

HCI's Role in the Capitalocene

Lessons Learned from an HCI Master Course Across the Globe

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ABSTRACT

Various concepts have attempted to capture the nature of the contemporary political-economic system of globalised capitalism and its disastrous consequences for the planet, including World System Analysis or the Capitalocene. Especially Decolonial thinkers see its roots in colonialism. The resulting modernity/coloniality structures many aspects of human life everywhere, including gender identities, relationships amongst humans and with nature. Technology plays a vital part, requiring reflections on how HCI researchers can react to these challenges. In a class of an HCI master program, we have attempted to jointly begin to understand HCI's role in the capitalocene by studying relevant concepts and empirically investigating specific local yet connected phenomena. With participants being distributed across the globe, we were able to study different shared yet locally specific phenomena inspired by multi-sited ethnography. In this paper, we report on the structure and experience of the class as well as our findings.

CCS CONCEPTS

- Human-centered computing → HCI theory, concepts and models.

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KEYWORDS

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1 INTRODUCTION

This paper aims to show how a semester-long class in an HCI master's program can develop responses to the crisis of the Anthropocene. With our class, we try to fill what we perceived as a gap in the education of HCI scholars as future designers. We believe to fill some of the gap with concepts, activities, and dialogue that generated projects elaborated by the students. Through that process we believe we can find ways in which HCI students can contribute to an emerging understanding of the role of HCI in this crisis, building on their personal experiences. We believe that the combination of 1) concepts that explain the crisis, 2) concepts of HCI and 3) personal interests is a tool to play a positive role in the crisis of the Anthropocene, as part of their future profession.

Although rightfully contested, the idea of the Anthropocene [27], and its critical cousin, the Capitalocene [60], accurately capture the home-made crisis our planet is facing at the beginning of the third millennium. It describes the planetary, interconnected and complex nature of processes through which the face of the planet earth is shaped by human activity, resulting in climate change, massive loss of biodiversity, and ultimately threatening the possibility for life on earth, for humans and non-humans alike.

However, whereas the Anthropocene is relatively silent on how we arrived there, vaguely locating responsibility in all of humanity through the use of the word *Anthropos*, Greek for human, the idea of the Capitalocene, as the name suggests, locates the responsibility firmly in globalized capitalism and its need for *Cheap Nature* [Ibid.]. Therefore, responsibility for this crisis does not fall on all of humanity equally, but on a specific way of living on this planet – capitalism – which is rooted in legacies of colonialism and ongoing unequal global relations and exploitation. This crisis of modernity becomes evident in innumerable instances, from the loss of forests in central Europe to climate change and monocultural plantations

[49], to deforestation in Brazil (to make way for farmland) [35], oppression of minorities or women to racism, with roots in colonialism and slavery. It is perhaps the - at the time of writing - still ongoing global Covid-19 Pandemic which embodies this most vividly. Brought on by the destruction of nature and human incursion into wildlife habitats [19–21, 89] and spread rapidly around the planet with new mutations, the virus has found a perfect host in the globally connected and hyper-mobile humanity. The pandemic also affected education and hence our course, on which we will report in this paper, in some sense facilitating our multi-sited [55] research, embodied by the projects the participants developed during the course.

HCI and the design of digital technologies undoubtedly play a significant role in the Capitalocene. However, this role is globally distributed. Its complexly systemic nature makes it challenging to grasp for HCI research, let alone decide how we as individual designers and as a discipline are to respond. In this context, some advocate a somewhat utopian vision of technology as a democratic solution to complex problems of human nature [71]. Others criticize the tendency towards a certain over-reliance on *technosolutionism* [52]. The answer, surely, lies somewhere in between: Research into Sustainable HCI [12, 29, 78, 79], for instance, has already made clear that HCI is not only part of the solution, but part of the problem, and through its use of physical resources and energy, digital technology severally contributes to unsustainability. Throughout the years, HCI scholars offered similar reflections about the manifold challenges HCI faces in a globalized world [34, 50, 51, 61]. Examples also include notions on Value Sensitive Design [33], Feminist HCI [11], Intersectional HCI [68, 69], Postcolonial Computing [42], Decolonial Computing [10]. Here lies the strength of HCI – its considerations of the social, societal, ecological, political, and ethical implications of technology in a globalized world [40].

However, such concepts are of less value if they are not reaching those who are potentially developing technology. As educators of (future) designers, universities arguably have a responsibility to draw their students' attention to such concepts and sharpen their mindset in the process. We might require a drastic shift in HCI curricula, including ways to evaluate putative *knowledge* and opening up spaces in educational settings where diverse students can bring a growing body in their situated perspectives. Raising topics such as the ones mentioned above entails a transition of thinking *HCI standard education* or *one fits all solution of learning* to an HCI that matters to each student. It also demands building trust and rapport through sharing, getting to know the interest of one another, and aiming towards the development of something more critical for society. Eventually, it might mean confronting students (and lecturers) with topics they might feel uncomfortable about.

In this paper, we report the attempt to embed this need for change and transition into a graduate course we called “HCI for Transition” (HCI4T). The course is part of a master’s program in Human-Computer Interaction. We introduced concepts and studies that explore and illustrate the challenges of the third Millennium and jointly attempted to understand HCI’s role in the Capitalocene through four specific and globally distributed case studies conducted by the students. Due to the ongoing global pandemic, we found ourselves unable to convene and study in the same location but were distributed worldwide, from South America to North

America, Europe, Africa and Asia. This allowed us to bring together locally specific perspectives and experiences on shared issues and explore similarities and differences in global phenomena manifestation.

The contribution of this paper is as followed: 1) We report on the setup of the course, including its conceptual foundations, as well as the various activities we conducted as part of our shared learning experience, and how these created a foundation for a mutual, collaborative and often a very personal learning experience. 2) We shortly present case studies from the students that were the base for their assessment to present the individual outcomes of the course. 3) We discuss our lessons learned, which form a basis for our subsequent proposal of ways for a more mindful HCI education and encourage other educators to pick up our experiences. The first three authors of this paper are the lecturers, and the last author is the supervising professor of the department, while the remaining co-authors attended the course as students. As this is a personal report which reflects sentiments of everyone involved, the following descriptions will frequently use the term *we*. Where we try to separate the activities and experiences we use the terms *facilitators* and *participants* or *students* to show the respective perspective and avoid potential confusion for the reader.

2 CONCEPTUAL FOUNDATIONS

In recent decades, scholarship outside of HCI has with increasing urgency attempted to grasp and conceptualize the interconnected nature of crises humanity and the planet face. They hinted to aspects such as mass extinction of non-human life and loss of biodiversity, forced migration of millions of people [72] from war, poverty and (directly or indirectly) consequences of the climate crisis, the often hostile response to migrants by for example the European Union as well increasing racism, discrimination and right-wing populist politics. Often, the idea of the Anthropocene serves as a successful starting point for such attempts. It was proposed in 2000 by meteorologist Paul Crutzen as a term for the current geological era, describing the central role humankind has come to play in shaping the planet and its ecosystem [27]. Even though it did not yet gain acceptance as the geological epoch’s *de facto* term, it has quickly gained popularity. However, it has also inspired substantial criticism, as we have alluded to in our introduction, and the creation of alternative terms, including the plantationocene [39], the chthulucene [Ibid.], or the Capitalocene [60]. While these terms are not meant as serious contestants as titles of the epoch, they embody specific critiques and ideas, making them tools to think with. For the sake of this class, we have primarily engaged with the critique embodied in the term Capitalocene. Proposed by Moore [Ibid.], the term does not deny the entanglement of human history and planetary history and the most profoundly destructive influence humans have on the planet but tries to address how we arrived there. Whereas the Anthropocene vaguely points to all of humanity as the culprit for the current state through its use of the term *Anthropos*, the Capitalocene strictly locates responsibility in global capitalism. It draws attention to the fact that not all humans have contributed to this crisis equally, but rather through globalized capitalism and its unequal global economic relations, some contribute much more

to this shaping of planet earth than others (e.g., through CO₂ emissions, extractivism, mining, etc.). A specific mode of being on this planet and relating to it has led to the current state: global capitalism and its reliance on Cheap Nature. The term also points out that global capitalism is a historical process, with roots in colonialism that has led to what Wallerstein calls the modern (capitalist) world system [90] and its division into centers and peripheries. Recent anthropological studies such as the work of Anna Tsing have aimed to empirically, ethnographically examine this world system, for example through the ethnographic study of supply chains [86] such as those of the Matsutake mushroom [87].

Such conceptualizations of the World System and its investigation led us to decolonial thought, especially Latin American decolonial thought, including the work of e.g., [30, 38, 58, 66, 91]. By studying the influences of historical colonialism, they point to the many ways in which colonialism shapes modern life. While historical colonialism has ended, its influence is ongoing as “Coloniality.” Grosfoguel [38] highlights how colonialism created a world system through the introduction of several hierarchies, including (amongst others) global class formations and an international division of labour, a global racial/ethnic hierarchy that privileges Europeans over others, a global gender hierarchy that privileges males over females and patriarchy over other gender relations, a global sexual hierarchy that privileges heterosexuality over homosexuality or other forms of sexuality, and a religious or spiritual hierarchy that privileges Christianity over other spiritualities and more. These hierarchies make up modernity. To highlight the impossibility of dissecting modernity from its colonial roots, they proposed the term modernity/coloniality, which we understood as a sister term to the Capitalocene as they refer to the same time and point to similar challenges. To further this line of thought and explore the role of racism, sexism, and discrimination in our time, we explored issues of diversity and the lack thereof and concepts that aim to address and remedy this inequality. We analyzed different facets of identity that shape people’s lives and experiences (such as sex and gender, sexual orientation, ethnicity, socioeconomic and family status, physical abilities, religious, cultural and political beliefs, etc.) as well as matters of intersectionality (which describe the nature of multiple oppressions) respectively multiple identities. The aim was to reflect on one owns gender identities to gain an understanding of being a gendered being as well as the implicit values, assumptions and stereotypes that come along with socialization. We also explored the several, often contested, forms of feminism which all examine at the very least the various reasons for gender inequality and share a similar understanding of emancipatory potential. While some forms of discrimination and violence, including the patriarchy, have existed in various ways before the onset of globalised capitalism, both the literature on Capitalocene as well as some decolonial literature including Ramon Grosfoguel introduced above [38] argue, that colonialism has introduced specific forms of systemic discrimination, including sexism and racism, and that these make up an integral part of the Capitalocene or coloniality/modernity. Oyèrónké Oyewùmi [63], for example, has studied how colonialism has changed gender relations and gender discrimination for Nigerian Yoruba society. Others, such as ecofeminist Vandana Shiva [77] have highlighted how colonialism and coloniality invalidate and eradicate other ways of knowing and belonging to the earth -

a process that Sousa Santos terms epistemicide [76]. Drawing on Carolyn Merchant [57], for example, she makes the point that a shift from understanding earth as a nurturing mother to manipulatable matter, this facilitates exploitation and destruction in the capitalocene. The entanglement of various forms of discrimination, economic systems and environmental destruction are complex and deserve further attention. However, for our class we presented them as related issues, joined together in the Capitalocene, following the work of Moore [60], Grosfoguel [38], Oyewùmi [63] and Shiva [77].

Throughout all of this exploration, we intended to link back to HCI work wherever possible to consider how the abovementioned notions influence design and usage of computing technologies. We dove into feminist HCI (e.g., [11]) and intersectional HCI [68, 69], to understand how HCI scholarship and design addresses issues of gender and sexual discrimination. We explored post- and decolonial HCI [10, 42] as well as the reliance of computing to mining and extractivism, including the violence and ecological destruction associated with it. We discussed sustainable HCI [29, 61] and examined attempts to include spirituality in HCI [56, 92, 93]. Furthermore, we included research ethics and morals in general as well as methodological HCI considerations such as Participatory Action-Research [31, 32, 46], Participatory Design [15] or Value Sensitive Design [33].

Scholarship in HCI has also begun to address the global, complex, and interconnected nature of these challenges through a small number of publications [34, 50, 51]. Especially previous LIMITS conferences have provided a home for debates on HCI’s role in climate change, (un)sustainability, capitalism, decreasing survivability or the challenges of refugees and migrants (see e.g., [18, 48, 53, 73, 74, 83]). Nevertheless, HCI faces considerable difficulties in understanding and examining its role in the Capitalocene, its contribution to it, and the potential ways of departure it might offer. On the one hand, this difficulty lies in the fundamental role computing technology plays in the Capitalocene. It both directly depends on extractivist modes of relating to the natural world and Cheap Nature through the use of metals and minerals in the manufacturing of its physical components but is also part of the infrastructure that enables economic expansion and globalization - itself a product of complex global economic relations as well as deeply rooted in Eurocentric humanism [10, 82]. How is one to escape from this fundamental entanglement? On the other hand, the academic tools of HCI are ill-suited to investigating and addressing the distributed, in a way place-less nature of the Capitalocene. HCI studies investigate behavior in *specific* places and contexts, whether they are online or physical, and develop technological artefacts and interventions in specific places and contexts. However, as Light et al. point out [50], one meaning of the Anthropocene is that all of life is forced to interact with human technology. How can we conceptualize and enact such a distributed and involuntary form of interaction?

In our view, these are crucial questions for HCI to answer in order to develop an appropriate response to the crisis that terms like the Capitalocene describe. With our class then, we aimed to fill what we perceived as a gap in the education of HCI scholars and future designers. We wanted to introduce these modes of thinking about our world and the interconnected challenges we face and jointly begin to understand ways in which HCI needs to undergo a transition to play a positive role in the Capitalocene, and how HCI

might be able to contribute to a transition in other domains. Hence, we named our course “HCI for Transition” (HCI4T).

3 ACTIVITIES OF OUR COURSE

The name was inspired by the Master program “Economics for Transition” completed by the first author at Schumacher College [7]. The college has a reputation for transformative nature-based and cutting-edge learning. The College is located in the same city where the movement *Transition Town* [8] was founded – a grassroot community movement that aims to increase self-sufficiency and community awareness about the climate destruction, and economic instability. In that direction, HCI4T followed a socio-constructionist [36] perspective on learning and education. Such an approach understands knowledge as a contextual and situated collaborative construction process. Knowledge is thus created by the process of negotiation and sharing meanings amongst the involved parties. This approach requires an active role from the learners which presents a drastic shift from the teacher-centered *chalk and talk technique*. The lecturers explicitly understand themselves as co-learners, as they receive the viewpoints of their students. Their main task is to prepare the lectures and offer stimuli in the form of learning content, thus proposing meaningful hooks for discussion and activities. This relies on a high degree of communication between all parties involved and a certain level of equality of the interacting partners. Constructionist paradigms emphasize work on personally meaningful topics or artifacts which is why additionally we followed notions of project-based learning [67]. The latter emphasizes active construction, student autonomy, and high-quality group work [17] by engaging students in complex problem situations (situated learning) over a longer time [41, 47]. The two main outcomes of this process were: (1) inspired students who are encouraged and challenged to act and to be uncomfortable; (2) paper reports which formed the base for assessment (see below).

According to our aims, the course description contained questions such as “*What role does HCI research play in a world increasingly characterized by humanity’s desire for accumulation - of capital, data and destruction? How can we make HCI research relevant in a time of planetary degradation and mass extinction?*”. HCI4T was a non-mandatory, elective course. The number of participants was limited to 15, as vivid discussions were a major requirement. In the end, eleven students took the class (some more students enrolled as well but had to drop out due to scheduling conflicts).

The lecturers’ intention was confirmed by positive reactions from the outset. Even before the course started, a student replied to the lecturers via mail: “*I have never read a more amazing course description! I am already very excited.*” The same sentiments could be felt during the first until the last session.

The three lecturers of this course have diverse expertise and research interests, ranging from the role of digital technologies in rural Latin American communities, designing for challenges of migration to Feminist HCI. All three are PhD students. Usually, they held the course together which surely is unusual in university learning settings were only one tutor is responsible for a lecture in a classroom setting. We however experienced a substantial benefit in it, as it contributed to the creation of community between lecturers and master students. The three lecturers are of Brazilian,

German and German-Iranian heritage. The course drew students with heritage from Germany, Mexico, Iran, U.S., Ghana, South Korea, Paraguay, Bangladesh, Colombia and Sri Lanka/Indonesia. Although we initially planned at least a hybrid-format, which would have included walks in the forest, the pandemic situation only allowed a digital format. Thus, the course was entirely held via Zoom. This however also opened up opportunities. By being unable to come to Germany, where the university is located, the students participated from all over the world. Countries of residence at the time our course took place hence included Germany, Netherlands, Iran, South Korea, Mexico, Paraguay, Bangladesh and the U.S..

Our course consisted of 14 lessons. Throughout the initial lessons we introduced the concepts mentioned above in lectures, followed by discussions. During this first half we presented various concepts drawing on work outside of HCI and trying, where possible, to find related work within HCI. The discussions served as an opportunity to relate the concepts to the personal experiences of facilitators and learners alike, as well as to the field and practice of HCI. In parallel to the theoretical discussion, in every session we would engage in personal conversations, where we would present our ancestors’ path, share and connect to the nature in our neighborhood, talk about our family, music tastes, musical abilities, cook, etc. At the end of the first half of the class, we engaged ourselves to add our interests in the Miro board. Based on that, we were ready to move to the second half of the course, where we would combine the learners interests (what matters to each of them), the HCI4T concepts, and HCI themes.

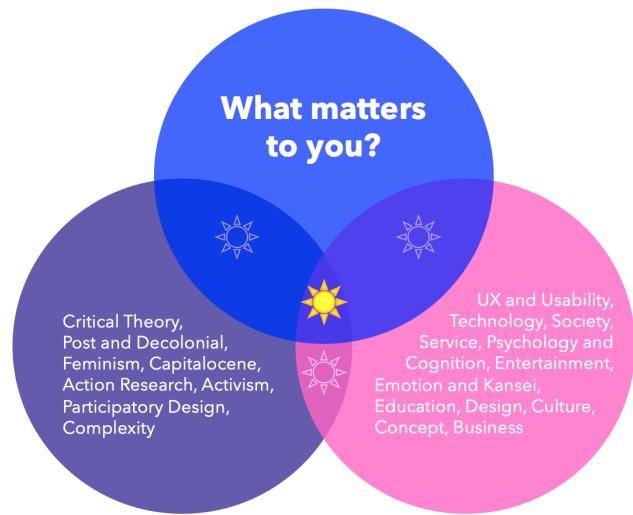


Figure 1: The three main interest of the course

The second half of the course was dedicated to project work. For this part, the participants built on the previous discussions, especially their personal experiences and interests in relation to the introduced concepts, and develop projects that would help us answer the broad and open-ended question: what role does HCI play in the Capitalocene? Students formed four groups of three people each and decided on topics or phenomena in alignment with personal interests and passions that they were going to investigate

empirically and analyze using the works introduced before. This resulted in the four projects and essays which we describe in Section 4 below. These projects each investigated specific phenomena that embody aspects of the Capitalocene, modernity/coloniality and the crises described with these concepts, and where possible formulated potential means for HCI to act in relation to these phenomena. Together, they loosely form a multi-sited ethnography in and of the world-system [90] in the sense of George Marcus [55].

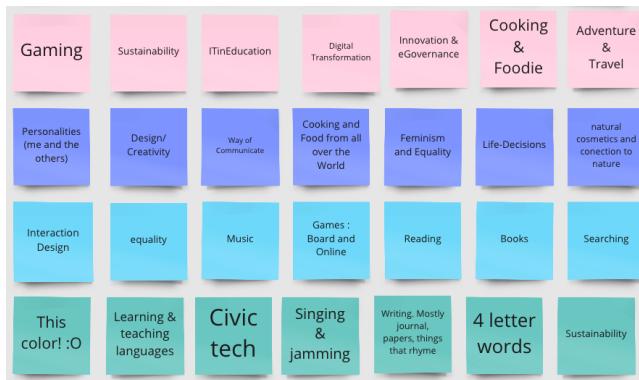


Figure 2: Examples for personal interests

Throughout the course we also engaged in a variety of activities that do not follow the traditional model of lectures, but were intentionally designed to create trust, companionship between lecturers and students and facilitate the sharing of questions, interests, and emotions including doubts and fears. Often, these activities included an element of discomfort that needed to be addressed and dealt with, but also included the sharing of (free) gifts and engaging in a meditation session under the guidance of an external facilitator trained in European Shamanism. What we learned in the course thereby became entangled with how we learned, both representing a mutually supporting divergence from HCI *business as usual*.

These activities included, for example, to look into the eyes of another participant for a minute in silence, type in the Zoom chat nice characteristics about each of us, or to share a personal element of their surroundings. Here, participants shared trees outside their apartments or houses, or an altar constructed for the Mexican *Día de los Muertos*. For some of these activities everybody was encouraged to engage in them, with the option of not participating also open to everybody, but other activities included a voluntary sharing of e.g., an experience in the last week that we felt grateful for, or a creative output. In some sessions, participants would read poetry, share drawings or perform music. The aim of these activities was on the one hand to build trust, familiarity and openness, and thereby create a safe space, where all of us would be able and comfortable to share how the topics of the course affect us personally, including feelings of doubt, uncertainty, vulnerability or fear. On the other hand, the discomfort of the activities built on the allegory of the growing lobster: when a lobster grows, it begins to feel the discomfort of a shell that has become too small and has to finally leave the shell. Its growth and discomfort are directly connected [59].

To make sense also of the emotional and individual aspects of our learnings, the student participants were encouraged to keep voluntary journals of their experiences throughout the course, which they could submit at the end together with the results of the project work. The journals could take any form the participants felt comfortable with, written text, blog post¹, poetry, drawings or other kinds of images. The students that submitted their diaries made ample use of this creative freedom and included pictures, screenshots, doodlings, text and content from other sources where they found additional inspiration during the course. The diaries included references and memories of specific sessions, notes about the content but also about emotional reactions or personal questions that emerged during the process.

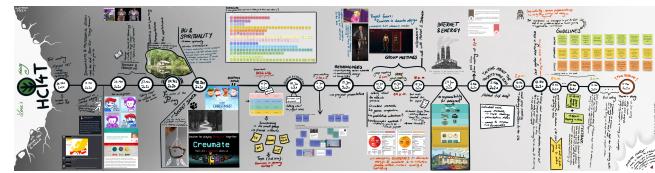


Figure 3: Diary of one of the authors Lena Hieber

In a similar manner, the close entanglement of HCI with the crises of the Capitalocene is bound to create discomfort, when we discuss how our discipline and profession contributes to these crises. It often arises through an ongoing voluntary blindness to our planetary limits, that now involve the unlimited digital world. During our class, students were engaged in measuring the footprint of their own or favorite website [2, 4], in learning what is the carbon footprint of streaming a video [9], where the metals and minerals needed for their electronics come from [1] and about the consequences in the *Global South* when those minerals are demanded by the *Global North* [54]. Together, we also estimated that for each Zoom call, each participant would release 250 grams of CO₂, and in total the HCI4T emitted at least 56 kilos of CO₂ during the four months of classes. At the end of the 90s there was the belief that the internet would lead to reductions in energy consumption and greenhouse gas emissions. However, as we are heading towards infinite data production and accumulation, the technological waste generated to make the digital world work is growing. During the course, we presented cases that show that the Internet is the largest coal-fired machine on the entire planet and make us aware of the consequences of lack of limits in the generation of data, use of digital traffic and cloud storage.

4 PROJECT WORKS

A crucial element of the HCI4T experiment was project work undertaken by the course participants. Building on Marcus' Multi-sited ethnography [55], the plan was to divide into small groups and ethnographically investigate phenomena close to the students (geographically and emotionally) and analyze them using the concepts introduced in the earlier half of the class, as mentioned above. Through this process we wanted to obtain a distributed, situated and necessarily partial understanding of HCI's role in the Capitalocene. The projects were also the foundation for the participants'

¹<https://www.notion.so/HCI4T-Diary-daeff577f37184fb49a3f52e344fa4649>

unfortunately necessary evaluation, a dilemma we will discuss in a later section of the paper.

Picking appropriate topics was not a trivial task. In order to find common interests between the individual participants, we asked everybody to share a list of interests, hobbies or passions on a common online whiteboard (figure 2). As a next step, everybody picked a limited number of these interests, and briefly presented them to the rest of the group. Everybody was also encouraged to think about how these interests manifest in their own lives and neighborhoods, and how they relate to the concepts and studies discussed so far in the course. Based on these presentations and the list of interests, which were also visually recorded in the shared whiteboard, the facilitators suggested group constellations to the students, including possible topics. Some students switched between groups, thereby also reframing the topics slightly. This process resulted in four groups with three members each. The groups then had three months to work on their projects. They could decide between several deliverables: 7-8 pages of essay, or 3-5 pages of essay in addition to a concept for a technological artefact, either in writing, or sketches, wireframes - how they want to communicate their concept was left up to them. Importantly, each group was expected to engage in some kind of ethnographic inquiry and relate their work to the concepts discussed in the course as well as HCI literature, which they were expected to research themselves. Below we will describe the work of each group.

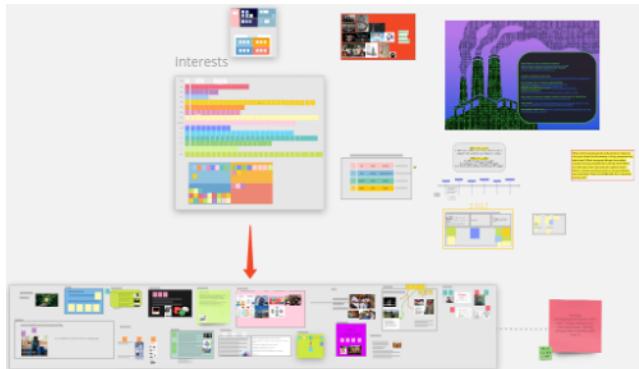


Figure 4: Overview of our Miro board

The role of the class facilitators was that of a consultant. Throughout their project work the students were free to contact them anytime with ideas, questions or results for feedback. We also continued to have joint sessions, where all groups were required to present intermediate work once and discuss it with the other participants.

4.1 Waste

In this project a male student from U.S., a female student from Mexico and a female student from Germany investigated waste and its role in the modern world system [90]. In order to study the *global-ness* of waste as a shared phenomenon all over the planet as well as the local and specific differences in its treatment, the three drew on their own experiences with and emotions towards waste. To this end, they followed the sadly globally familiar figure of the disposable face mask on its journey in the three countries. This

elicited three similar yet also surprisingly diverse stories, illustrating familiarity and difference of waste and waste treatment.

In Germany, masks are - in the best case - already separated within the household into the residual waste bin. As part residual waste the mask is then collected separately from e.g., organic waste, and delivered to waste treatment plants. There it is further separated into re-usable or recycle materials. What is left is burned to provide energy e.g., for district heating. 25% of the material remains after burning and is either used for e.g., road construction or ends up in a landfill.

In Mexico, the mask is also sorted into the non-organic waste at home. It is picked up by the trash truck and brought to a landfill, 25 minutes outside of the city, located next to a community of around 3,000 people. There, the mask becomes part of a peculiar landscape: the flat terrain is now the foundation for an alpine landscape of compacted trash. The landfill was officially closed in 2017 but continues to be used and is now at the verge of collapsing, posing significant health risks to the neighboring community. At the landfill the mask is received by informal workers that further separate the trash and bring it to specific collection spots, where they receive payments for certain kinds of waste. This is where the mask's journey ends. It would stay there in the landfill on top of the trash hill, or it would fly away and cling to a tree in the surrounding area, creating an alien mutated landscape where trash grows on trees.

In the USA, the mask is also separately disposed of at home and located by private waste processing companies that transport it to their private sorting facilities and then to a private landfill. But this is not where the journey ends, neither in Germany or Mexico: whether it is burned or not, the mask slowly decays, turning into leachate, from solid into liquid, in the worst case then seeping into the ground.

All three reflected on the similarities and differences of waste separation and the conditions to separate waste, including awareness about its importance as well as the necessary infrastructure. Such aspects become clear through the story of the mask. The group then went on to conceptualize a system that would tell such stories of waste when materials are disposed of in the household, with the aim of inspiring change in waste behavior. A sensor on waste bins would detect what kind of item is thrown away and trigger an exemplary story this specific item would take through the local waste system, starting at the trash bin.

4.2 Game Design

This project examined current issues in the gaming community with special regard to gender and equality within computer games [25, 26, 64, 80]. The discussion is of particular social relevance with video games being a growing and influential medium. Video game companies with first and foremost economic interests, especially developers of AAA-games, tend to market games towards lucrative, male *hardcore gamer geeks* [37] (for feminist discussions on market conditions being a patriarchal system fueled by manipulation and ideological control, see [45]). The group consisted of a female student from Germany, a female student from South Korea and a male student from Bangladesh. Taking Feminist HCI as a starting point, they took a closer look at the possibilities for feminist approaches in gaming, focusing on how women are depicted in video games

and as participants in gaming culture. As previous research has shown, there are still severe problems regarding harassment, bias and gender-based division in games, despite the fact that nearly half of all gamers are women [22, 23, 28, 44, 88]. As the core of their work, the group analyzed several current video games regarding the roles and representations of player and non-player characters in the games.

The group found that female characters were depicted stereotypically in several ways. They are more often portrayed in revealing (and impractical) clothing and characterized as helpless or innocent. Their characters were often less powerful than male characters, and more often female characters were given supplemental roles in games. A common role was the “damsel in distress”, a helpless woman in need of rescuing by male heroes [37]. Current games were found to sometimes differ from this stereotypical character design, such as “Horizon Zero Dawn” [5], where women characters are designed with every class, age, social status, sexuality and with a female main character, many minor female characters and with (female) Non-Player Characters having their own agenda, history, interests and community. Other games like Scythian [6] provide an equally women-centered story, and Cyberpunk 2077 [3] allows for gender neutrality and gender-mixing, breaking with stereotypical male-female representation in many other games.

Based on their analysis, the group then went on to develop a set of guidelines for more just and equitable character design in video games. The guidelines cover aspects such as camera angle with which players view characters, ensuring that depiction of female characters fits the setting and avoids sexualized and inappropriate clothing, the depth with which characters are developed, including their own narratives and motivations to act, their own character traits, and also allow diverse, non-binary combination of features. Their guidelines can be understood as a provocation, as a manifesto for more than just video games that points to the current inequalities and discrimination, but also as a practicable tool for game designers.

4.3 Digital Colonialism

In response to our shared exploration of historical colonialism and ongoing coloniality/modernity, a female student from Mexico, a male student from Ghana and a male student from Colombia were interested in the role of digital technology in this coloniality and what can be described as *digital colonialism* (building on e.g., [65]). In preparatory discussions for their project work, the three talked about the powerful roles multinational digital companies as well as foreign states play in their respective home countries. Foreign companies provide critical digital infrastructure, outside of public control, to extract digital data from citizens. Foreign governments extract natural resources at low costs to develop their own economies and technologies. To give their study direction, they decided to investigate the arrival of ride sharing apps in their respective home countries. In Mexico, Ghana and Colombia, Uber has become a crucial component of local mobility infrastructure. The service has created considerable conflict with existing local means of transportation, especially taxis, as well as local alternatives. The group drew on their own experiences with the app, conversations

with drivers and customers as well as secondary data such as company texts to analyze the process by which Uber has become a crucial part of their infrastructure. Their project came to the conclusion that the company’s success depends on the neglection of negative social consequences brought on by its arrival, such as destruction of formerly paying jobs in favor of Uber’s self-employed Gig economy model which neglects social security and health insurance of drivers. In Colombia the government has declared the company’s operation illegal, but Uber continues to operate through the exploitation of legal loopholes. Uber successfully positions itself against existing means of transportation through a narrative of superior technology and business models. In a process not unlike historical colonialist prophecies of the arrival of Aztec gods which Spanish colonialists were able to exploit, Uber’s arrival was styled as a prophecy to inevitably fix all existing mobility problems through this superior technology.

The group characterized Uber’s operation as digital colonialism, as it mirrors historical colonialism in its exploitation and dispossession of lands, resources and people, which translates to modern days dispossession over digital infrastructure, exploitation of privacy and people’s data as well as gaining control over systems beyond their jurisdiction.

4.4 Feminist Internet

The project group consisted of three female students from Paraguay, Iran and Germany with a South Asian background. Taking the *Feminist Principles of the Internet* as their starting point, the three had extended discussions amongst themselves, sharing how they experienced the internet from their personal and geographic standpoint. The aim of these collaborative auto-ethnographic investigations was to reflect on how women’s experience online differs, how feminist values are represented online but also where their representation is crucially lacking.

The Feminist Principles of the Internet are the result of a workshop that took place in Malaysia in 2014, hosted by the Association for Progressive Communications (APC). 50 activists from various domains including digital rights and women’s rights participated in the workshop and the formulation of the principles. The principles are divided into five categories: Access, Movements, Economy, Expression and Embodiment. The group discussed each category separately, sharing their own experiences and points of views with each other over several online meetings. The conversations were documented and then consolidated, retaining the personal narrative and individual standpoints but significantly shortening the presentation.

The three women found that a *digital gender gap* was clearly manifested in their experience online and that they all were very keen on changing that. They also found, however, that the way in which this gender gap was experienced differed significantly for each of them. The culture and history of the countries each of them was located in had an influence on their positions as women, as well as the geographic location of each of them, which entailed a disparity in regard to the extent in which each principle applied into their countries and daily lives. These differences are also related to the degree in which women’s rights are implemented or given importance in the different locations. They found, for example, that

they experience regarding *Access* differed significantly. In Germany and Paraguay, it is relatively easy for them to access any site on the web, whereas in Iran a VPN is required for a similar experience. This led to a discussion over how power over access is differently distributed, with occurrences such as an *Internet shutdown* or how online censorship by governments govern what is accessed and by whom. Such power perpetuates violence, discrimination, and oppression online, as it limits what women can access but also how they can safely express themselves online.

5 IMPLICATIONS FOR HCI EDUCATION

We hope that our experiences present interesting insights into how broad concepts such as the Capitalocene and coloniality/modernity, as holistic critiques of this century and the associated crises, can fruitfully and practically be included in HCI. Our experiences resulted both in insights about the complicated role of HCI on the Capitalocene as well as on practical education approaches. All of which resulted in rich co-creation of knowledge to better understand HCI's role in planetary and distributed crises. It served as a space to defoliate multi-layered perspectives, bringing them to the fore, and creating possibility like skipping stones create waves in water. Below, we will summarize and reflect on our insights along two axes: 1) We discuss insights regarding HCI and the Capitalocene, this way demonstrating the creative and reflective potentials our collaborative efforts were able to unleash. 2) We provide reflections on the *system* of HCI education and the co-construction of knowledge regarding critical issues for (and with) future designers.

5.1 Approaching the Capitalocene

A core goal of our course was to understand the role of HCI in the issues of the Capitalocene and envision possible ways to respond to this role and contribute to a transition. As outlined above, after an introduction of concepts and related work from within the HCI community, this was mainly approached through the participants project group work, attempting to approach the question through a process of multi-sited ethnography. As formulated by George Marcus [55], this refers to the impossibility of studying places or phenomena by themselves: in the modern world-system, as outlined by Immanuel Wallerstein, places do not exist outside of globalized capitalism and are inevitably affected and thereby connected. The projects addressed a wide variety of topics and phenomena from a wide variety of (geographical) standpoints. While this on first glance obscures conceptual coherence and the conceptual relation between the different studies, in this diversity also lies their strength. First of all, each study by itself connects to the overarching concepts in a unique way and studies specific aspects of it, which become clearer through their situated, diverging analysis.

The waste project illustrated this in a rather poetic way, using the central character of the mask and accompanying it on a fraction of its journey. The mask and its disposal show waste as a global phenomenon and practice, existing in Mexico, Germany and the U.S. in very similar ways. In each place the concept of waste separation exists, waste is separated in the home and picked up to be disposed of elsewhere. It also shows crucial differences in this process: whereas in Germany (supposedly) a certain amount of the waste is recycled as a source of energy or building material,

in Mexico it fills and shapes a landscape, as a health hazard for communities neighboring dumpsites and dystopian decoration for trees. But yet again, in neither of these places recycling is perfect, and certain components of the waste are left, unused, decomposing and seeping into the environment. While the project also exhibits a certain Euro-centricity, by highlighting the seemingly more sophisticated separation and recycling system of Germany, it also shows the imperfection of such an approach. Furthermore, the project points to many possible strands of investigation, embodied by the story of the mask: Where does it come from? Where is it made? What elements is it made of and how are these assembled? How does it travel to its place of use? The further unbecoming of the mask holds similar possibilities for investigation, and as the project rightfully points out, the story does not end in the landfill. Decomposition occurs at many stages, depending on the processing of the waste. When burning waste, certain elements are released into the air, when decomposing different elements are released into the soil, the water. Where do they go? Lastly, the project proposes a positive role of HCI, as a tool to visualize these stories of travel and unbecoming, to inspire a different relation and treatment of waste.

The project on the ride sharing platform Uber focusses on a much more direct entanglement of computing technologies with the Capitalocene [60] and coloniality/modernity [58]. In this investigation of the operation of Uber in Mexico, Colombia and Ghana, the project attempts to show how digital technology has become a platform for the continued enactment of colonial global relationships, where actors from the center of the world-system, in this case the U.S. Westcoast, in the interest of financial profit and growth actively exploit peripheral countries, undermining local legislation and siphoning data off of individuals to be owned and processed in the center for the benefit of the center. Computing technologies also serve in a narrative of *superior technology* that facilitates *superior business models*, a notion of progress presented as inevitable, inescapable, thereby mirroring narratives of historical colonialism to assert dominance by the colonial powers. By building on the idea of digital colonialism [65], the project does not point to positive possible responses, but contributes to a deeper understanding of the complicated relation HCI has to coloniality, stressing a need for transition without providing easy answers for what we are to do about it. The project thereby contributes and expands in debates on de- and postcolonial computing within HCI. The project thereby contributes and expands in debates on de- and postcolonial computing within HCI [10, 42] including the relation with capitalism [83] and the celebration of entrepreneurship and innovation - the last of which has been highlighted many times as central for HCI, as well as highly problematic [43].

The other two projects investigate different aspects of sexual and gender-based discrimination. As Grosfoguel has outlined, such ongoing discrimination is a crucial component of coloniality/modernity, being introduced by colonial powers [38] and thereby enmeshed with the Capitalocene's need for Cheap Nature, in which nature is often used to discriminate against other human beings and exclude them from *humanity*. One project shows how discrimination is encountered by women online, but also how the experience of discrimination differs with geographic location, providing a personal and nuanced analysis of such situated experiences. The other takes on a more generalist approach, studying sexism in the design of

female game characters. The group then went on to formulate suggestions for a more equitable approach to game character design, addressing not only the visual representation of characters as well as camera angle, but also story line, roles of non-player characters as well as diversity in a wider sense, touching on intersectional discrimination in video games.

Overall, the different projects then begin to unravel the complicated relationship between HCI and the Capitalocene. In several instances they illustrate how HCI contributes to the crises of modernity, highlighting its role in coloniality, sexism and waste production. In other instances, they point out possible opportunities for HCI to play a more positive role, by changing how ICTs are designed, such as in the case of game design, or by highlighting how ICT can be deployed to support the telling of complex stories, as in the case of the waste study.

It needs to be said however that these studies are also necessarily partial and limited. Each study is only able to hint at the complicated relationship between its specific subject and the role of HCI, leaving much to study, and many threads untouched as we have pointed out above for the waste project. While our brief analysis hopefully shows each study has a clear relationship to the issues of the Capitalocene and modernity/coloniality as a whole, the relationship between the studies, how they paint a picture of the Capitalocene deserves further unpicking. Nevertheless, we believe the studies as a collective highlight the possibility of coming to understand HCI's role in the Capitalocene in a patchwork manner, with each study contributing to what is a continuously unfinished yet growing tapestry of the Capitalocene.

5.2 Potentials for HCI education

As mentioned in the earlier part of this paper, we did not follow a teacher-centered chalk and talk technique for our course, but instead employed a project-based learning approach [41, 47], attempting to co-create knowledge, involving students and facilitators as learners. The course was created as an open-ended process, with facilitators serving as guides, as creators of a learning space, but also with an interest in learning from and with the students about the relationship between HCI and the Capitalocene and about their personally situated perspective as well as experience of this relationship. To this end, facilitators strived throughout the course to lower hierarchies between participants through a variety of activities to engage in mutual sharing. Despite the obvious limitations of the projects given the scale of the question alluded to in the previous section, we would argue that this process has been quite promising. While project-based learning has been broadly written about, we here reflect on our application in approaching HCI's role in the Capitalocene, building on the participants personal experiences and standpoints.

In a self-directed manner, driven by personal interests and experiences, and in many cases taking these experiences as the starting point for their investigations, the projects present exploratory studies into new domains for HCI research, hinting at promising lines of investigation. They bring together shared yet disparate experiences as well as positions from various locations and standpoints and make these differences a central asset of their inquiry. We would argue that such a self-directed and intrinsically motivated approach

is necessary for the rather difficult topic of the course and the introduction of the concepts into HCI education. While they certainly have found wide purchase in academia, the concerns presented here are arguably hard to apply in a commercial setting, where many HCI and design students will find employment. While some of them certainly matter for business and are somewhat translatable into commercial appeals e.g., the narrative of sustainable growth, the renewable energy sector, such a translation also diminishes the fundamental nature of the critique as embedded in concepts like Capitalocene or modernity/coloniality. Such concepts take aim at the very foundations of capitalist business. Therefore, it becomes the work of self-directed future designers to embed such lines of thinking (and feeling) [31] in their chosen professional settings outside of academia. The *transition* from the title of the class, therefore does not only refer to the transition of HCI or a contribution HCI can make towards transition, but also to a possible personal transition from which future designers explore these issues and translate them into their professional contexts.

We also want to clearly note that the pandemic crucially shaped the co-learning process described in this text. All sessions of the course were done virtually via Zoom. We were dispersed all over the planet due to travel restrictions and the common sense of not moving around the planet (thus avoiding contributing to the pandemic and its ongoing suffering). While this has provided challenges such as finding acceptable time frames to meet (on a side note, Friday afternoon turned out to be a quite nice date for this specific course, creating some positive *TGIF-vibes*), it has also allowed us to make use of the diversity of locations we found ourselves in and the diversity of views this affords on shared issues. Arguably, this has strengthened the studies in ways that would have been considerably difficult if we would have found ourselves in the same location. In addition, it provided all of us with a space where not only educational but also personal notions were shared, thus creating bonds between like-minded attendees. This unleashed a special power during an era of turmoil with its dramatic impacts on social and economic life. During times of lockdowns, contact bans, potential isolation and other worries, our weekly courses offered a hook of consistency and something to look forward to. With the current experiences and lessons learned of the pandemic, there are vivid discussions about the future impacts on our society, including work- and education related contexts. This includes the following questions: How do we want to understand the future of university education and campus life? Which kind of emotional support and attachment can the (HCI) education of the future bring to all parties involved? We are hopeful that sharing our experiences here offers some food for thoughts in this regard.

At the same time, this significantly makes use of and contributes to the *unsustainability* of HCI and digital technology. Our two-hour long video calls drew excessive energy, resulting in CO₂ emissions, that would have been prevented if we had met in person. In-person meetings on the other hand would have required air travel, again resulting in CO₂ emissions. Measuring this impact of such a course is no straight forward process as we have discussed in our course and has been debated also within the HCI community [13, 84]. Nevertheless, if HCI4T, including HCI education, really wants to move towards transition out of the crises of the Capitalocene, new

computing systems are necessary, that need less energy and use fewer material natural resources in their construction.

Lastly, our course had to fit into the formal regulations of our university to comply with European legislation, which limits the freedom we want to apply to alternative approaches. As a non-mandatory course, the small group with intrinsically motivated students surely benefited the discussions of sensitive topics and the sharing of personal sentiments. Managing a larger group of participants with higher diversity, also perhaps in terms more diverse mindsets, attitudes etc., might be challenging. However, we believe that our course generally offered a broad set of hooks to match a multitude of interests. Also, having three lecturers with different expertise was hugely beneficial for the course and arguably luxury, especially considering the economisation of education in the Capitalocene [24]. This approach is, we acknowledge, resource intensive. In addition, our course is bound to formal aspects of assessment. As we noticed towards the end of the class, the co-constructive aspect runs into difficulties when it comes to evaluating and grading work. Despite breaking boundaries with regard to course setting, each student eventually has to receive a grade in the end which appears in their transcript. A carefully constructed equality as learners between facilitators and students flares up to a steep hierarchy again, when the facilitators have to grade student work, even though everybody, facilitators and students alike, were learners during the course, engaging in a mutually trusting learning experiment. Scholars already hinted to the challenges of assessment in constructivist project based learning environments [14, 70]. In a course setting which is built on closeness and rapport between attendees and which advocates low hierarchies, assessment can be a tricky thing for educators. This is especially true in a somewhat experimental environment like ours. What are ‘fair’ criteria for assessment regarding this approach to teaching? This ‘hierarchy and fairness problem’ could be somehow solved by alternative ways of assessment as proposed by other scholars e.g., a self- and peer-reviewing [62, 85] or 360-degree feedback [75, 81] where one has to rate the other. This would, eventually, lead to a more democratic approach to learning. The question of scale, however, remains unanswered. Even if the experiences we detail in this paper are perceived as valuable, applying them to larger classes with the aim of reaching more participants, the way our class played out is at least partially due to the small class size. This smaller size allowed for the creation of relationships between participants and the emergence of trust, which was the basis for the personal reflections, relating the learning to personal experiences and reflections. As mentioned above, creating such spaces is increasingly a challenge in the Capitalocene. Blevis [16] reported on similar project-based educational experiences and reflects on the question of scale, being able to offer educational experiences to significantly larger groups. While this potentially holds lessons for future courses, creating valuable smaller spaces is increasingly a challenge in the Capitalocene, as mentioned above.

6 CONCLUSION

In our text above we have reported on a semester-long course we have created as part of an HCI masters education program. The course aimed to explore the various interconnected crises of our

time, building on concepts such as the Capitalocene and modernity/coloniality and begin to unravel the role of HCI as a discipline and practice in these crises - both as a contribution to the dilemma as well as an opportunity to transition away from it. To this end we have designed the course as a co-constructive learning experience, in which facilitators and master students co-construct knowledge on this role of HCI in the Capitalocene, through four ethnographic inquiries, building on George Marcus’ concept of multi-sited ethnography. Together, these studies have leveraged the divergent geographically and personally situated standpoints of the participants to develop nuanced pictures of HCI’s relation to various aspects to these complex concepts and issues, highlighting both HCI’s complicity as well as glimmers of hope. We argue that such an approach presents a valuable and innovative approach to HCI education. This value lies both in the chosen topics, which we believe are urgently needed in the education of future designers, as well as its methodological approach of project-based learning and the co-construction of knowledge between facilitators and students. Arguably, these two elements are required in combination, as the class aims to create knowledge about conceptual and practical territory that remains underexplored within HCI, attempting to define an HCI for Transition. This transition needs new knowledge along emerging lines of inquiry within the wider HCI community, which our course has begun to extend.

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