning objectives. Below I will provide additional details about the students' experiences in the class.

The Student Experience

Throughout this chapter, I have used the term XR to encompass all immersive media, from augmented reality (AR) to virtual reality (VR). I designed the introductory course described above with the Reality-virtuality Continuum in mind. The continuum recognizes that each immersive medium is on a spectrum of immersion users can move through (Milgram & Fumio, 1994). Students taking this course moved from learning about how immersion works to introductions to cognitive psychology and principles of perception. They learned about AR and mixed reality (MR). From there, they moved into 360-filmmaking and then to fully immersive VR. As I introduced new technologies, ethical concerns regarding representation, accessibility, inclusion, privacy, and data exploitation emerged.

Since the course focused on using AR and VR, students discussed several interrelated topics listed in Table 6.1. The first third of the class encouraged students to become comfortable with the general theories, ideas, and practices associated with immersive media. Specifically, Module 3: Speculative Media and Designing XR Prototypes helped to spark students' design thinking. It introduced students to speculative media and how we can design potential or plausible future artifacts to ask how XR might be used by future audiences (Dunne & Raby, 2013; Auger, 2013; Ashraf, 2020). Students watched a series of science fiction

Table 6.1 Modules in the Immersive Environments I course

Module	*Topic*
1	Introduction to XR
2	History of Immersive Media
3	Speculative Media and Designing XR Prototypes
4	Immersive Cinema and Animation
5	Immersive Media Storytelling
6	Immersive Journalism
7	Accessibility and WebXR
8	XR and Activism
9	Dark XR and Identity
10	Interaction Design for AR
11	User Experience Design for AR
12	Image Tracking for AR
13	XR in Industry Beyond Gaming and Entertainment
14	Final Exam Review

shows and movies for inspiration. They then created XR prototypes for a plausible and potential future use case.

The middle modules (six through nine) addressed issues of ethics, identity, politics, and access related to immersive media. During this course phase, students engaged with XR topics through the lens of science, technology, and society studies. Issues identified in the field perennially intersect the emerging media space, where the release of new technologies outstrips our understanding of ethical uses. An example is the ways in which Meta engages in gatekeeping and the distribution of experiences. The company has high standards and is known to put experiences through the gauntlet before accepting them to the Oculus Store. Ensuring diverse, equitable, and inclusive representation in XR spaces should be critical to all educators. To this end, encouraging students to explore these issues through experience design is one way forward. In the course, students considered their place and XR's place in their community of Chicago. The goal of this section was to encourage them to lead in the emerging media space and to shape it to be more democratic and inclusive.

Assessing Learning Outcomes

I assessed learning outcomes through weekly assignments, three significant projects, three quizzes, and a final exam. The variety of tools was intentional. First, as this course was situated in an arts

college, there was a premium placed on making artifacts. Second, since these were mostly first-year students, I wanted to prepare them for a rigorous and active education by giving them multiple ways to demonstrate their knowledge. Lastly, I felt that some material was better suited for a quiz or an exam, such as history, than other material, such as design guidelines, that students should implement in a project.

A vital component of the course was enabling students to produce and discuss immersive experiences. To assess that capacity in their midterm project I gave students a design problem and asked them to compose a design brief for an immersive experience. Using material from the lectures and homework, students needed to substantiate their use of immersive media, why the media was the appropriate solution, and produce a visual mockup of their idea. The first seven weeks of the course prepared them to do this work. In addition, the students were given practice brief assignments to help them excel on the midterm. The project encouraged students to put the lessons they learned from class into practice through a meaningful real-world scenario. Further, the production of mockups encouraged them to push their developing design skills in new ways based on conceptual work. Generally, the students found this midterm challenging but valuable. A rubric revised to highlight the graded aspects of VR is included as Appendix A.

Learning and Assessment Challenges

The course included different kinds of assignments that required unique assessment styles. For example, students were encouraged to work on one or two in-class assignments during each studio session. These ranged from design ideation exercises to peer reviews of developed artifacts. More significant assignments were project-based. I took students through an agile development process to iterate on their designs and artifacts. However, since this was an entry-level course, I focused on students gaining basic literacy, design, and development skills for XR, demonstrating that they could use the basics to construct prototypes. In many ways, the class was about experimentation and pushing into new creative areas with emerging technology. Assessing that goal was a challenge. Third, I discussed the necessity of access and inclusivity regarding VR headsets and the capacity to experience

VR works. I connected these challenges to ethical concerns regarding immersive media broadly speaking.

There are a corresponding number of challenges to XR design and development that make equitable assessment difficult. Some of these challenges are related to the previously discussed issues related to media literacy, material access, and space access. Other challenges relate to the ever-evolving standards pursued by academics and industry professionals. For example, in the summer of 2022, Oculus updated its firmware for the Quest, invalidating the use of Long Term Support (LTS) versions of Unity. Certificate Programs, such as New York University's AR/VR Development course in which I also teach, had to shift their curriculum to meet the new requirements in the middle of the term. Students struggled through the transition capably enough, but assessments were delayed. Programs with established curricula for VR development in Unity had to revise lessons and videos over the summer to prepare for the Fall 2022 semester. These shifting requirements, processes, and methods mean that instructors must assume a flexible and dynamic role in assessment.

With this in mind, I developed rubrics that focused on specific design and development outcomes for the project-based work. Rubrics, like the one for the midterm depicted in Appendix A, accounted for the various aspects of XR development. They addressed how well students were designing for immersion and sense of presence while at the same time protecting users' safety. Further, the rubrics encouraged students to consider accessibility as part of their projects. As previously mentioned, this is a very active area of research and development for XR. The rubrics did not focus on the students' process of implementing or developing their solutions. They instead focused on completion. I hoped that the students would experiment more if they were not constrained to specific methodologies. However, it became clear that students continued to produce only to the rubric's standards. There was no experimentation or striving to create more compelling work.

This lack of experimentation, in both process and final artifacts, might have been connected to students' lack of confidence in their technical capacity to produce XR materials. However, challenges of access and technology hurdles did not make learning easy. As discussed, discovering one's capacity to do this, related to their disciplinary identity, was central to a learning outcome and student success in the course. Taking creative risks requires confidence, which may have been lacking

for some students. Admittedly, I approached this problem with an ineffective strategy. I sought to list more requirements in rubrics and grade with more rigor. The result was that students experimented even less and sought only to meet the rubric requirements. Upon reflection, the course covered too much material—design and development to theory and ethics—simply too much. Building capacity in the different technologies and tools related to design theories of Human-Computer Interaction (HCI) was piecemeal. As a result, constructive efforts were spread too thin. Indeed, while students learned a lot about XR, my greatest disappointment was the failure to develop their capacity to take creative risks. In the end, the adage, "less is more," rings true for teaching emerging media.

Part Three: The Ethical Challenges of Teaching and Using Immersive Media in the Classroom

Throughout this chapter, I have connected ethical issues directly to learning outcomes. The first ethical issue discussed was student capacity and respecting student autonomy regarding disciplinary identity. Students came to the course from all over campus with different backgrounds. There was a moral obligation to respect those disciplinary identities by integrating their methods into the emerging media practice of XR development. Second, I discussed the ethics of participation related to media literacy. Without a shared sense of capacity or ability to create XR, students sometimes struggled to connect the skills they brought to the class with the expected work.

This struggle was connected to the third ethical concern, accessibility. Accessibility for students in this course was related to equipment capable of running or developing XR experiences and their ability to engage with XR experiences as a user. The equipment needed to design, develop, and run XR experiences can be expensive. So, too, are the experiences themselves. This puts some low-income students at a disadvantage. In terms of accessibility from a user perspective, students with visual, locomotion, touch, and auditory disabilities—as well as any musculoskeletal challenges—will also be at a disadvantage. VR and immersive media practitioners are beginning to address these challenges. In the meantime, without

accommodations, these students will need to overcome more significant obstacles than their peers.

The fourth ethical issue addressed was inclusion. Students without access to physical space or who had issues with hardware were limited in their inclusion in various activities. Inclusion also manifests in the emerging field's development of course curriculum and its nascent historography. There is a moral obligation to include diverse voices representing a plurality of practitioners in the history of immersive media. Presenting these diverse practitioners in the classroom allows students to identify their success with leaders in the field.

Privacy is a fifth ethical issue not directly associated with learning outcomes. As previously mentioned, Meta's platform, which I used in the course, raises some interrelated privacy concerns (Swaak, 2022). Since students used their accounts with the college-owned headsets, their information was consistently at risk. Students were encouraged to reset and wipe their headsets before returning them to the department to mitigate this risk. Student-workers were encouraged to do the same with returned headsets. As the course instructor, I often checked to ensure this was happening. Unfortunately, it was not. Students did not follow the prescribed standard operating procedure. This vulnerability potentially has FERPA (Family Educational Rights and Privacy Act) privacy issues associated with it.

Implementing immersive media in a course that teaches students VR design and development skills raises several interrelated ethical concerns. Teaching the medium while using it allows instructors to highlight those concerns for students in real time. However, these concerns need to also be communicated to the large corporations and businesses building the technologies. Groups like the XR Safety Initiative are beginning to hold these groups accountable. However, a concerted effort on behalf of practitioners, educators, and researchers on ethics is needed as industry rushes haphazardly toward their idea of the metaverse. Capacity needs to be built in communities on all sides of the digital divide, rural and urban. Accessibility for all people should be protected and safeguarded so that a diverse community of voices can join in the emerging XR space. And all who wish to participate should be included, their efforts and victories inscribed in the growing history of the media. There is no better place to do this work than in the classroom.

Appendix A

Midterm rubric Criteria	Ratings				Points
XR technologies					
XR technologies are discussed in detail with how they will be used. Discuss the system, how it is meant to work, and how it will be designed.	20 pts Explicit use and detailed explanation	19 to 15 pts Slightly unclear use or unclear explanation	14 to 10 pts Unclear use with little or no explanation	9 to 0 pts No discussion of use or no explanation	20 pts
XR language					
Language from the lectures is used in the brief. Further, the language is explained so that a person unfamiliar with the technologies can understand them.	20 pts Precise use and detailed explanation	19 to 15 pts Potentially unclear use or inaccurate explanation	14 to 10 pts Inaccurate use or explanation	10 to 0 pts No use or explanation	20 pts
Be sure to discuss: Immersion Sense of presence Embodied cognition Spatial cognition Spatial user experience Spatial interface					
XR System Impact					

Discuss how your XR intervention will impact the broader community. Address ethical concerns related to accessibility, inclusion, diversity, and equity. **Be sure to discuss**: Your users The space and place your XR experience will be	20 to 16 pts Deep consideration is given to ethical concerns. A solution has been proposed.	16 to 12 pts Consideration is given to the ethical concerns, but they are not clearly explained. An impractical solution is suggested.	12 to 8 pts Little consideration is given to the ethical concerns, which are not clearly explained. No solution is suggested.	8 to 0 pts Little to no considerations and no solutions.	20 pts
Design brief must-haves The brief contains all the must-haves as discussed in the assignment.	20 to 16 pts Missing none to one must-have item	15 to 10 pts Missing two to three must-have items	10 to 5 pts Missing three plus must-have items	4 to 0 pts No must-have items	20 pts
Visual mockups or storyboards At least three images representing the XR experience are included, and they represent original thought, are annotated, and showcase functions.	20 to 14 pts Images are clear, annotated, and showcase functions. However, points may be lost for lack of clarity.	13 to 10 pts Images are not well designed and are missing functions or are not annotated.	9 to 0 pts No Marks and unclear images.	20 pts	
Total points: 100					

References

Appiah, K. A. (2010). *The ethics of identity*. Princeton University Press.

Ashraf, A. (2020). An uneasy terrain: An immersive and speculative research-creation. *The Ontario College of Art and Design University*. http://openresearch.ocadu.ca/id/eprint/3054/1/Ashraf_Amreen_2020_MDES_DigitalFutures_THESIS.pdf

Auger, J. (2013). Speculative design: Crafting the speculation. *Digital Creativity*, *24*(1), 11–35. https://doi.org/10.1080/14626268.2013.767276

Baker, H. (2021). *Facebook login, user data and privacy on meta quest headsets*. UploadVR. https://uploadvr.com/facebook-login-privacy-data-quest-2/

Bernardes, S., Howard, A., Walker, A., Mendki, A., Bhanderi, D., Guest, A., Sorrells, R., Nercessian, P., Dooley, C., Le, L. Naidu, I., & Madden, M. (2020, December). Immersive and experiential learning based on multi-technology integration: Bringing UAVs, augmented reality and virtual reality into the classroom. In *AGU Fall Meeting Abstracts* (Vol. 2020, pp. ED008–ED0007).

Buck, L., & McDonnell, R. (2022). Security and privacy in the metaverse: The threat of the digital human. *Association for Computing Machinery (ACM) Conference on Human Factors in Computing Systems*.

Butler, S. (2021). How to create a throwaway Facebook account for Oculus Quest. *How-To-Geek*. www.howtogeek.com/765034/how-to-create-a-throwaway-facebook-account-for-oculus-quest/

Calabrese, J. P. (2022). Opinion and order on Ogletree v. Cleveland State University. In *United States District Court Northern District of Ohio Eastern Division* (pp. 1–24).

Çamcı, A., & Hamilton, R. (2020). Audio-first VR: New perspectives on musical experiences in virtual environments. *Journal of New Music Research*, *49*(1), 1–7.

Dunne, A., & Raby, F. (2013). *Speculative everything. Design, fiction and social dreaming*. MIT Press. http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:Speculative+Everything#2

Dwoksin, E., & Lerman, R. (2022). Facebook loses users for first time in history. *The Washington Post*. www.washingtonpost.com/technology/2022/02/02/facebook-earnings-meta/

Facebook. (2020). Facebook Accounts on Oculus. *Oculus Blog*. www.oculus.com/blog/facebook-accounts-on-oculus/

Lang, B. (2020). Facebook promised Oculus users would never need a Facebook account. *Road to VR*. www.roadtovr.com/oculus-guarantee-promise-facebook-log-in/

Gómez Paloma, M., Ramírez Santiago, A., García Seco, G., Casanova, R., MacKenzie, D., & Tucker, C. (2022). Ethics in the use of geospatial information in the Americas. *Technology in Society*, *69*, 101964. https://doi.org/10.1016/J.TECHSOC.2022.101964

Meta. (2022). Getting started with Meta accounts. *Oculus Blog*. www.oculus.com/blog/getting-started-with-meta-accounts/?utm_source=www.google.com&utm_medium=oculusredirect

Milgram, P., & Fumio, K. (1994). Taxonomy of mixed reality visual displays. *IEICE Transactions on Information and Systems*, *E77-D*(12), 1321–1329. https://doi.org/10.1.1.102.4646

Swaak, T. (2022). What colleges' contracts for "Metaversities" leave out. *The Chronicle of Higher Education*. www.chronicle.com/article/will-virtual-reality-metaversities-risk-students-data-privacy-we-asked-for-contracts-to-find-out

Willems, W. (2021). Unearthing bundles of baffling silences: The entangled and racialized global histories of media and media studies. *History of Media Studies*, *1*. https://doi.org/10.32376/d895a0ea.52801916