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JAKKI O BAILEY, University of Oregon Portland, Portland, OR, United States

XINYUE (SALLY) YOU, The University of Texas at Austin, Austin, TX, United States

ANDREA STEVENSON WON, Cornell University, Ithaca, NY, United States

SUN-JOO AHN, University of Georgia, Athens, GA, United States

BLAIR MACINTYRE, Khoury College of Computer Sciences, Boston, MA, United States

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Students' Privacy and Ethical Concerns of Using Social Virtual Worlds for Online Learning

JAKKI O. BAILEY, School of Journalism and Communication, University of Oregon, USA

XINYUE (SALLY) YOU, School of Information, The University of Texas at Austin, USA

ANDREA STEVENSON WON, Department of Communication, Cornell University, USA

SUN JOO (GRACE) AHN, Grady College of Journalism and Mass Communication, University of Georgia, USA

BLAIR MACINTYRE, College of Art, Media, and Design; Khoury College of Computer Sciences, Northeastern University, USA

Social virtual worlds provide students in remote online courses with a unique approach to collaborative work and social interactions. However, the use of social virtual worlds in online learning raises concerns about what privacy and ethical issues students might encounter. To shed light on this topic, we examined college students' ($N = 68$) ethical and privacy concerns about using social virtual worlds in multiple class sessions, courses, universities, virtual environments, and technologies. Students revealed (a) struggling to manage their identity between classmates and strangers, (b) discomfort over violations of their avatars' personal space, (c) problems of vulnerable populations experiencing harassment, nudity, and loneliness, and (d) concern over companies tracking and storing user data. In addition, the students described the technological advantages that mitigated their privacy and ethical concerns. We discuss the implications of our findings for the future of collaborative learning and the design of social virtual worlds.

CCS Concepts: • **Human-centered computing** → **Empirical studies in HCI**.

Additional Key Words and Phrases: virtual reality, metaverse, social VR, social virtual worlds, online learning, collaborative learning, remote learning, ethics, privacy

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1 Introduction

Positive social connections play an integral part of university life [25, 45, 53] as feelings of belonging promote academic persistence and reduce the likelihood of student attrition [11, 32]. As online and remote learning grows within higher education, instructors need unique methods to facilitate instructor-to-student and student-to-student collaborations and social interactions to promote a sense of community and belonging. Online social virtual worlds can create collaborative learning spaces similar to face-to-face interactions. For example, students have reported feeling “most

Authors' Contact Information: **Jakki O. Bailey**, School of Journalism and Communication, University of Oregon, Portland, Oregon, USA, jakkib@uoregon.edu; **Xinyue (Sally) You**, School of Information, The University of Texas at Austin, Austin, Texas, USA, xinyueyou23@utexas.edu; **Andrea Stevenson Won**, Department of Communication, Cornell University, Ithaca, New York, USA, asw248@cornell.edu; **Sun Joo (Grace) Ahn**, Grady College of Journalism and Mass Communication, University of Georgia, Athens, Georgia, USA, sjahn@uga.edu; **Blair MacIntyre**, College of Art, Media, and Design; Khoury College of Computer Sciences, Northeastern University, Boston, Massachusetts, USA, b.macintyre@northeastern.edu.



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connected” to their peers using social virtual worlds as opposed to using video conferencing software, like Zoom [61]. Within virtual worlds, students treat their avatars’ bodies as their own and see others’ avatars as physically and socially present [22, 42]. By taking ownership of one’s avatar and experiencing one’s avatar as the self, students in remote online courses can feel as if they are present in a university course, enhancing their motivation to learn [42].

While contained individual experiences in virtual environments have proven to enhance learning [7, 15], the potential to use social virtual worlds to facilitate feelings of connection during remote learning may come at a cost. Ethical and privacy issues may arise using online social virtual worlds and immersive technology like virtual reality (VR) for remote online courses, virtual places where students can interact with known classmates and strangers alike. Students using social virtual worlds within the context of a classroom will likely have different expectations and values around what information to share, how to share it, with whom, and when, compared to using virtual worlds in social contexts, such as playing games with friends or family. The context of social interactions influences people’s perceptions and values surrounding privacy and ethics in different digital contexts [39]. Much of the existing literature regarding online social virtual worlds focuses on users’ privacy and ethical concerns within a *social* context [34] and few empirical studies examine them in the context of *formal online remote learning* [54]. It will be paramount to identify the privacy and ethical concerns that arise across multiple groups of students in social virtual worlds to better prepare for the future of online education and creating welcoming online collaborative learning environments.

Understanding the implications of ethical and privacy concerns on students’ university experience in remote learning necessitates identifying the issues that students report themselves as important and relevant. Past studies on social virtual worlds in learning contexts often emphasize quantitative measures (e.g., [33, 43]), lacking qualitative data on students’ experience, particularly on describing privacy and ethical concerns in their own words (e.g., [36, 38]). In addition, they often focus on the use of social virtual worlds in either lab settings [17], with a small number of studies emphasizing the remote aspect of online learning in university ecosystems (e.g., [41]). Less is known on the privacy and ethical issues that arise within large-scale social world usage with students in active remote online courses in the field [38]. Typically, studies report students’ social virtual world experiences in one specific virtual environment and/or during one session. Finally, scholars have called for the need to delve into the ethical and privacy concerns that students face in social virtual worlds in the context of learning [60], yet few apply specific ethical approaches as methods to understand these ethical and privacy concerns.

To address this gap in the literature, we examined the ethical and privacy concerns of university students using online social virtual worlds during remote online learning for three semesters across two academic years beginning in 2020. University students enrolled in VR-related classes interacted with a range of social virtual worlds and used a variety of devices, using desktop or laptop computers, VR headsets, and phones or tablets. This study contributes to the HCI and CSCW community by (a) identifying and applying ethics approaches to examining the use of social virtual worlds in the context of formal remote online learning, (b) yielding insights on the privacy and ethical concerns that students experience in a formal online learning context, in their own words, while using commercially available social virtual worlds, and (c) capturing generalizable student experiences from multiple institutions, across various contexts, and over multiple sessions. We report the privacy and ethical concerns students identified when using social virtual worlds for online learning, including descriptions on how they represented their identities via avatars and the type of devices they used to engage in the social virtual worlds.

2 Background

2.1 The Unique Affordances of Social Virtual Worlds for Online Learning

A social virtual world is "a synchronous, persistent network of people, represented as avatars, facilitated by networked computers" [10] (p. 2), allowing a large number of users to socially interact within the same virtual environment [10, 46]. The continued growth of VR as a billion-dollar industry will likely promote greater usage of social virtual worlds in classrooms [6]. The future of the internet, commonly referred to as web 3.0, is projected to expand the use of social virtual worlds in the education segment [16, 55], and "is being driven by the need to adapt to the changing education landscape, as well as the desire to create more interactive and personalized learning experiences" ([55], p. 42). Furthermore, instructors have greater ability to incorporate online social virtual worlds into their instruction at little to no cost. Large online social virtual world and gaming platforms host hundreds of millions of users [55] and provide sections dedicated to education. Social virtual world gaming company Roblox, for instance, hosts over 70 million daily users [3], and provides education resources for grades as early as first grade [4]. In higher education, VR education company, VictoryXR, works with over 120 higher education institutions to create virtual worlds, including digital replica campuses for over 50 higher education institutions [2].

Social virtual worlds provide unique benefits and challenges to collaborative learning, that differ from face-to-face collaboration and video conferencing [18, 26, 30], and the privacy and ethical issues warrant their own research. Social virtual worlds allow non-co-located classmates to collaborate and socialize in a multitude of contexts [15]. A variety of social virtual worlds exist such as Mozilla Hubs, SecondLife, VRChat, and Meta Horizon Worlds, and can be accessed using different types of devices like computers, tablets, or VR headsets. These virtual environments can mirror the physical world such as a room with desk and chairs, but also create improbable class locations like on the icy landscapes of Antarctica or transform into class activities that may be impossible in physical classrooms, such as scientific learning while floating above the planet Mercury. Students interact and communicate in social virtual spaces through avatars, digital representations that they control in real-time, using verbal and non-verbal behaviors. Students can choose to use pre-made avatars, those that allow customization of aspects such as the shape, color, and style of different parts of the body (e.g., eyes, skin, hair, face) and dress (e.g., clothing, accessories), or photorealistic avatars that capture their likeness (e.g., via body scans or uploading photographs to avatar building software) [31]. Unlike video conferencing, avatars allow students to manage the specific aspects of their identity they wish to share with their classmates, such as physical disability status, without hindering their ability to dynamically engage in activities with each other online [14]. Regardless of the exact level of customization, people can feel body ownership over their avatars, and their avatar's appearance can impact their perceptions, attitudes, and behaviors [40, 50].

While online social virtual worlds allow students to socially interact with their classmates, students may also encounter strangers, potentially eliciting ethical and privacy concerns. In some cases, meeting new people provides new and unique perspectives, but in others it leaves students vulnerable to harm. For instance, members of marginalized communities based on race and sexual orientation have reported experiencing harassment while in social virtual worlds [23]. Experiencing unwanted and unsolicited behavior from others in social VR could be compounded by users that hide their identities. The majority, if not all, of current social online virtual worlds do not require users to verify their identities to create an account nor to verify if their avatar's appearance represents who they claim to be or someone else. An avatar can look like person A, but be controlled by person B. Concealed online identities under the digital cloak of anonymity in some cases can lead to cyberbullying, with greater anonymity leading to more aggressive behavior [37, 62], even in virtual work spaces [28]. Furthermore, engaging in harmful online actions can translate into real

world behaviors, such as writing sexist comments towards women and increasing sexist behaviors towards women offline [21]. Even experiencing hostility from a person who hides their identity through their avatar can increase a person's likelihood that they will in turn act in an aggressive manner[47]. People exploiting the use of an avatar to conceal their physical identity to harm others disrupts the trust and safety of the online community in social virtual worlds. This type of learning context differs from university courses where students typically engage only with their classmates, and also differs from purely social online contexts where people tend to expect to encounter strangers. Applying an ethical lens can help determine the potential benefits and costs of leveraging social virtual worlds and avatars for online collaborative learning at scale.

2.2 Applying Ethical and Privacy Approaches to Social Virtual Worlds for Online Learning

Understanding the ethical and privacy issues of online social virtual worlds for learning calls for a multi-dimensional approach, such as applying the rights and care ethics approaches. The rights approach to ethics emphasizes an individual's dignity and well-being. These rights include protecting human freedom or liberty by not interfering with a person's activities as well as a responsibility to help others to do or have something [56, 57]. A moral right, for instance, could be a right to an education, a student's right to a safe learning environment or a right to privacy (e.g., not to have their personal and educational information exposed). According to Velasquez [57],

[it is] wrong for others to abuse us or to use us against our will. . . . humanity must always be treated as an end, not merely as a means. . . .to treat a person as an end is to respect the person's dignity by allowing each the freedom to choose for himself or herself.

The right to dignity and well-being can be applied to student experiences in social virtual worlds as students experience their avatars as their personal identity [22, 41] and ownership over their digital bodies [5]. The avatar options available for students to represent themselves have ramifications beyond the virtual world. For instance, after controlling a hypersexualized female avatar, typically found in popular video games, users struggled with harmful perceptions of self-objectification and acceptance of rape myths [20]. If students perceive ownership over their avatars, it raises ethical questions of body autonomy and their rights to their virtual bodies, and the right to emotional comfort and psychological safety. Do ethical rights exist for people who experience distress when their avatar is physically assaulted by another person's avatar? Do students consider it an ethical right to have their personal space respected in social virtual worlds, or a right not to be harassed by others?

The care approach to ethics can also be applied to understanding students' experiences in social virtual worlds. The care approach emphasizes the social relationships people have with each other, the dependence of humans on others, the importance of emotions and the body, and noting that ethical decision-making is context-sensitive [29]. Furthermore, this approach emphasizes the value of caring for others, particularly people you share a relationship with. The care ethics approach attends to:

what is required for relationships to be healthy, reciprocal, and caring, rather than abusive, exploitative, or unfair. Furthermore, care ethics is not limited just to considering personal relationships that are especially intimate or close, but can also extend to professional relationships, political relationships with fellow citizens, and even global relationships with distant others across the world [29].

In addition, the care approach recognizes that emotions and the body are interconnected and that ethical reasoning can occur by (a) experiencing empathy, compassion, and sympathy, (b) taking on the perspective of others, and (c) being attentive or responsive to others' needs [29]. Communicating

and experiencing emotions through avatars is an integral aspect of social virtual worlds, and taking a care ethics approach could illuminate the nuances of students' experiences. Through avatars, students can express their own emotions verbally and non-verbally as well as perceive emotional responses from others. Furthermore, by viewing and treating other people's avatars as real, students feel emotional ties and empathy toward others in virtual environments. For example, users will feel emotional pain when they use their avatar to inflict virtual harm to what they know is a digital human representation completely controlled by a computer algorithm [49], and develop empathy for the homeless after experiencing it from a first-person view in VR [24].

Intertwined with ethics, privacy can be defined as "the ability to understand, choose, and control what personal information you share, with whom, and for how long" [48](p. 50). Importantly, the sharing of information extends beyond intimate realms, such as technology surveillance in one's home, but includes privacy within public realms [39]. Broadly, online social virtual worlds can be considered public spaces, with varying degrees of privacy, that require students and instructors to carefully manage their private information. For instance, some virtual worlds have privacy levels similar to a public park, while others provide students the option to put up virtual barriers between themselves and others such as creating a private room.

Privacy impacts how people communicate and socialize with each other: "By exercising control over intimate and sensitive information about themselves, people may exercise control over the way they portray themselves to others, especially those others with whom they engage in lasting relationships" [39](p. 592). Arguably, a person's sense of privacy is an interaction between various contexts and emotions; feelings express how people think about privacy and the contexts of these feelings shapes what they deem as an appropriate level of privacy [52](p. 18). Nissenbaum [39]states that "even if information is quite personal or intimate, people generally do not sense their privacy has been violated when the information requested is judged relevant to, or appropriate for, a particular setting or relationship" (p. 584). Thus, privacy concerns within social virtual worlds will likely vary by context, subjective to each student. For instance, students using social virtual worlds outside of the context of a classroom may have different expectations and values around what information to share, how to share it, with whom, and when. Shilton [48](2009) contends "privacy is a vital part of your identity and self-presentation. Deciding what to reveal to whom is part of deciding who you are"(p. 50).

In addition, social virtual worlds track and record students' verbal and physical behaviors which in turn allows the virtual environment to change and update dynamically in real time based on students' actions. However, tracking student behaviors raises ethical concerns about the benefits and risks of how this is data used. Utilizing the tracking data to animate the avatars provides students the benefit of using their avatars' body movements such as head nods, hand gestures, and proximity to communicate information to others [35], such as facilitating turn taking in conversations, and creating a feeling of intimacy by moving closer to someone to discuss a private matter. When combined with AI modeling, student behaviors tracked in virtual environments can be leveraged to improve learning outcomes [43], but also could harm student outcomes if used to categorize them as high or low learners from a few isolated instances, impacting the trajectory of their education and future careers [51, 58]. In addition, the behavioral data captured in social virtual worlds, particularly through VR technology, can reveal students' personal identity such as gender and health status, without their knowledge [8]. The decisions that students make about privacy, ethics, and identity representation in social virtual worlds will likely happen as they interact with known people like classmates, instructors, and guest speakers as well as with strangers. In this paper, we aim to examine the ethical and privacy tensions students identify in virtual social worlds during online collaborative learning.

3 Method and Materials

3.1 Study Overview

We examined students' ethical and privacy concerns when using social virtual worlds during remote online courses in four different classes across four different American universities. We utilized a repeated measures field study. We employed a diary study technique [13, 27] to examine the use of social virtual worlds in existing university ecosystems to capture students' experience in their own words, with the research study minimally influencing the overall design and implementation of the courses [27]. As part of a larger study on social connections, students completed an online survey after each class session that incorporated a social virtual world as part of their interactions. The researchers provided instructors a link to an online survey that acted as a diary entry, and the instructors then provided the link to their students to complete after each class session. Within each diary entry, students reported the devices they used, any privacy and ethical concerns they identified during their experience as well as a description of their avatars. The type of device that students utilized during each session was at the discretion of each instructor based on available resources. Instructors integrated the diary surveys as part of their courses as an assignment with the purpose of students reflecting on the use of social virtual worlds related to the class topics. All students within each course completed the diary entries. After instructors completed all grades, students could consent for researchers to analyze their diary entry responses. This was done to reduce students feeling that their grade for the course would be based on their choice to participate in the study. A research assistant not associated with the design of the study or data collection (and not a student in any of the courses), extracted the data files of the students that consented to participate in the study and deidentified their data.

3.2 Overview of Courses' Learning Objectives and Activities

Classes took place from September 2020 through December 2020, February 2021 through May 2021, and September 2021 through November 2021 during the COVID-19 pandemic. All courses were completely online and remote. Students completed all class sessions from a physical location of their choosing, as many of the participating universities closed communal facilities and classrooms. The courses consisted of (a) an upper-division undergraduate seminar course at a private university in the northeast on virtual communication, (b) a graduate seminar course in the south focused on the design and user experience of virtual environments, (c) an upper-division undergraduate and graduate seminar in the southeast on 3D user interface design, and (d) an undergraduate and graduate seminar course in the southeast emphasizing virtual reality for persuasive communication.

3.2.1 Learning Objectives and Topics. All courses were special topics or elective courses chosen by students, in which instructors used virtual environments, like social virtual worlds, to teach students about virtual environments. Through the courses students learned about (a) the history and development of immersive virtual environments, (b) technological features of extended reality technology, virtual environments, and 3D interfaces, (c) concepts, theories, and models that advance the understanding of people's virtual experiences, (d) the use of VR for current and future applications, (e) skills for designing and building virtual environments, and (f) the ethical considerations of using immersive technologies and virtual environments. The objectives of the courses included gaining hands-on experience with immersive environments and understanding the application of VR in non-gaming domains to solve real-world problems. Across courses, specific class topics included, but not limited to, technological immersion and presence, the technical aspects of tracking, rendering, and displays (e.g., 3D interfaces), avatars and embodied agents, virtual social interactions, perspective taking and empathy in virtual spaces, VR for health and wellness, the Proteus Effect, and transformed social interactions.

Syllabi and course introductory lectures included language on fostering a positive, safe, and collaborative learning environment. Instructors informed students verbally during class time and in the syllabi about the ethical and privacy risks of using videoconferencing technology (e.g., Zoom) and social virtual spaces, including ethical guidelines to create a positive and respectful learning community. However, classes varied in the specific information instructors gave about revealing identifying information. In some classes, instructors recommended students use a name that their other classmates could identify, but not to reveal too much information, while in other instances the instructors did not encourage students to use identifying names but allowed students to select their desired names. Students were told to consider social virtual world visits as “field trips” and to remember that they were representing their university.

3.2.2 Learning Activities. The class learning activities took place in both private, semi-public (by invitation), and public virtual spaces within social virtual worlds. Private spaces took place in Rumii, Mozilla Hubs, Gathertown, and AltSpace VR. Students visited public and semipublic virtual spaces in vTime, AltSpace VR, Virbela, RecRoom, and Second Life. Instructors used public and semipublic virtual environments for virtual field trips to examine specific environments and use cases (e.g., art gallery, outer space) that included also lectures and tours from academic and industry research experts. Courses also utilized social virtual world spaces for course introductions, group project discussions, and conference style poster presentations (e.g., Gathertown, Mozilla Hubs).

The class sessions used a variety of learning activities within virtual social worlds. Students embodied various avatar types to examine and discuss (a) the connection between their physical world movements and their avatar’s body movements (e.g., testing and understanding tracking, rendering, and display in Rumii, vTime and Virbela), (b) avatar representation and self-identification across a range of photorealism levels during collaborative social interactions (e.g., a scavenger hunt and art creation project in Mozilla Hubs). Classes also used virtual spaces for course discussions on using perspective taking in VR to address bias and empathy, as well as evaluating the design features and affordances of avatars during social interactions. Students visited and interacted in specific environments in the social virtual worlds to discuss the merits of social VR experiences that merge with “real-world” activities (e.g., AltSpace VR, Virbela, Second Life), such as through touring a college campus recreated in AltSpace VR made to provide a sense of community for students getting online remote degrees, and calming nature environments for mental health and wellness. During another activity, an academic expert guided students through their virtual lab to discuss accessibility in virtual worlds for those with disabilities, considering how people engage in social activities that they otherwise are unable to do physically, such as using their avatar to dance. Students also met with experts in industry and academia about topics on tracking and rendering, as well as the use cases and design of social interactions, avatars, and embodied agents in virtual worlds.

3.3 Participants

The study recruited students within the four courses at the four different universities. A total of 68 students consented to participate in the study, with 32 providing demographic information. Students identified their gender identity and born sex. There were no differences in how students reported their gender and born sex, with 16 identifying as men, 15 identifying as women, and one preferring not to self-identify. Participants reported their race and ethnicity as Asian or Asian-American ($n = 13$), White ($n = 12$), multiracial ($n = 4$), African, African American, or Black ($n = 1$), Hispanic or Latinx ($n = 1$), and Middle Eastern ($n = 1$), and their ages ranged from 20- to 54-years old ($M = 25.16$ years, $SD = 7.97$ years). Students reported their prior experience with VR headsets, with 44 %

having never used VR prior to the course, and 56% ($n = 18$) participants with prior VR experience. See Table 1 for a detailed breakdown of students' engagement with various media-technologies.

3.4 Procedure

Students completed all online class sessions remotely at the physical location of their choosing (the courses took place during the COVID-19 pandemic when in-person classes were not feasible). During each class, students and the instructor first meet online in either a Zoom or Microsoft Teams videoconferencing room and then transitioned to a social virtual world. After the in-class social virtual world activity, students and the instructor returned to their videoconferencing room to conclude the class meeting time. Students used a variety of devices to interact within the environments across the multiple courses and class sessions (i.e., VR headset, desktop or laptop computer, and mobile phone or tablet). Students completed a range of one to 6 individual class sessions in a social virtual world ($M = 3.00$ class sessions, $SD = 1.59$ class sessions), navigating the virtual environments during class time. To mitigate the influence of being observed by others on students' virtual world perceptions, no video recordings were made of the class sessions nor observational notes taken during the live class time [13]. Furthermore, we opted to reduce the burden on instructors of having to record their social virtual world sessions, given that not all instructors had the computing power (i.e., strong consistent internet connection, computer storage) and personnel (teaching and maintaining additional software) to record their use of virtual world interactions during class time.

The course instructors selected and incorporated the online social virtual worlds into their online instruction according to the needs and emphasis of the course, which included Altspace VR, Virbela, Mozilla Hubs, vTime, Rumii, and Second Life (see Figure 1 and Figure 2 for examples). The virtual worlds consisted of both public and private virtual spaces and were chosen at the discretion of the instructors to best reflect their course goals. For example, students visited an ethnographic researcher's virtual lab space in a semi-public area of Second Life to learn about accessibility and virtual worlds. Instructors informed students about the potential risk of online interactions with strangers before visiting any public social virtual world. In addition, instructors discussed the ethical use of videoconferencing based on their institutions policies for online learning.

After each social virtual world session that occurred during class time, all students completed the diary entry online (part of a larger study on social connections in VR) asking about any privacy or ethical issues that arose. The surveys were a requirement for each course and used by instructors to stimulate class discussion (via aggregated and anonymized data organized by a research assistant). In addition to discussing their social virtual world experiences, students reflected on how their background and previous experience with virtual environments might impact their understanding of virtual worlds, after completing the initial demographic questionnaire.

At the end of each course, after grades were finalized, students could consent to participate in the study via an online questionnaire. Researchers obtained consent after grades were completed to minimize students feeling that their decision to participate in the study would influence their grades. After all data was collected across all semesters, an outside graduate research assistant that was not a student in any of the courses and not involved in the initial design of the study, separated out and de-identified the data of the students that consented to participate in the study. Instructors were unaware as to which students selected to participate in the study. All aspects of the study were approved by all the involved universities' Institutional Review Boards

3.5 Measures

3.5.1 Demographic Information. Students reported their gender identity (i.e., woman, man, non-binary, a gender identity not listed, I prefer not to identify my gender), born sex (i.e., female, male),

Table 1. Students' Media-Technology Usage over the Six Months Prior to Participating in the Study

Type of Device ($N = 32$ participants*)	Everyday (avg. time/session)	3-4 times a week (avg. time/session)	1-2 times a week (avg. time/session)	Never
VR headset	0	0	9 (37 mins)	9
Console or gameplay	2 (150 mins)	2 (33 mins)	10 (68 mins)	18
Laptop or desktop	4 (150 mins)	2 (180 mins)	11 (50 mins)	15
Smartphone or tablet	1 (60 mins)	3 (23 mins)	18 (22 mins)	10

*Participants reported their experience with multiple devices



Fig. 1. Students in a group discussion at a lounge in a social virtual world by vTime

race/ethnicity, and age. In addition, students reported their previous experience over the past 6-months using VR, games on a laptop or desktop computer, and games on a mobile phone or tablet (i.e., never, several times a week, once a week, several times a month, once a month, less than once a month).

3.5.2 Social Virtual World Diary Entry. After each virtual world session that occurred during class time, students completed an online survey capturing their reflections on their experience within their class context. Within a larger study, two open-ended survey questions asked students to describe: (1) how they represented their identity and self-representation in the virtual world via an avatar, including what they liked and didn't like about it and (2) to consider any threats to privacy they experienced during their interaction or any ethical concerns that came to their attention.



Fig. 2. Students exploring in a social virtual world by Mozilla Hubs

4 Results

4.1 Coding Techniques and Schemes

The data set consisted of all the diary entries that students completed after each class session that used a social virtual world, and the individual diary entry acted as the unit of analysis. We developed themes on students' privacy and ethical concerns about using social virtual worlds in a formal learning context by applying Braun and Clark's 6-phase process for thematic analysis [12]. First, one researcher reviewed the initial data set and identified diary entry responses that explicitly referred to an aspect of their virtual experience as a privacy or ethical issue. Then, the first researcher identified a preliminary list of codes and themes across all diary entries. Next, the first and second researchers collaboratively identified and defined the initial codes. The two researchers sorted and grouped the codes into overarching themes using Figma FigJam Board as a visual mapping tool. This process resulted in the development of a code book, which guided the two researchers in an iterative and holistic coding process across the entire data set to identify themes surrounding student privacy and ethics concerns when using online social virtual worlds during class.

When developing the codes and themes, the researchers applied inductive coding to the data, utilizing both the rights and care approaches to ethics [29, 56]. Kwan [29] argues that "simply applying general moral rules in an automatic or top-down way will often fail to appropriately engage with the nuances and complexities present in our caring relationships." According to the rights approach to ethics, we coded responses that reported observations or experiences that impacted students' rights to personal agency, identity, or personal information. Applying a care approach to ethical issues, we coded student responses if students described elements that impacted their psychological or emotional comfort related to their virtual bodies (i.e., avatar) and/or social interactions with others in the virtual environment (e.g., violating their well-being or safety).

Table 2. Privacy and Ethics Themes by Devices Used

Privacy and Ethics Themes (<i>N</i> = 102 theme instances)	Desktop/Laptop (<i>n</i> = 58)	HMD (<i>n</i> = 30)	Phone/Tablet (<i>n</i> = 3)
Interactions with strangers (<i>n</i> = 32)	18	13	1
Violation of social norms (<i>n</i> = 22)	15	6	1
Collection of user data (<i>n</i> = 13)	8	4	1
Risks to vulnerable populations (<i>n</i> = 8)	4	2	2
Features reducing concern (<i>n</i> = 27)	17	10	0

Table 3. Privacy and Ethics Themes by Avatar Type

Privacy and Ethics Themes (<i>N</i> = 102 theme instances)	Created avatar resembled self*	Created avatar different from self*	Avatar randomly created by virtual world*
Interactions with strangers (<i>n</i> = 32)	14	7	5
Violation of social norms (<i>n</i> = 22)	6	6	4
Collection of user data (<i>n</i> = 13)	6	3	1
Risks to vulnerable populations (<i>n</i> = 8)	4	3	1
Features reducing concern (<i>n</i> = 27)	9	11	1

*Nineteen responses didn't indicate if the created avatar's appearance matched the self

4.2 Overview of Privacy and Ethical Issues from Social Virtual World Classes

Analyses identified 91 entries about ethics and privacy (out of 224 entries), across 39 students (out of 68 total students). Across the 91 virtual world entries, a desktop or laptop computer was used 58 times, a VR headset (i.e., HMD) used 30 times, and a phone or tablet used 3 times. Thematic coding identified five themes surrounding students' privacy and ethical concerns while using social virtual worlds in their class sessions (Tables 2, 3): (a) students struggling to manage their identity between known people and strangers, (*n* = 32), (b) concerns about violating the social norms of personal space (*n* = 22), (c) concerns about tracking and storing user data (*n* = 13), and (d) the ethics of vulnerable populations experiencing harassment, nudity, and loneliness (*n* = 8). Concerns about interacting with strangers included not only the discussion of directly interacting with strangers, but also describing concern over the virtual space being public and the possibility of interacting with strangers. Student concerns about capturing user data included revealing personal information such as their name, their appearance, audio, and visual information from videos, as well as downloading software and creating account information on their personal devices. In addition, students discussed features of the virtual world that reduced their concerns (*n* = 22). Students described the avatar that they used for each of the sessions (Table 2). Analysis revealed that students either (a) created an avatar to look like themselves (*n* = 35), (b) created an avatar that appeared different from themselves (*n* = 26), (c) allowed the system to randomly assign them an avatar (*n* = 11), or (d) failed to identify if the avatar they created or selected was similar or different from them (*n* = 19). Responses that described non-human avatars were coded as different, regardless of if they explicitly stated that the avatar was different from themselves.

4.3 The Struggle of Managing Identity Between Known People and Strangers

Across courses and institutions, students navigated both private and public social virtual spaces. Access to private spaces within a virtual world typically required a protected password (e.g., Mozilla Hubs) or specific link. Public social virtual worlds only required creating an account to enter an open-world environment, interacting with unknown people from around the world (e.g., Second Life). As the most mentioned concern, students expressed anxiety about interacting with strangers during class: *“I definitely was not comfortable talking to that random ‘John’ ”* (P28, HMD, Session 4). They also noted that strangers could see identifying information, like names, that the virtual world automatically revealed to others: *“The only threat to privacy would be a random guy joining at one point, but I think he could only see our display names”* (P64, HMD, Session 3). In some cases, students craved more privacy than if they met a stranger in a public space in the physical world than in the social virtual world, such as wanting to hide their appearance. For example, students felt that they were more vulnerable if their avatar’s appearance closely resembled their actual appearance even if there wasn’t a way for a stranger to confirm that: *“When we talked to the stranger a bit, I felt a bit vulnerable because our avatars look a lot like our real-world selves”* (P14, HMD Session 2). Other students felt safer around strangers if their avatar did not resemble them, even if part of their actual name was shown: *“I didn’t notice any privacy concerns because the avatar looked nothing like me, and I only used my first name”* (P42, HMD, Session 2).

While students wanted to protect their privacy from unknown people, they struggled with wanting to share their identity with their classmates. Specifically, they wanted to present to their classmates an avatar that matched their physical world name and appearance. For example, P32 emphasized the importance of seeing familiar faces:

“The only big drawback is you can’t see the real faces of people, which I appreciate when talking to strangers but I would prefer real face contact with people I know.” (P32, Desktop, Session 2).

In another instance, a student felt more comfortable when avatar names matched people’s “real” life names:

“I didn’t know whether my real name showed at the top of my avatar, so I would be worried if someone could recognize me when our professor asked us to split into groups to have a discussion” (P34, HMD, Session 1).

In addition to not being able to identify their peers, students noted that anonymity via avatars could be a liability to their safety and privacy in public virtual spaces. Specifically, students pointed that anonymity made it more challenging to identify if an unwanted person joined their group: *“It was strange because most of us didn’t have our names over our avatars so it was tricky to tell who was who, or if someone was missing. It could be very easy to enter the room as a stranger and not be noticed”* (P18, HMD, Session 1). P9 expressed discomfort about not being able to accurately identify their classmates, particularly when strangers from the social virtual world joined their class activity. In addition, they felt uncertainty about how anonymity could cause people to misbehave:

“While at times anonymity is nice, I really disliked it in this virtual world because I could not tell who my classmates were at any given time. And there were people in the world and on our tour who weren’t in the class and those interactions could be uncomfortable. Everyone was very respectful in the virtual world though but it was just difficult to know if that would always be the case given that everyone is anonymous” (P9, Desktop, Session 4).

4.4 Privacy Concerns about Violating Social Norms of Personal Space

Students conformed to social norms about interpersonal distance with classmates and strangers alike in the virtual spaces. When someone breached their virtual personal space, students felt discomfort and a violation of their privacy, regardless of knowing that their avatars were digital and not physical beings:

“I was a bit concerned with privacy in this virtual world, especially at one point when a stranger entered our room and was sitting right next to me. I know the stranger was nowhere near me in the physical world, but I still got a sense that my personal space was being violated, which was a really weird experience.” (P14, HMD, Session 2)

While a violation of personal space was particularly salient with strangers, students felt uncomfortable when their classmates violated these norms as well: *“In one of the stages where we were dancing, two other classmates were dancing really close to me and it made me feel uncomfortable so I moved away”* (P36, Desktop, Session 2). Some students described feeling uncomfortable when their avatars’ body responded to touch, similar to how their physical bodies would respond: *“I felt very uncomfortable with how close people could get to my avatar. This was also the first time that I noticed being jostled and pushed by others as they were walking through”* (P36, Desktop, Session 4). Furthermore, students noted that they experienced unwanted touching by other people in the virtual environment: *“When I was exploring on my own, another person also got very close to me and put their hand on my avatar’s face, which made me uncomfortable.”* (P12, Desktop, Session 3).

Possibly to minimize being able to “touch” others, some virtual environments removed physics from the avatars, so that students could pass through other virtual people like ghosts. However, students found this feature unsettling and still a violation of physical autonomy. Even when done unintentionally, students disliked having any parts of their avatar move through another person’s avatar: *“When I was trying to move my body around, my body cut through others’ body, which made me feel really weird”* (P34, HMD, Session 1). Students often described the ability of avatars to pass through each other as disrespecting a person’s personal space, as opposed to identifying this ability as a unique feature of using a virtual environment: *“I found it awkward that people could walk through other people on the platform - and not have to respect their personal spaces”* (P33, Desktop, Session 5). P36 described the suddenness and unexpectedness of someone’s avatar invading their avatar’s personal space as uncomfortable but also as a direct violation of their privacy: *“It was a startling experience when someone walked through me. I wasn’t expecting it and then all of sudden someone was literally on top of me. It made me feel uncomfortable, because it felt like an invasion of privacy”* (P36, HMD, Session 1).

Students also noted that issues of personal space and privacy revolved around the ability to estimate distance in the virtual environment when discussing private information with others. Typically, in the physical world people use proximity to modulate how much others can hear, and virtual environments utilize spatialized sound to mimic this experience. However, P36 pointed out that spatialized sound threatened privacy:

I noticed two people who walked away from the group to have a private conversation, but even though they were quite far away, I could still hear them. In real life you can sort of estimate how far away you need to be to have private conversations, but it’s hard to do that in a virtual environment which doesn’t give us any hints on the boundaries of their spatialized audio. Did the other two people even know that I could hear them? (P36, Desktop, Session 3)

4.5 Ethics of Vulnerable Populations Experiencing Harassment, Nudity, and Loneliness

Students also expressed ethical concerns about the negative interactions in the virtual world that could impact vulnerable populations, including ethical concerns of children in these types of virtual spaces: *“If there aren’t age restrictions on the space, that could present some ethical concerns”* (P47, HMD, Session 1). Commonly, concerns arose on the types of speech and social interactions in public spaces where students encountered strangers, and a lack of clear guidelines on how to keep spaces safe through moderation. P45 noted the potential for online harassment in public spaces in social virtual worlds: *“Ethical concerns with talking to strangers could entail grooming or hate speech”* (P45, HMD, Session 3). Furthermore, when considering the risk of harmful encounters with strangers in the virtual world, students observed the challenge of moderating social interactions in real-time: *“It was a little odd in terms of privacy because I could hear random strangers talking and they could hear me. This could be a s[l]ight ethical concern because I do not know how this would be moderated in real time”* (P60, Smartphone/Tablet, Session 2). In other cases, students expressed concern about a lack of oversight regarding false identities used in the virtual world. For instance, P40 wrote, *“Ethically, the experience could provide some difficulty as the person can insert their own imagery for the avatar with no vetting by the website”* (P40, HMD, Session 2).

With a lack of moderation and the threat of harassment salient, students from marginalized communities expressed concerns about revealing their actual physical identity in these virtual worlds. For example, P44 created an avatar that differed from her physical appearance to feel safer interacting with others: *As a young woman on a foreign virtual world, I felt threatened by the large number of people active on the platform so I dressed up as a white man. But I couldn’t control my voice which immediately gave my real identity away”* (P44, Desktop, Session 4).

More than anticipating the possibility of threat, the lack of moderation in a social virtual world created an unsafe environment in which students witnessed and experienced harassment. In one instance, P56 reported witnessing a stranger verbally assault a classmate:

“In the main room where it was kind of an open world where a lot of kids seemed to be meeting, one approached a classmate and called her a racial slur. The classmate made the avatar skin tone to represent her own and then to hear someone call her a slur was just really bad. I was not sure how to help in that situation because the kid then ran off once we talked about him being a little jackass. I think that raises a huge concern with ethical uses of social VR and how to regulate things like that” (P56, Smartphone/Tablet, Session 5).

Students also encountered unsolicited nudity in the virtual spaces, when anatomical human avatars possessed the ability to be naked: *“Although I did not have any privacy concerns, I do have an ethical concern: some other users’ avatars seem to be partially nude on Prof. [...]’s Zoom screen for unknown reasons. My guess was that those avatars’ costumes files did not load”* (P28, HMD, Session 6). Even if accidental, the ability to create nude avatars let students know that the possibility existed that other users could remove their virtual clothing and reveal their avatars’ bodies to them with or without their consent: *“An ethical concern that arises in Second Life is the ability to have an avatar be clothless, creating issues for younger users on the platform”* (P40, Desktop, Session 5).

Finally, students brought up the concern of the social and mental well-being of people in these virtual worlds; questioning if isolation and loneliness would be reinforced by using these spaces with VR technology:

“When we were talking to the stranger, even though we were in a virtual reality, we still got the sense that the stranger was socially awkward even though in theory this person could have presented any persona he wanted. I wonder if this VR technology becomes widespread will it encourage or diminish socialization skills and will it enhance social connections or promote feelings of loneliness” (P14, HMD, Session 2).

Another student even raised the moral implication of emulating suicide in a virtual world:

“I went up to the top of the lighthouse with a friend and we discovered we can’t just jump off the ledge into the water to go for a swim. I think this was purposeful so that people can’t virtually kill themselves, which is definitely an ethical issue” (P43, Desktop, Session 3).

4.6 The Privacy and Ethical Concerns of Tracking and Storing User Data

Students also questioned the ethics of the social virtual worlds collecting their data. Primarily, students wondered how the virtual spaces recorded and stored their non-verbal and verbal behaviors: *“It’s strange that our physical mannerisms like head movement, eye movement, and speech were probably being tracked. I’m unsure what these types of data would be used for”* (P14, HMD, Session 2). Not only did students express concern about their non-verbal data being captured while using a VR headset, but also when using less immersive technology, like a desktop computer: *“The only concern I had in terms of privacy was that every movement of mine in the virtual world could be tracked, such as mouse clicks, what things I looked at, people I interact with and for how long”* (P11, Desktop, Session 2). Student reflections about capturing personal data also included privacy concerns about social virtual worlds using web cameras (e.g., Gather) as well as those that required entering personal information to create an account.

Additionally, students asked how these virtual spaces managed user created content. P42 wondered about the ethics of the virtual world capturing and storing course curriculum and how long that information would be stored:

“One ethical concern is that the professor included presentation slides in the virtual world, but I’m not sure how Gather Town is hosting those images. Do they keep them locally or on their own server? What happens to those images after we leave the virtual world” (P42, Desktop, Session 1).

And P54 wondered how much the system captured media artifacts they created during their social interactions, like taking a “selfie,” a social act commonly done in the physical world: *“I didn’t think much about privacy at the time. However, I always wonder how much of the interaction is recorded (like the selfie we took)”* (P54, HMD, Session 2).

4.7 Features that Provide Control of Self- Representation Assuages Privacy Concerns

Finally, virtual worlds that provided students with agency over their avatars’ interactions reduced their ethical and privacy concerns. Students felt safe in environments that provided control over (a) managing their identity, (b) when to engage with strangers, and (c) maintaining their personal space. First, students felt safe in environments that allowed them to manage their physical appearance, voice, and name. For example, when virtual worlds contained a combination of a digital avatar and videoconferencing, students liked the option of turning their microphone and video camera off: *“There were no threats to privacy because you could easily turn off and on your video and microphone”* (P1, Desktop, Session 1). In contrast, they felt a threat to their privacy when the virtual world limited their ability to manage their physical identity or environment: *“I felt a threat to privacy when I realized that the backgrounds on the video feeds couldn’t be altered, as with Zoom”* (P6 Desktop, Session 1). P9 expressed issue over the virtual world lacking features that clearly indicated if and when they had control over their video: *“I was not sure when people could see my video icon at the top of their screen. This just made me more conscious of being perceived at times when I was not sure if I could be seen or not”* (P9, Desktop, Session 1).

In other cases, students felt safe using a social online space during class because they were using avatars. For example, P33 felt that their identity was protected because their avatar had low fidelity

(“There weren’t any privacy or ethical concerns, mostly because the avatars in the environment and animal agents were not very realistic”; P33, Desktop, Session 3). In another case, a student likened using avatar to taking on another identity: (“I did not feel that my privacy was invaded during the interactions. I felt a bit like another person”; P54, HMD, Session 1). For other students, hiding personal identifying information like a name, as opposed to the appearance of their avatar was enough to maintain privacy: “I did not feel any privacy concerns since I could change my name and leave when I needed to” (P42, HMD, Session 3). However, the limits on diversity for avatar and environment representation raised a moral concern: “Ethically, I wish there were more diverse options of avatars and locations to choose from” (P31, Desktop, Session 2).

Second, students valued controlling when and if they interacted with a stranger; typically in the form of receiving an invitation or providing a code: “I didn’t have any concerns with privacy or ethics. It felt very self-contained especially since you needed a code to enter the room. If someone were to enter the room though, I think that would feel very scary” (P18, HMD, Session 2). Likely as an unintended consequence, the accept and deny feature acted of entering a private virtual space cued students that their class could be held in a public social virtual world: “Strangers could request to join you or invite you to join them, but since you had the power to accept or deny, it was more so a reminder that you were not alone in the world though you may have been alone in space” (P49, HMD, Session 3).

Finally, virtual worlds that allowed users to manage interpersonal distance towards others reduced privacy concerns: “I liked that some designs took privacy into account. For example, there were privacy zones where only people in the zone could hear each other talk. The doors to some rooms were also lockable” (P33, Desktop, Session 2). Some environments extended the idea of a private space to users’ avatars themselves, allowing them to manage how near others in the environment could be to them: *I appreciated the bubble feature where if we moved too close to another user, their avatar would disappear. This prevented the feeling of discomfort created by getting too close to another avatar*” (P11, Desktop, Session 3).

However, students also identified ways to override the privacy settings in place. P44 confessed that although the social virtual world allowed users to create private spaces, people could override this privacy measure simply by reacting quickly:

At the end of class, I was in the Campfire world when I noticed a small clique teleporting to a private gaming room. Out of curiosity, I immediately clicked the blue hole the second before it disappeared and was transported to a ‘Trending Environment’ which resembled a very expensive looking game room. While this may have been ok since the world was open to all, in some cases, joining a private room when uninvited could lead to ethical issues where unwanted intruders could trespass or even spy [on] the private group (P44, Desktop, Session 3).

In addition, P45 noted that instructors could override student privacy measures without their knowledge through specific virtual world features:

“I was confused about when my professor could be hearing my small group’s conversation and if we would know if she was listening in. I don’t think there are any ethical concerns unless the person who is the host/admin of the environment takes advantage of the listening-in capability” (P45, Desktop, Session 1).

5 Discussion

Our study examined students’ privacy and ethical concerns of using social virtual worlds during their remote online classes and demonstrated the importance and relevance of applying the rights and care ethics to understanding their experiences. The next generation of online learning will

likely continue to utilize social virtual worlds, and our results provide insights on the ethical design and deployment of social virtual worlds to protect the safety and well-being of students in future coursework. Not only can the rights and care ethical approaches be applied to understand student's privacy and ethical concerns of using social virtual worlds in remote online learning, they also provide insights into our findings for crafting the development and use of future social virtual worlds in a learning context. Overall, social virtual worlds will need to replicate some aspects of the physical world, such as adjusting sound when moving away for private conversations, but additionally utilize the unique aspects of avatars in virtual spaces to enhance online remote learning.

The rights lens to ethics focuses on individuals' dignity and well-being, including a right to privacy. In our study, students valued the right to maintain their privacy and to hide physical world identifying information like their appearance, name, and physical environment from strangers. Students often designed avatars that corresponded with their physical world identities and felt that their avatars revealed their personal information when encountering strangers, even though it was unlikely for strangers to know that their avatar appearance matched their physical world appearance. Social virtual worlds in remote learning contexts need to provide students the ability to manage their personal identifying information, beyond using a specialized code or link to create a contained and private virtual space. For example, students in our study appreciated systems that provided a privacy "bubble" in which they could give permission for someone to approach their avatars when strangers joined their class unexpectedly. Using public social virtual worlds, such as open art galleries, provide students with unique learning opportunities, and only using private rooms during class sessions may not be appropriate.

Finally, the right to privacy in an educational setting ties into the collection of data. Some students expressed ethical concerns on data being collected not only from the accounts being made, but from the ownership of the artifacts created in the world, and the tracking of their nonverbal body movements, particularly those using VR headsets. While tracking data allows for avatars to engage with one another in a three-dimensional space, companies need to deidentify data from accounts, reveal what data is being collected in transparent and easily understandable ways, and not to store data once the interaction ends. Furthermore, virtual worlds need to allow students to opt-in to data collection as opposed to opting-out.

In contrast to a rights perspective, the ethical care approach emphasizes the value of social relationships. Students wrestled with how to manage the personal information they shared with classmates versus with strangers, struggling between valuing the ethical right to privacy from strangers and revealing personal aspects of their identity to socially connect with their classmates. This reaction aligns with previous research in a non-learning virtual environment context, where young adults preferred sharing a highly detailed and photorealistic reconstruction of their physical environment in VR with close friends but preferred to blur that reconstruction when interacting with distant friends, classmates, and online-only friends [59]. Our study expands on this previous research by demonstrating that in the context of collaborative learning in social virtual worlds, university students prefer and expect to share an accurate representation of their identity through their avatars to their classmates, but to shroud that information from strangers. As Shroder [46] points out when describing the importance of context when using avatars in social virtual worlds:

Compare two cases: One, a task in a highly immersive [social virtual environment] such as an IPT system where two users are collaborating on a spatial task, and the other a desktop [social virtual environment] where users have cartoon-like figures and the purpose is to socialize. In the former, avatar appearance may be of negligible importance since the users are almost exclusively focused on the objects and the task, whereas in the latter the users may be searching for clues about the other users' identity in their avatar appearance

because the features of the avatar, even if they are very basic, may be an important indication or clue about how the users choose to express their identity ([46] p. 713).

To continue to reap the benefits of public social virtual world spaces in online learning and maintaining the ethical and privacy rights and social relationships, settings need to allow students and instructors to mask and reveal aspects of their identity dynamically in real time. One design option could include setting up an avatar to reveal one identity to a preselected group (i.e., classmates), and then provide another identity or blur that identity to another (i.e., strangers). Social virtual worlds would then lean into the unique features that allows for what Bailenson and Yee call “transformed social interactions” [9], in which a person’s physical world actions and appearance become decoupled from their virtual representation depending on the audience.

Students also identified virtual eavesdropping as issue that arose because of how spatialized sound was incorporated into the classroom. In some virtual worlds, such as Gather, instructors could listen in on student conversations from any location in the virtual space. In other virtual worlds, during group discussion, students reported being able to hear the conversations of other groups even when moving away. To maintain privacy, social virtual worlds need a nuanced approach to sound. For example, instructors could still easily transport to other student groups across large areas to check in on them, but systems would need to provide a cue that signals them approaching, such as their avatar slowly appearing, written text, an audio or a haptic cue allowing for greater accessibility options for students. Additionally, honing how spatialized sound travels in group settings, would allow for privacy zones to be easily added for participants, which can allow for better concentration on the conversation in addition to providing privacy.

The care ethics approach also highlights the connection between emotions and the body, and students in our study treated their avatars as an extension of their own bodies. Social virtual world designs could apply the ethical care of protecting the bodies of students’ avatars. For example, students expressed strong negative emotional reactivity to their avatars being walked through. However, completely stopping avatar bodies from crossing other avatar bodies may be a hindrance during specific learning activities. Literature on avatar crossing shows that people prefer to share virtual space to get a better view in busy settings [44], like an art gallery or to pass through a narrow area. While current systems may provide permission that allow other people to approach another person’s avatar, as students pointed out, an additional layer to the design could allow students to decide if and when they would allow avatar crossing or having their avatar touched by others. Mesh colliders on avatars could be programmed to stop avatars from automatically moving through other people’s avatars and also to reduce the possibility of getting hit by another person’s avatar.

Students also described the need for both the ethical right to protect and the ethical care of vulnerable populations such as children and people from marginalized communities in social virtual worlds. Closely tied with a lack of moderation, instances of racial slurs and unsolicited avatar nudity arose in student classroom sessions. Systems can help alleviate potential issues of harassment and inappropriate behavior by incorporating rigorous moderation that provide users the ability to quickly flag concerns, through a combination of human moderation and AI-powered embodied agents [19]. For instance, 8- to 16-year-old children felt safer and less sad in VR when an embodied agent moderator intervened during a disruption [19]. In addition, moderating systems can identify behaviors related to mental health issues such as loneliness and isolation. Some students in the study discussed the ethical issue of virtual suicide acts by avatars and the possibility of social virtual worlds exacerbating loneliness. Design features could allow moderators to identify concerning behaviors and connect students to additional resources.

In addition to developing specific design features, our results also show that policy needs to address harassment and assault that occurs in these spaces, as students treat their avatars as their own bodies. For instance, universities will need to consider applying Title IX policies[1] on sex discrimination and sexual harassment to student avatars in social virtual worlds. Next, researchers, designers, and policymakers need to debate the ethics of recording student behaviors in social virtual worlds—how data is used to enhance student learning while protecting them from exploitation by commercial entities. Finally, students often framed their concerns of using social virtual worlds during class as personal violations, but few stated ethical concerns for society at large. Future courses teaching about or simply using social virtual worlds for instruction would likely benefit for providing digital literacy on these types of virtual spaces, where students can evaluate and debate their ethical implications for society at large.

5.1 Limitations and Future Directions

The limitations of our study provide opportunities for future research directions. We gained insights on the student experience of social virtual worlds in online learning in a field study across multiple universities courses. However, by observing classes where the instructors decided how to incorporate social virtual worlds into their courses, the study lacked control over which social worlds and devices were used and when they were incorporated into class time. Instead, the results of our study could be used to examine the impact of the specific themes of privacy and ethical concerns students reported on more specific learning environments in online social virtual worlds. For example, a future study could examine how the specific topics and issues identified in our study could impact student learning across various courses and instructors as well as examining the impact of specific devices on students' privacy and ethical concerns. In addition, the number of sessions per course varied, and therefore not all students were represented equally. However, our findings captured at scale the type of social virtual worlds instructors use for online courses, illustrating the benefits and challenges in action. Future research could utilize the topics that students identified from our study and apply them to more specific and controlled studies between courses and institutions. Another study could examine how specific privacy and ethical issues impact learning outcomes and skills, providing insight on how to ethically utilize social virtual worlds at scale.

5.2 Conclusion

Online social virtual worlds promote collaborative learning through a variety of environments and contexts akin to and different from the daily lives of students. Moving forward, we must consider the social, psychological, and moral costs of using social virtual worlds for online collaborative learning to enhance positive student outcomes and mitigate harm.

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