DIALOGUE
The Interdisciplinary Journal of Popular Culture and Pedagogy

Peril and Promise: Student Experiences of Virtual Reality and Implications for Inclusive Social Justice Pedagogy

Michelle VanNatta
Dominican University
River Forest, Illinois, United States
mvannatta@dom.edu

ABSTRACT

Virtual reality (VR) is a fast-evolving technology rapidly being integrated into education and training in multiple sectors of society. As the use of VR spreads, it is important to critically analyze both its role in effective pedagogies and how students experience it. Virtual reality has extraordinary promise for deeply engaging students, and it also poses particular challenges for equitable and effective teaching of diverse students. This paper discusses students' responses to a VR exercise and examines some of the complexities VR presents around racial justice, gender equity, and economic fairness. Virtual reality technology may be less effective and less comfortable for some types of bodies compared to others. In addition, the content of VR videos and the use of the technology to experience entering spaces that one could not otherwise access must be handled with sensitivity to power differences and social hierarchies. Finally, the potential anonymity and shifts in norms in moving into virtual interactions must be carefully addressed by instructors in order to create productive learning spaces and reduce potentially harmful or toxic interactions. This analysis focuses on teaching in the field of criminology and draws from experience exploring VR with several criminology classes, but is applicable across disciplines. Best practices involve first assessing if virtual reality is truly the best way to teach specific material and if so, using backwards design and effective teaching strategies, considering the accessibility and risks of the technology for students of different genders, races, abilities, and experiences, and carefully reviewing technology set-ups and content in order to use the technology safely and to the best advantage of students.

Keywords: virtual reality, educational technology, diversity, social justice pedagogy, inclusive teaching

Virtual reality (VR) is a fast-evolving technology that is being integrated into many different sectors of US society, including gaming, medicine and healthcare, entertainment, the physical sciences, psychotherapy, education and training, and the criminal legal system, among others. There has been rapid growth in collections of 360-degree videos that can be a rich source of teaching material. This technology is a quickly expanding facet of popular culture that is often highly engaging for students, and many educators are interested in incorporating virtual reality into their pedagogy.

Like all teaching tools, VR presents particular challenges for effective, equitable, and inclusive teaching. This paper considers some of the research literature on risks and benefits associated with VR technology that are relevant for classroom use, examining some of the value and challenges VR poses for teaching diverse students in terms of racial justice, gender equity, and economic fairness. The paper also discusses the experiences reported by students using VR for a class assignment. Though the analysis draws from experience exploring a pilot VR exercise with several criminology classes, the majority of the issues addressed are relevant for a range of disciplines in the social sciences, humanities, STEM, and other fields.

Most students reported in a survey that the class VR exercise was extremely engaging and helpful to their learning, with many noting that the exercise helped them better understand others' experiences. At the same time, some students experienced negative physical effects from their VR use, some were concerned that engagement with the technology could overshadow focus on course content, and some commented that they had feelings of guilt or sadness after viewing a particular VR video.

This paper will discuss recent research concerning the promise and also the risks of incorporating VR into the classroom. Next, the paper will summarize student survey responses about their experiences with a VR exercise in several criminology courses. Finally, the article concludes with both concerns and recommendations that the literature and pilot exercise suggest about the use of this technology for college classrooms.

ENGAGING THE BODY FOR EFFECTIVE PEDAGOGY

Students can often learn best when their attention is captured by content and teaching techniques that connect to their whole selves, potentially including intellect, emotions, and the body. In his work on body pedagogics, Shilling (2007, 2017, 2018) asserts that "*physical* experience is vital to thought and learning" (2017, p. 1209). The body can be engaged with movement and with in-person human interaction. This is commonly attempted through in-class discussions with instructors and other students, creative projects, internships, games, scavenger hunts, or exercises such as "gallery walks" that have students move around their classroom commenting on articles or images posted throughout the room.

Although we might be tempted to think of virtual reality as a cerebral experience, virtual reality is fundamentally an embodied experience (Czub & Janeta, 2021; Kilteni & Groten, 2012; Tham et al. 2018). Immersive VR involves vision and hearing, and sometimes smell, temperature, movement, and proprioception. More research is needed to clarify how physical engagement with VR affects different bodies and to understand what issues VR poses for education in a society that allocates different privileges and values based on race, ethnicity, gender, body size, normative body and cognitive abilities, and other sociophysical factors.

Inclusive teaching methods that maximize learning for all students are a crucial part of effective pedagogy (Clayton-Pedersen & Clayton-Pedersen, 2007). The University of Michigan Online Teaching resource explains: "Inclusive teaching involves deliberately cultivating a learning environment where all students are treated equitably, have equal access to learning, and feel valued and supported in their learning. Such teaching attends to social identities and seeks to change the ways systemic inequities shape dynamics in teaching-learning spaces, affect individuals' experiences of those spaces, and influence course and curriculum

design" (Center for Research on Learning and Teaching, n.d.). Inclusive teaching is beneficial to all students in its commitment to using multiple methods of delivering content and assessing learning, as well as promoting an atmosphere of respect for learners and meeting students' learning needs. From this foundation, new technologies incorporated into the classroom need to be accessible to students with different identities, abilities, experiences, backgrounds, and perspectives. This means considering issues of race, ethnicity, class, gender, sexuality, ability, language, religion, immigration status, and other social identities and hierarchies in the use of classroom technology. Professors can best reach students when honoring diversity in determining which voices to center in the classroom, using multiple methods to deliver content and assess learning, and planning carefully to optimally implement educational technologies.

Virtual reality-based lessons can strongly motivate students and can assist in perspective-taking and full-body engagement. At the same time, VR can risk thwarting efforts for inclusive teaching in multiple ways, raising issues of racial justice, gender equity, and unequal access based on economic resources and physical ability. The paper will address each of these issues, along with ideas about moves toward equity and inclusion in the use of this technology.

DEFINING VIRTUAL REALITY

There is no universally accepted definition of virtual reality, but the term usually refers to a range of computer-generated, three-dimensional environments that users can interact with to different degrees. In 1996, Steve Bryson called VR a "new interface paradigm that uses computers and human-computer interfaces to create the effect of a three- dimensional world in which the user interacts directly with virtual objects (62). In 1999, Frederick Brooks defined VR simply as "any in which the user is effectively immersed in a responsive virtual world" (16).

There are many different forms of VR emerging. Most often, visual and audio elements are included, and users can observe and interact with the space with the use of a headset with earphones and goggles in any room that allows safe movement. Increasingly, other sensory inputs are included and may include temperature, motion, pressure, and smell. Gloves may be used to transmit sensation to the hands, and full suits may include inputs throughout the body. Dedicated rooms and caves are now the primary venues for some systems. Many setups are designed for specific gaming consoles. Some virtual environments are designed for single users, while others can involve interacting with avatars of other users. Prices vary accordingly.

This paper focuses on moderately priced immersive virtual reality options that were available in 2019. The technology and prices are changing so rapidly that it is not particularly useful to offer specifics on VR systems here, but educators seeking options may wish to consult with their disciplinary organizations, trusted technology magazines, and their university's educational technology specialists. The next section will delve into some of the reasons that instructors may indeed want to consider incorporating virtual reality into their pedagogy.

THE PROMISE OF VIRTUAL REALITY IN TRAINING AND ENGAGED SOCIAL JUSTICE TEACHING

A search for virtual reality in an academic database turns up not only all kinds of results in computer sciences, but burgeoning use in a wide range of fields. For example, Dawson, Levy, and Lyons (2011) posit: "virtual reality and 3D technology might be useful in establishing new discourses in archaeological interpretation, as well as assisting in the exploration, construction, and maintenance of cultural identities through knowledge repatriation" (387). Gasperin, Zanirati, and Cavazzola (2018) found that first year surgical residents could build up to the skill level of second year residents using virtual reality training for laparoscopic

gallbladder removal techniques. Higher education, professional development, and community training are all making use of VR, including police training (Fields, 2006; Reyes, n.d.), therapy and education for prisoners (Trahan, 2019), empathy-building and community education (Tsoupikova et al. 2017; Stuart, 2016), and diversity training (Lee, 2014).

It is useful for professors in liberal arts and social sciences to help prepare their students to navigate the complex technologies that graduates may encounter in their professional lives. While many professors speak of their students as "digital natives" and assume that students are experts in the technologies surrounding them, in reality, professors may overestimate students' expertise in truly understanding contemporary technologies (Murray and Perez, 2014). Professors can enhance students' intellectual and pre-professional development by helping them wrestle with the ethical, practical, and social issues raised by emerging technologies. Instructors can help prepare students to consider the benefits and limits of particular technology and to make decisions about its use.

There are many different studies arguing that carefully designed virtual reality experiences can potentially be used to advance student learning and to enhance social justice-oriented pedagogies. For example, Farmer and Maister (2017) argue that specific forms of virtual reality experiences which have users take on aspects of others' identities in virtual spaces can help users to build empathy and reduce prejudice, as measured by instruments such as implicit bias testing. Mateu, Lasala, and Alaman (2014) examined an interactive mixed reality world called "virtual touch" that allows roleplaying and problem-solving. They looked at the benefits of virtual touch for inclusive education at a high school level. Their review is enthusiastic about the inclusive education potential of virtual touch for helping immigrant high school students learn Catalan language and culture. The assessment they provide is promising, but gives very little discussion of students' subjective perspectives and the best practices for implementing this type of program for true inclusivity. Diaz-Lopez, Tarango, and Contreras (2019) explore the inclusive educational promise of VR for archives and digital libraries, asserting that VR can be used to expand access to information and facilitate citizen science. Petrunina et al. (2020) comment that VR can be useful in promoting cognitive development for students with disabilities such as musculoskeletal disorders. Kavanagh et al. (2017) give a systematic review of VR in education and conclude that the most common use of VR was to "increase the intrinsic motivation of students" (p. 85).

While much research shows strong promise for VR in areas of social justice and inclusive teaching practices, VR must be employed with care and attention to specific factors in order to achieve its promise. The next section will consider some of the research findings about potential risks and pitfalls in the use of VR.

PERILS OF VIRTUAL REALITY IN UNIVERSITY CLASSES

Although virtual reality can provide significant educational benefits, there are a variety of risks and concerns with adapting VR for classroom use. Some key issues include the potential of a VR experience to involve: physical and sensory discomfort, negative cognitive impacts, trauma and difficult emotional reactions, lack of fit for particular bodies, lack of appropriate space or assistance to use the equipment, risk of assault or harmful interactions, and reinforcement of hierarchies of race, gender, and other social identities. These factors could exclude or intensely harm some students with marginalized identities, while more privileged students may find the same VR assignment to be fun or to bolster their sense of power and knowledge. Each of these factors will be considered in turn.

Physical Effects and Gender in Virtual Reality

Virtual reality use can provide a rich and engaging learning environment for users, but it carries the risk of certain kinds of physical harm. First, VR systems require disconnection from one's real physical surroundings and can involve repetitive, awkward movements that could lead to accident or injury (Penumudi et al. 2020).

Users of VR can also be vulnerable to a condition specific to computer applications called cybersickness. Symptoms can include "nausea, vomiting, eye fatigue, dizziness, [and] ataxia… related to the conflict between different body sensory systems" (Baniasadi, Ayyoubzadeh, and Mohammadzadeh 2020, p. 5). Some studies have shown these reactions to be extremely prevalent with certain types of virtual reality. One study found in their survey of participants that in a 15 - 60-minute exposure, "more than 80% of participants experienced nausea, oculomotor disturbances, and/or disorientation" (Stanney et al. 2003, p. 504), with the disorientation sometimes persisting more than a day. Almost ten percent of participants in that study quit early, while the authors noted that around 1% experienced an "emetic response."

Of particular concern for inclusive teaching is the finding that women may be more likely than men to experience sickness with currently available VR technologies. For example, Dobie et al. (2001) believe that there are biological differences in susceptibility to motion sickness that do not have to do with previous exposure to the technology nor to differences in reporting between men and women. A 2017 study specifically of men and women playing games on the VR system *Oculus Rift* found no significant differences in side effects for men and women in one game, but dramatically higher rates of motion sickness for women compared to men in another game (Munafo, Diedrick, and Stoffregen). The higher rates of motion sickness apparently correlated with gendered differences in body sway patterns (ibid). Stanney, Fidopiastis, and Foster (2020) argue that some differences in men's and women's susceptibility to cybersickness stem from headsets being designed to fit men better than women. When headsets were better adapted to accommodate women's interpupillary distance and not just to fit the average interpupillary distances of men, gender differences in cybersickness dropped significantly.

Trauma, Oppression, and Virtual Reality

Virtual reality also proves to be a double-edged sword in its psychological impact. For example, while VR can be used to treat post-traumatic stress disorder (Kothgassner et al. 2019; Loucks et al. 2019; Gerardi et al. 2010; Difede et al. 2006), it can also trigger flashbacks and anxiety in some situations. There is the potential for deep and disturbing effects on the psyche that impact different groups in different ways that are not yet fully explored and understood.

One research group concluded that individuals can be strongly affected by the nature of the avatars made available to users in virtual spaces. They found that women who saw their own faces on highly sexualized avatars in virtual space subsequently self-objectified more and agreed more with rape myths in a questionnaire than did women who had the opportunity to operate in virtual space with more neutral avatars (Fox et al. 2015).

Nakamura, in her powerful 2020 article "Feeling Good about Feeling Bad: Virtuous Virtual Reality and the Automation of Racial Empathy," raises the issue that people who occupy different positions in social hierarchies are bound to experience VRs differently. For example, Nakamura describes how a VR which places viewers in a position to observe the murder of Trayvon Martin appears to have been perceived as an interesting consciousness raising opportunity for many white viewers, while it was intensely traumatic for many Black viewers.

Nakamura writes that while VR content companies advertise themselves as offering unique opportunities to build understanding, "VR about victimized people has much in common with earlier forms such as literature, photography, and film, all of which use representations of suffering to produce feelings of immersion, identification, and empathy for those bodies that are not ours (Gaines, 2017)" (53). Referring to the VR depicting the murder of Trayvon Martin, Nakamura comments that many white people have difficulty believing Black teenagers' accounts of being brutalized by police, and instead feel the need to witness or "experience" some aspect of police violence themselves within VR before feeling distress about the problem or taking the issue seriously.

Nakamura argues that VR creates a sort of automated racial empathy that stops short of encouraging any kind of action toward transforming material conditions of inequality, writing that "the invasion of personal and private space that documentary VR titles 'for good' create is a spurious or 'toxic empathy' that enables white viewers to feel that they have experienced authentic empathy for these others, and this digitally mediated compassion is problematically represented in multiple media texts as itself a form of political activism" (47).

Harmful Behavior in Virtual Reality

Some analysts have raised concerns about how VR environments are vulnerable to particular forms of crime, including identity theft (Lake, 2020) and sexual aggression (Hansen, 2019). There is a concern that interacting in a virtual space can include a sense of anomie, anonymity, and exemption from the everyday rules of social interaction that could enhance the risk of harassment or abuse of others. Various such cases have been reported and some individuals and groups are working on developing strategies to reduce the risk of mistreatment in these spaces (see, for example, Hansen, 2019; Lemley and Volokh, 2018; and Madary and Metzinger, 2016).

Virtual Reality and Memory

Some have also raised the issue of how use of virtual reality may interact with memory and create confusion for users between "real" memory and memories of virtual reality. Already in 2009, Segovia and Bailenson at Stanford were finding that elementary school children had trouble discerning whether they had experienced something in VR or in real life. Although there have been various proposals for the use of virtual reality in treating psychiatric disorders and dementia (e.g. Kim, Pang, and Kim, 2019), this potential for users to confuse VR with real world events could make the use of the technology especially problematic for those with disturbances in perception, memory, and cognitive processing.

Pilot Exercise Exploring Use of Virtual Reality in Undergraduate Classes

The following section will discuss the exploration of virtual reality in several undergraduate criminology and sociology classes at Dominican University in Illinois. In keeping with findings in the literature, this pilot exercise found both potential risks and potential rewards in a trial of VR. The main questions guiding this pilot test with virtual reality were: How do students experience virtual reality in the context of a class exercise and what do they take away from viewing short VR videos related to class topics? Different elements of this question were examined with a short survey administered to students intended to address the following: How well can a short, immersive virtual reality exercise with moderate-cost equipment contribute to learning? What kinds of physical, emotional, or other effects do students experience when using virtual reality? Could virtual reality be useful for enhancing empathy-building or perspective-taking in college students? What kinds of technical or logistical issues might arise with the use of VR for a class exercise?

VR and Course Learning Goals. The VRs were selected to assist with goals related to understanding diversity and inequality in the criminal legal system for the courses Law & Society, Crime & Social Justice, and International and Comparative Criminology. All classes were assigned to view two short VR videos available freely online: "Clouds Over Sidra" and "On Blindness."

Law & Society has a learning goal that "Students will build capacity in critical assessment of diverse approaches to criminalization, adjudication, punishment, incapacitation, and maintenance of social order. Students will be able to articulate issues around implementing a fair legal system in a society with communities with diverse values, experiences, and identities." Crime and Social Justice has a learning goal that "Students will be able to articulate the impact of diversity issues and social inequality based on race, class, gender, sexual identity, national origin, ability and health, age, and religion on the US criminal legal system." International and Comparative Criminology has a goal "to assess strengths and weaknesses of different criminal legal systems on multiple dimensions, including efficiency, fairness, public safety, and human rights."

After the viewing, some courses connected to "On Blindness" by discussing questions about how blindness might impact interactions with police, testifying in court after being violently victimized, participating on a jury, serving as a witness in court, or being in jail or prison. Course discussions around "Clouds Over Sidra" addressed factors such as why there is controversy in the US around refugee issues, different views of refugees, ideas about the "cultural defense" to criminal charges and how the US should handle legal cases involving refugees who come from legal systems that are very different from that of the US, and whether culture and personal experience should be a factor in assigning guilt or giving a sentence.

Sample. Dominican is a small, private liberal arts university with an enrollment of about 2100 students and approximately fifty different undergraduate majors. Many students enroll just after high school and are between eighteen and twenty-four years old. Many students also enroll as transfers from community colleges. Most students live off campus and commute. The school is a Hispanic Serving Institution and has a student/faculty ratio of 11:1. Many students speak Spanish or Polish as a first language and a significant number of students are first generation college students.

Method. Virtual reality videos were assigned in several classes in an attempt to learn about students' responses to the technology. Working with a limited budget, the school provided a small grant to purchase a Samsung Galaxy cellphone and Samsung Gear headset, which use audio and visual inputs. This setup allowed students to use 360 videos that are freely available online.

Dominican's Media Center created a supervised space for students to use the headset and move freely with minimal risk of bumping into walls or other objects. A google sheet allowed students to coordinate their schedules with the library staff. The staff member oriented the students to the equipment and assisted them throughout their use, which typically had a duration of ten to twenty minutes each.

An alternative assignment worth the same credit was made available for students whose schedules made it difficult to get to the Media Center or who were not able or willing to view and respond to the VR for any reason.

Data Collection. After viewing, students were instructed to fill out anonymous electronic Qualtrics surveys reflecting on their experiences. About forty-six students responded. The survey asked students fourteen open-ended questions about factors such as their overall experience; what they learned; what aspects of the VR were helpful to their learning and why; what aspects of the VR did not contribute to their learning and why; how did the VR affect them emotionally and physically; how did the VR affect their impressions of different individuals and groups; what they liked and disliked about each VR video they viewed; how they would compare learning through VR with other types of learning; what they would change about this exercise; concerns they had about VR in college classes; and a question inviting them to comment freely.

Data Analysis. After initial review of student comments, a coding system was created by the author. The survey responses were then analyzed and coded into categories based on themes that appeared in the data. The coding process assessed the answer to each question to determine if it was primarily positive about VR, primarily negative about VR, primarily neutral, or mixed.

Findings. The survey questions were open ended and allowed students to frame their own responses. The core themes that emerged from the data are discussed below. Overall, the responses were strongly positive, although students did express a variety of concerns as well. Themes that emerged related to the questions asked in the survey and included: Positive engagement with and excitement about the exercise, negative bodily reactions, mixed emotional reactions, enjoyment of the technology as well as some negative technical and logistical issues, the immersive nature of the experience and the feeling of "being there," increased understanding or learning, novelty of the experience, the desire to experience more VR, and concerns about misuse of the technology or addiction to the technology. Student responses are described in more detail below.

General responses. When asked to reflect on their overall impressions, four students mentioned that this was their first-time using VR, while another four emphasized that they had used such technology previously. The majority used positive language to describe their experience, a few had significant negative reactions, and many had a blend of positive and negative comments.

Excitement about the technology. A dominant theme in student comments was positive engagement with the VR process. Comments included that: this experience with VR was novel and unique for them; they found the process very engaging and attention-grabbing; they had fun and were entertained; the experience was immersive and "felt like you were there."

Learning. Numerous students pointed out specific ways that they had learned about diverse communities and many also commented that there was nothing about the experience that they felt was detrimental to their learning process. Three students commented that they had difficulty linking the VR material to their learning from the course.

Based on informal professor impressions rather than survey responses, student discussion related to the VR topics involved more energy and attention than has been observed when these issues were taught through other means, though this intensity was not formally measured.

Physical experience. Four students described negative physical experiences including dizziness, motion sickness and disorientation. One student reported having a headache afterward that lasted for an hour. Some students expressed concern about others potentially becoming sick if VRs were used more widely.

Emotional experience. Some students emphasized that the VRs helped them have more empathy for others or feel more grateful for the privileges in their own lives, while some student responses focused on more negative emotional effects that the experience had on them, such as feeling sad or guilty. Some students expressed concerns about others becoming upset if exposed to certain kinds of VRs.

Logistics. Some noted that noises from the surrounding area disrupted their ability to learn. One of the respondents commented that having to go to the Media Center to participate was an inconvenience.

Concerns about Addiction, Distraction from Core Learning Goals, and Misuse of VR. Multiple students raised concerns that relying on VR for school could contribute to screen addiction or distractibility, that there could be problems with paying for the technology or ensuring adequate technical functioning, that students might focus too much on the technology and not on substantive material in a lesson, and that students might not take VR learning seriously. One student noted, "Virtual reality eliminated the human connection to the world which would make learning hard in the future." Another commented, "People might use it as a form of torture." An additional qualm was, "People could definitely use this technology for inappropriate things such as adult videos or violent content."

Comparing VR to other teaching tools. A number of students noted that they felt VR was better than traditional classroom learning tools, with comments like, "It was more intriguing. I felt more involved which made me pay attention more." Another said, "It is better because you can visualize it as well as listen. It keeps you more engaged." One student commented that the VR experience was so much better than learning in the regular classroom that they wondered: "Do we still need profs?" On the other hand, a smaller but significant number of students commented that they preferred classroom staples such as professor lectures or regular videos in class followed by discussion, and noted that their VR experience, at least as used in the pilot, had them much more focused on the technology itself rather than any course material.

DISCUSSION: CONSIDERATIONS FOR INCORPORATING VIRTUAL REALITY INTO A CLASS

The following section of this paper offers some ideas toward incorporating the technology in a way that is compatible with inclusive teaching that builds the best student learning outcomes. This feedback

on experiences with virtual reality, along with the literature discussed, suggest several ways to create the most optimal VR learning experiences for students. These include significant preparation so that students understand the context of what they will experience both in terms of content and how it fits into learning goals, as well as potential physical and emotional reactions. A detailed and structured debriefing afterwards can help students integrate and reflect on what they have experienced. In this exercise, students were placed in the fairly voyeuristic role of observing the Syrian refugee camp in "Clouds Over Sidra" without a clear analysis of the history and context of these specific camps and the production of this particular virtual video. Some of the ethical problems with "Clouds Over Sidra" are discussed in Nakamura's powerful 2020 *Journal of Visual Culture* paper, mentioned earlier. This pilot exercise was conducted in 2019, before the publication of Nakamura's article, and the article raised crucial issues that were not considered in implementing the pilot. Although the student survey data did not point to any particularly concerning results from the use of this VR, anyone interested in using "Clouds Over Sidra" is strongly encouraged to review Nakamura's concerns about the politics and ethics of this particular VR and the general genre to which it belongs.

The VR video on blindness would have best served students if its importance and limitations were carefully discussed with students in advance, and the questions asked in the debriefing about people with visual disabilities navigating the criminal legal system would best have been posed both before and after the VR experience.

Ideally, professors would be able to select VR systems that minimize side effects for all genders and types of bodies, but the availability of these is questionable. At minimum, students need to be adequately warned of potential physical and psychological effects they might experience during and after the use of VR, and any available information on cybersickness related to any specific system in use must be actively investigated in advance. Students must be informed that if they experience physical, emotional, or other discomfort that they can choose to stop their VR experience at any time and access course learning goals in another way. Some potential alternative assignments that may offer other approaches to the learning goals could include viewing and responding to conventional video or working through interactive web material.

The room set up for students to use for their VR experiences should not be noisy nor distracting, in order to allow students to properly engage with their experience. There should be staff available to help students with set up and to monitor students during use to help ensure safety. Finally, students' potential emotional outcomes, such as potential feelings of guilt or distress, should be discussed both before and after the experience.

Professors must consider why they want to incorporate virtual reality into a class in the first place. Using the course planning strategy of backwards design (Wiggins & McTighe, 1998; Reynolds & Kearns, 2017), instructors do best to first develop the core learning goals of their class. What do they want students to be able to do and understand at the conclusion of the semester? If VR is the best tool for bringing particular content to the class, or if students need to learn about virtual reality itself because of its importance in their field, then finding the optimal ways to incorporate VR is a positive step. Using VR in a class simply because the technology itself is intriguing is tempting, but suboptimal for overall learning, as students themselves commented that the technology can be more a distraction than an aid in learning.

For social science students in particular, it can be valuable to connect the use of classroom materials and media with information on the political economy of the production of those materials. Students can learn to critically analyze how information, knowledge, and images are created. Students may be able to build their understanding of the genre of VR by considering who profits economically from the sales of VR equipment and content, as well as considering the conditions of labor under which content is produced. It is also useful for students to know who controls the images and narratives that they are consuming (Nakamura 2020). For example, in the same way that professors may ask students to consider the historical and political context in

which a particular work of literature was created, students may consider how a VR video featuring members of marginalized communities may take a different shape if the video is written, directed, and produced by members of more privileged communities employed by a video game company compared to a video produced by members of the community being portrayed. Virtual reality is a powerful format that has the potential to provide a major platform for diverse perspectives that can be extraordinarily beneficial to students if meaningful content is incorporated into classes with due care.

In addition, students can be asked to critically consider the emotional elements of VR representations. What is the VR experience positioning students to feel, and to what end? The company that produced the aforementioned VR about the murder of Trayvon Martin asserts that its aim is to produce empathy, but Lisa Nakamura reminds us that the name of the company is actually "Pathos."

Next, instructors need to investigate the specific VR systems they would like to use in order to best fit the technology to their classroom needs. First, it is important to consider what students might be able to afford if they have to purchase any technology on their own. Students are often already facing excessive debt from tuition, living expenses, and books. Most likely, professors will need to consider what the school is able to afford, as well as the type of space and supervision needed to effectively use the technology while avoiding risks of injury, theft, or use of the devices for purposes not appropriate to the university. Very low-cost goggles are now available, some even made of cardboard, that can give a very basic VR experience for under $30. These can be paired with mobile apps and earbuds, but students must be able to afford a smartphone to be able to do this. For students who are studying from home via online learning, these goggles could be a required purchase for a class to be used at home in the same ways that textbooks or calculators may be required for a course, but economic assistance or equipment loans may be needed for students who do not have access to smartphones.

Some types of VR take quite a bit of effort to set up and acclimate to, so the logistics of incorporating the technology for a class can be complicated. Is someone available to train and assist students in the use of devices? How will scheduling be handled? Professors may be able to collaborate with a campus library, media center, technology center, teaching assistant, or other campus workers or resources in order to make a virtual reality exercise happen.

Instructors can seek out VR systems that are maximally accessible to students of all sizes, abilities, and genders, as some VR setups are easier to adjust for different body sizes and shapes than others, and some setups are more likely than others to produce gender differences in physical side effects. Additionally, some systems are better designed than others to accommodate students who may have blindness or low vision, hearing impairment, claustrophobia, movement or balance issues, a tendency to motion sickness, or other physical, psychological or medical conditions that could impact the use of the technology.

While VR may have great potential for empowering populations with different abilities (see, for example, Bryant, 2020), it can also be developed and deployed in ways that exclude. It is up to developers and instructors to make VR spaces as inclusive as possible.

Once an instructor has identified the course goals and clarified that incorporating VR is a good way to meet those goals and selected the most appropriate VR system, it is important to take care in selecting specific VR content. The strength of VR in producing an immersive experience can also be a downfall if the content produces significant distress. Trauma triggers can be difficult to predict. While the issue of trigger warnings continues to be debated in academia (see, for example, Bentley, 2017), if an individual has post-traumatic stress disorder, all sorts of stimuli could trigger flashbacks or distress, from the color red to the smell of lemons. Just as attempts at universal design can never be one hundred percent universal in accommodating every individual's needs at all times, not all trauma triggers can be predicted and avoided. There are, however, many virtual reality videos that can be easily identified as potentially traumatic to view for particular individuals or

groups. Trauma is not distributed equally in the population. Individuals with marginalized identities, groups targeted for state violence, people who come from communities burdened by systemic trauma (Goldsmith, Martin, and Smith, 2014) and/or historical trauma (Kohut, 2020), and women, trans*, and non-binary people targeted for gender-based violence may be vulnerable to acute distress when confronted with materials related to violence or oppression. Learning about certain human rights abuses through VR could be an engaging and powerful learning experience for some students, while others directly affected by these or similar abuses may become so overwhelmed by the distressing material in the immersive VR medium that their learning in class and their overall wellbeing is harmed. While some students may benefit from having their awareness raised about particular types of suffering in the world, other students in the class may be routinely subjected to that form of suffering. Those who are targeted may need to be able to distance themselves through a variety of sophisticated practical, cognitive, emotional, and intellectual strategies in order to contemplate the same issues. The intense immersion of virtual reality can make it difficult to employ distancing techniques that can work with an emotionally overwhelming book, such as daydreaming, looking away, slowing down one's reading, skipping around in the text, or using grounding techniques to focus on one's immediate physical surroundings. It is important for professors to use extreme caution or to avoid VRs that depict intense forms of suffering, abuse, mistreatment, and inequality. The same students who are already facing marginalization and inequality are those who are most likely to be harmed in the process of viewing such materials.

In terms of addressing potential crime or aggression in classroom VR spaces that involve interaction with others, professors need to develop clear policies and safety strategies. It may be useful to collaborate with a university's information and technology department, computer science faculty, diversity officer, sexual assault and gender violence prevention staff, counseling center, safety office, and office of student conduct, among others, to develop clear codes of conduct, supervision measures, safety planning, grievance procedures, intervention plans, and sanctions or restorative practices as a response to any policy violations.

LIMITATIONS AND FUTURE DIRECTIONS

With anonymous one-time surveys, it was not possible to ask probing questions and delve more deeply into why some students were able to make learning goal connections more readily than others. In addition, there was no pre and post-test of material, strongly limiting the conclusions that can be drawn about the efficacy of the exercise for student comprehension. Students' positive responses focused most intensely on the interesting nature of the exercise and the ways it helped them expand their knowledge of others' perspectives, and their negative responses focused most intensely on physical side effects and their concerns about the potential of the medium being more engaging than the content.

For both instructor and students, the novelty and excitement of incorporating this technology sometimes overshadowed the focus on core learning objectives. This highlights the importance of strict adherence to backwards design, focusing first on creating learning objectives, measuring the objectives effectively, and incorporating teaching methods and technologies always and only in the service of those objectives.

While this pilot exercise provided valuable information about student experiences, for future research, it would be useful to divide students into a VR group and a control group viewing conventional videos. Student knowledge of target material and skills could be carefully assessed before and after the lesson so that student learning can be evaluated along with their general experiences of the technology. In addition, it would be useful to have a larger number of participants in order to complete some statistical analyses and to look for any correlation between student characteristics and responses to the VRs. The technology and content would need to be carefully selected for accessibility, with consideration given to avoiding both VR systems and VR videos with heightened risks of causing cybersickness or distress to any group of students.

CONCLUSION

Virtual reality classroom assignments have the potential to reproduce or create inequalities through the colonizing gaze and artificial embodiment. The technology creates differential physical and emotional impacts across race, gender, and disability, with a higher burden falling on groups with marginalized identities and histories of trauma. Likewise, the technology can be hard to access for those with physical disabilities or those facing economic struggles. Is there a role for VR in criminology pedagogy? Like most technology in education, instructors can use VR more or less skillfully as a tool to help students build particular competencies and knowledge. With good planning, preparation of lesson specifics, careful selection of technology and content, and thorough debriefing, VR could be useful as a tool for certain types of classes. Best practices involve first assessing if virtual reality is truly the best way to teach specific material if so, using backwards design, inclusive teaching strategies, and careful review of technology set-ups and content in order to use the technology to the best advantage of students.

REFERENCES

Baniasadi, T., Ayyoubzadeh, S., & Mohammadzadeh, N. (2020). Challenges and practical considerations in applying virtual reality in medical education and treatment. *Oman Medical Journal*, *35*(3), 1–10. https://doi-org.dom.idm.oclc.org/10.5001/omj.2020.43

Bentley, M. (2017). Trigger warnings and the student experience. *Politics*, *37*(4), 470–485. https://doi-org.dom.idm.oclc.org/10.1177/0263395716684526

Brooks, F. (1999). What's real about virtual reality? *IEEE Computer Graphics and Applications,19*(6), 16- 27. https://www.cs.unc.edu/~brooks/WhatsReal.pdf

Bryant, L., Brunner, M., & Hemsley, B. (2020). A review of virtual reality technologies in the field of communication disability: Implications for practice and research. *Disability & Rehabilitation: Assistive Technology*, *15*(4), 365–372. https://doi-org.dom.idm.oclc.org/10.1080/17483107.2018.1549276

Bryson, S. (1996). Virtual reality in scientific visualization. *Communications of the Association of Computing Machinery*, *39*(5), 62–71. https://doi.org/10.1145/229459.229467

Center for Research on Learning and Teaching. (n.d.). Online Teaching: Inclusive Teaching. Retrieved from https://onlineteaching.umich.edu/inclusive-teaching-2/

Clayton-Pedersen, A., & Clayton-Pedersen, S. (2007). Making excellence inclusive – In education and beyond. *Pepperdine Law Review, 35*(3), 610 – 648. https://digitalcommons.pepperdine.edu/plr/vol35/iss3/3/

Czub, M., & Janeta, P. (2021). Exercise in virtual reality with a muscular avatar influences performance on a weightlifting exercise. *Cyberpsychology*, 15(3), 1–16. https://doi.org/10.5817/CP2021-3-10

Dawson, P., Levy, R., & Lyons, N. (2011). Breaking the fourth wall: 3D virtual worlds as tools for knowledge repatriation in archaeology. *Journal of Social Archaeology, 11*(3): 387–402. https://doi:10.1177/1469605311417064

Díaz-López, L., Tarango, J., & Contreras, C.P. (2019). Strategies for inclusive and safe education using virtual reality: From the digital library perspective. *Digital Library Perspectives*, 35(3/4), 216–226. https://doi.org/10.1108/DLP-08-2019-0034

Difede, J., Cukor, J., Patt, I., Giosan, C., & Hoffman, H. (2006). The application of virtual reality to the treatment of PTSD following the WTC attack. *Annals of the New York Academy of Sciences*, *1071*(1), 500–501. https://doi-org.dom.idm.oclc.org/10.1196/annals.1364.052

Dobie, T., May, J., McBride, D., & Dobie, T. Jr. (2001). The effects of age and sex on susceptibility to motion sickness. *Aviation, Space, and Environmental Medicine*, *72*(1), 13–20. https://pubmed.ncbi.nlm.nih.gov/11194988/

Farmer, H., & Maister, L. (2017). Putting ourselves in another's skin: Using the plasticity of self-perception to enhance empathy and decrease prejudice. *Social Justice Research, 30*(4), 323–354. https://doi.org/10.1007/s11211-017-0294-1

Fields, G. (2006). With 'Reality Visors', officers try new tack to face mentally ill. (Cover story). *Wall Street Journal*, *248*(73), 1–11. https://www.wsj.com/articles/SB115923660989073902?st=sipv7p9d2u3xhbz&reflink=desktopwebshare_permalink

Fox, J., Ralston, R., Cooper, C., & Jones, K. (2015). Sexualized avatars lead to women's self-objectification and acceptance of rape myths. *Psychology of Women Quarterly, 39*(3), 349–62. https://doi.org/10.1177/0361684314553578

Gasperin, B., Zanirati, T., & Cavazzola, L.T. (2018). Can virtual reality be as good as operating room training? Experience from a residency program in general surgery. *Arquivos Brasileiros de Cirurgia Digestiva: Brazilian Archives of Digestive Surgery*, *31*(4), e1397. https://doi.org/10.1590/0102-672020180001e1397

Gerardi, M., Cukor, J., Difede, J., Rizzo, A., & Olasov Rothbaum, B. (2010). Virtual reality exposure therapy for post-traumatic stress disorder and other anxiety disorders. *Current Psychiatry Reports*, *12*(4), 298–305. https://doi.org/10.1007/s11920-010-0128-4

Goldsmith, R., Martin, C., & Smith, C. (2014). Systemic trauma. *Journal of Trauma & Dissociation*, *15*(2), 117–132. https://doi-org.dom.idm.oclc.org/10.1080/15299732.2014.871666

Hansen, J. (2019). Virtual indecent assault: Time for the criminal law to enter the realm of virtual reality. *Victoria University of Wellington Law Review, 50*(1), 57–76. https://doi.org/10.26686/vuwlr.v50i1.5553

Kavanagh, S., Luxton-Reilly, A., Wuensche, B., & Plimmer, B. (2017). A systematic review of virtual reality in education. *Themes in Science & Technology Education*, *10*(2), 85-119. http://earthlab.uoi.gr/theste

Kilteni, K., Groten, R., & Slater, M. (2012). The sense of embodiment in virtual reality. *PRESENCE: Teleoperators & Virtual Environments, 21*(4), 373–387. https://doi.org/10.1162/PRES_a_00124

Kim, O., Pang, Y., & Kim, J. (2019). The effectiveness of virtual reality for people with mild cognitive impairment or dementia: A meta-analysis. *BMC Psychiatry*, *19*(219), 1-10. https://doi-org.dom.idm.oclc.org/10.1186/s12888-019-2180-x

Kohut, T. (2020). History flows through us: psychoanalysis, historical trauma, and the shaping of experience. *Psychoanalysis: Self & Context*, *15*(1), 20–24. https://doi-org.dom.idm.oclc.org/10.1080/24720038.2019.1688330

Kothgassner, O., Goreis, A., Kafka, J., Van Eickels, R., Plener, P., & Felnhofer, A. (2019). Virtual reality exposure therapy for posttraumatic stress disorder (PTSD): a meta-analysis. *European Journal of Psychotraumatology*, *10*(1), 1–11. https://doi-org.dom.idm.oclc.org/10.1080/20008198.2019.1654782

Lake, J. (2020). Hey, you stole my avatar!: Virtual reality and its risks to identity protection. *Emory Law Journal*, *69*(4), 833–879. https://scholarlycommons.law.emory.edu/elj/vol69/iss4/5

Lee, E. (2014). Use of avatars and a virtual community to increase cultural competence. *Journal of Technology in Human Services*, *32*(1/2), 93–107. https://doi-org.dom.idm.oclc.org/10.1080/15228835.2013.860364

Lemley, M., & Volokh, E. (2018). Law, virtual reality, and augmented reality. *University of Pennsylvania Law Review,* 1051-1065. https://dx.doi.org/10.2139/ssrn.2933867

Loucks, L., Carly Y., Norrholm, S., Maples-Keller, J., Post, L., Zwiebach, L., Fiorillo, D., Goodlin, M., Jovanovic, T., Rizzo, A., & Rothbaum, B. (2019). You can do that?!: Feasibility of virtual reality exposure therapy in the treatment of PTSD due to military sexual trauma. *Journal of Anxiety Disorders*, 61, 55–63. https://doi-org.dom.idm.oclc.org/10.1016/j.janxdis.2018.06.004

Madary, M., & Metzinger, T. (2016). Real virtuality: A code of ethical conduct. recommendations for good scientific practice and the consumers of VR-technology. *Frontiers in Robotics and AI, 3*, 1-23. https://doi.org/10.3389/frobt.2016.00003

Mateu, J., Lasala, M. J., & Alamán, X. (2014). Virtual touch: A tool for developing mixed reality educational applications and an example of use for inclusive education. *International Journal of Human-Computer Interaction*, *30*(10), 815–828. https://doi.org/10.1080/10447318.2014.927278

Munafo, J., Diedrick, M., & Stoffregen, T. (2017). The virtual reality head-mounted display oculus rift induces motion sickness and is sexist in its effects. *Experimental Brain Research*, *235*(3), 889–901. https://doi-org.dom.idm.oclc.org/10.1007/s00221-016-4846-7

Murray, M., and Pérez, J. (2014). Unraveling the digital literacy paradox: How higher education fails at the fourth literacy. *Issues in Informing Science & Information Technology*, 11, 85–100. https://doi-org.dom.idm.oclc.org/10.28945/1982

Nakamura, L. 2020. Feeling good about feeling bad: Virtuous virtual reality and the automation of racial empathy. *Journal of Visual Culture*, *19*(1), 47-64. doi:10.1177/1470412920906259.

Penumudi, S., Kuppam, V., Kim, J., & Hwang, J. (2020). The effects of target location on

musculoskeletal load, task performance, and subjective discomfort during virtual reality interactions. *Applied Ergonomics*, *84*, 103010. https://doi.org/10.1016/j.apergo.2019.103010

Petrunina, E., Belaglazova, L., Belaglazov, A., & Bayramov, E. (2020). 20th International Multidisciplinary Scientific Geoconference Sgem 2020. STEF92 Technology Ltd. https://doi.org/10.5593/sgem2020/5.2/s22.096

Reyes, L. E. (2017, August 14). How do police use VR? Very well. National Policing Institute. https://www.policinginstitute.org/onpolicing/how-do-police-use-vr-very-well/

Reynolds, H., & Kearns, K. (2017). A planning tool for incorporating backward design, active learning, and authentic assessment in the college classroom. *College Teaching*, *65*(1), 17–27. https://doi-org.dom.idm.oclc.org/10.1080/87567555.2016.1222575

Segovia, K., & Bailenson, J. (2009). Virtually true: Children's acquisition of false memories in virtual reality. *Media Psychology*, *12*, 371-393. https://doi.org/10.1080/15213260903287267

Shilling, C., & Mellor, P. A. (2007). Cultures of embodied experience: Technology, religion and body pedagogics. *Sociological Review*, *55*(3), 531–549. https://doi.org/10.1111/j.1467-954X.2007.00721.x

Shilling, C. (2017). Body pedagogics: Embodiment, cognition and cultural transmission. *Sociology*, *51*(6), 1205–1221. https://doi.org/10.1177/0038038516641868

Shilling C. (2018). Embodying culture: Body pedagogics, situated encounters and empirical research. *Sociological Review, 66* (1), 75–90. https://doi.org/10.1177/0038026117716630

Stanney, K., Fidopiastis, C., & Foster, L. (2020). Virtual reality is sexist: But it does not have to be. *Frontiers in Robotics and AI*, *7*(4), 1-19. https://doi.org/10.3389/frobt.2020.00004

Stanney, K., Hale, K., Nahmens, I., & Kennedy, R. (2003). What to Expect from Immersive Virtual Environment Exposure: Influences of Gender, Body Mass Index, and Past Experience. *Human Factors*, 45(3), 504–520. https://doi-org.dom

Stuart, S. C. (2016, September 14). Project empathy tackles criminal justice reform with VR. *PCMAG DIGITAL GROUP.* https://www.pcmag.com/news/project-empathy-tackles-criminal-justice-reform-with-vr.

Tham, J., Duin, A. H., Gee, L., Ernst, N., Abdelqader, B., & McGrath, M. (2018). Understanding virtual reality: Presence, embodiment, and professional practice. *IEEE Transactions on Professional Communication*, 61(2), 178–195. https://doi.org/10.1109/TPC.2018.2804238

Trahan, M., Smith, K., Traylor, A., Washburn, M., Moore, N., & Mancillas, A. (2019). Three-dimensional virtual reality: Applications to the 12 grand challenges of social work. *Journal of Technology in Human Services*, *37*(1), 13–31. https://doi-org.dom.idm.oclc.org/10.1080/15228835.2019.1599765

Tsoupikova, D., Rettberg, S., Coover, R., & Nishimoto, A. (2017). Hearts and minds: The interrogations project. *Leonardo*, *50*(5), 513–514. https://doi.org/10.1162/LEON_a_01235

Wiggins, G., & McTighe, J. (1998). *Understanding by Design*. Association for Supervision and Curriculum Development.

AUTHOR BIO

Michelle VanNatta is an Associate Professor and the coordinator of the Criminology Program at Dominican University in River Forest, Illinois. She is interested in prison abolition, pedagogy, and preparing students to be trauma-informed professionals. Her previous published work addresses racism in immigration court, systemic responses to sexual violence in women's prisons, heterosexism in battered women's shelters, and deployment of emotion narratives in the prosecution of battered women who fight back against abusers. In her spare time, she tries to cheer herself up with novels, films, television, and podcasts that imagine other worlds.

SUGGESTED CITATION

APA

VanNatta, M. (2022). Peril and promise: Student experiences of virtual reality and implications for inclusive social justice pedagogy. *Dialogue: The Interdisciplinary Journal of Popular Culture and Pedagogy, 9*(3). http://journaldialogue.org/issues/v9-issue-3/peril-and-promise-student-experiences-of-virtual-reality-and-implications-for-inclusive-social-justice-pedagogy/

MLA

VanNatta, Michelle. "Peril and Promise: Student Experiences of Virtual Reality and Implications for Inclusive Social Justice Pedagogy." *Dialogue: The Interdisciplinary Journal of Popular Culture and Pedagogy,* vol. 9, no. 3, 2022, http://journaldialogue.org/issues/v9-issue-3/peril-and-promise-student-experiences-of-virtual-reality-and-implications-for-inclusive-social-justice-pedagogy/