Engineering Educators Bringing the World Together
2025 ASEE Annual Conference & Exposition
Palais des congrès de Montréal, Montréal, QC • June 22–25, 2025 ASEE
Paper ID #45368

Pandemic Transformation in a Field Study Design Course: Insights Before, During, and After the Crisis

Dr. Todd Nicewonger, Virginia Tech

Todd E. Nicewonger has a Ph.D. in Applied Anthropology and his work focuses on the ethnographic study of engineers and designers.

Shea Fitzgerald Hagy, Chalmers University of Technology
Catarina Östlund

Pandemic Transformation in a Field Study Design Course: Insights Before, During, and After the Crisis

In early spring of 2020, a group of engineering and architectural graduate students from a Swedish technical university traveled to Kenya as part of a field study course. Like the student groups before them over the past two decades, they enrolled in this course to better understand how their skills could address the needs of marginalized communities in the Global South. Coming from some of the wealthiest countries in the world and trained at elite universities, the students arrived in Nairobi with high expectations. However, just three and a half weeks later, they were forced to return to their home countries as the COVID-19 pandemic began to spread globally.

Once back home, these students worked to develop online strategies so they could continue their collaboration with their Kenyan partners. Throughout this process, both the students and their Kenyan collaborators adapted their co-design methods, allowing them to work across cultural and geographic distances and differences while still employing decolonizing tactics and methods.

This paper examines the long-term effects that disruptions to this course's curriculum have had on the overall program. It explores how these experiences have transformed teaching and learning activities. Did they enhance our understanding of effective collaboration? Additionally, how can a comparative analysis of the curricular experiences of students and faculty during the pre-pandemic, pandemic, and post-pandemic periods provide new insights into the creation and translation of engineering and design knowledge across different scales of lived experience? By addressing these questions, this paper qualitatively analyzes how the value orientations regarding learning within this course have contributed to the transformation of its curriculum. It aims to unveil new approaches to collaborative design activities.

Background

The "Studio," a field study design course we are analyzing, was established in the early 2000s when faculty from a Swedish technological university recognized a crucial need for design courses that went beyond traditional product design. This recognition led to the creation of a field study course in which engineering and architecture students traveled to East Africa to collaborate with communities in the Global South for seven weeks during a 15-week semester. While there, students engaged in collaborative design projects that provided experiential opportunities to apply their design skills in diverse cultural contexts. A central focus of the curriculum is to enhance students' understanding of the relationship between design and culture through social immersion.

The curriculum is founded on several principles that differentiate learning and teaching, emphasizing the importance of studying the "unknown" to better understand how cultural assumptions influence designers' practices. This approach remains a core tenet of the program. One instructor noted that they encourage students to prioritize "capacity building" rather than aid or "charity work." They argue that capacity building is based on participatory design theories

that foster an exchange system where all participants in the design process gain and learn from one another.

Reflecting on this idea further an instructor for this course, explained:

> Working there has been challenging, and I often feel anxious about the future of the projects after we leave. While on-site, I also worry that students might misunderstand their role, thinking they are there to provide charity, which is not the purpose of the course. Striking a balance is difficult because the need is significant, and our goal is to develop sustainable projects. However, we are not there as a charity organization, which makes this work both complex and demanding. (paraphrased quote from fieldnotes)

By connecting concepts such as "capacity building" and "mutual learning," The Studio creates a learning experience that spans multiple contexts and institutional social worlds. In this way, the course extends beyond the classroom to apply development theory, influencing the professional growth of student designers. However, what are the limitations of this curriculum, and how can a critical exploration of its pedagogy yield valuable insights for creating alternative learning collaborations that enhance the experiences of engineering and architecture students participating in the course?

Methods

This paper draws on ethnographic data collected by Nicewonger during participation in course activities in Sweden and Kenya. This includes observations of design charrettes and coursework in Sweden, as well as travel to multiple locations in Kenya in 2020 and 2024. Nicewonger engaged in the program's daily activities until the pandemic required participants to return to their home countries, conducting observations and semi-structured interviews with students, collaborators, and former instructors. Additionally, he reviewed course curricula, gray literature, and publicly available student reports.

All data collection by Nicewonger was conducted under an IRB-approved study, with informed consent obtained. Data has been anonymized and is presented in accordance with the IRB protocol.

In 2020, Nicewonger observed a course that was initially taught on-site in Kenya by, co-authors, Hagy and Östlund. When the pandemic necessitated that course participants return home, the instructors adapted by continuing the course online. This transition allowed Nicewonger to gain insights into how the participatory methods used in the course evolved in response to the learning constraints imposed by the pandemic. Several debriefing meetings facilitated broader discussions between Nicewonger and Hagy and Östlund about engineering and design education, as well as curricular challenges of teaching participatory design practices remotely. Consequently, Hagy and Östlund contributed valuable pedagogical reflections and curricular context based on their experiences as educators in the program being analyzed in this paper.

Theoretically, this paper is inspired by ontological debates about design [1], [2]. Specifically, we draw on Arturo Escobar's [2], [3] writings, where he describes design as a powerful tool for

reproducing social hierarchies and post-colonial legacies. In making this argument, he brings his experience studying engineering (early on in his professional life) into dialogue with his anthropological work on post-development, social movements, and political ecology [2]. For Escobar [2], design projects in the Global South should challenge approaches developed in dominant institutional systems by co-creating approaches with local communities that support local autonomy and knowledge practices when engaging in design activities. Such a shift means moving away from commercial and extractive logics that dominate Western design thinking to allow alternative design imaginaries and relationalities to emerge. As he writes: "This calls into the need for a new foundation for design that recognizes 'Design's powers of world-making' and that 'radically transforms what design is and does'..." [3].

Integral to this argument is the idea that the transformation of design requires integrating social theory into designers' educational development.

> Design theory and design education occur at the edges of social theory, conventionally the providence of the social science and the humanities. Thus, it makes sense to affirm that the development of an ontological approach to design, one that destabilizes its comfortable niche within naturalized modern orders, demands a recentering of design education to bring it fully into the critical social theory space [2].

Similar arguments have been made by engineering education scholars Dean Nieusma and Donna Riley, who interrogate how power relations are shaped by how collaborations in development projects are configured and carried out [4], [5]. Issues of power are complex but are central to the ontological debates on design, particularly as they relate to the role of design in addressing social needs in the Global South [6], [7]. However, how do you prepare engineering students to address these issues without having ever experienced them in person? For design philosophers like Anne-Marie Willis, this is one of the main reasons why the subject of power must be central to the educational training of aspiring designers.

> There is a need to create new learning contexts by teaching philosophy and social and political theory in relevant, new, and engaging ways to designers as well as to graduates and professionals from non-design fields so as to create new postures – that is, new modes of thinking and acting in professional and everyday life [8].

For other scholars, critical engagements with teaching students how power dynamics shape and influence design processes are only part of a much bigger need to rethink "common sense" assumptions about what counts and does not count as design. As the Colombian design scholar Alfredo Gutierrez writes:

> Disciplinary authority fails to see that the vast majority of everyday human objects were prefigured and crafted without the help of professional university-graduated designers and that there is much more design and materialization in what is technically not recognized as design in what it is identified as such [9].

These points raise important questions for researchers and educators developing field study design courses. For instance, what do these issues look like in the curricular context of an

existing educational program, like The Studio, where faculty have theorized their teaching practices for over two decades? Are we to assume that these broader intellectual discussions about the ontological politics of design have not been critically reflected on by the students and teachers in these programs? What might we learn by comparing the theoretical arguments outlined above to insights gathered from on-the-ground observations of curricular practices of field study? Addressing these questions requires developing a case study that offers a nuanced understanding of how ontological design theories are experienced in a particular context.

Findings

This section describes three student design projects that originated in Kenya in 2020. As students explained at both the beginning and end of the trip, they had signed up for this course because they felt they needed to move beyond the boundaries of the "theoretical" or scenario-driven projects they were often assigned in their classes. Take, for instance, the following comment shared by an engineering student who explained:

> It had a lot to do with doing something in reality [or the real world] and not just doing things theoretically, like, "Oh, pretend you had this case. And then do it," but [this time we were] actually doing something for real.

This student was looking for opportunities to work in cross-disciplinary contexts that would challenge her understanding of design. She further explained that collaborating in a "transdisciplinary environment allowed students" from engineering and architecture to learn from one another. Furthermore, she also explained that before this class, she had been curious about how different design professions approached projects. "It was so nice to have the chance to learn from working with the engineers," she said. "This course provided many opportunities for us to learn from each other."

Image 1: Students working engaging in participatory workshops with local stakeholders.

One of the ways in which students create in situ collaborations with one another and their community partners is by conducting design investigations. These investigations can include a wide range of activities, from observing a particular local building technique to interviewing artisans about the processes they use to produce a particular good or product. The images above depict a group of students at a local organization learning about different paper-making processes used to create greeting cards sold to tourists. Students first observed and participated in the paper-making process (Image 1) before they began outlining possible projects they could work on collaboratively with local artisans that would explore alternative methods and uses of the paper-making technique. This initial observation inspired the students to want to know more about how different materials in the area, like leaves, flowers, and twigs, could be incorporated into this paper-making process. Advised by a local artisan, they conducted experiments that deepened their understanding of the production process. The process also gave the local artisan a chance to explain in greater detail why he wanted to work with them on identifying alternative methods that would increase the audience for his paper-made card business.

An engineering student connected this experience to her personal development, noting how these interactions led the group to generate new ideas for improving the process. For instance, she reflected on a demonstration of the method used to make materials for the design process, which was highly time-consuming and daunting. While observing this process and experiencing it through hands-on interactions with the materials, she began to wonder:

> How can we make this [process] better? Like, my brain gets going, and it's processing and processing ideas. As you know, if you were to improve [the process] that would make a real difference. And that's the thing: the impact of this type of project is what I like [the most].

These initial interactions generated ideas amongst the students and in collaboration with the local community partners they were partnering with. Eventually, the students would break into four smaller groups focusing on a specific topic. We will reflect on three of these group projects in the following sections. This includes the Sanitary Pads, Rammed Earth, and Women's Collective projects, which are comparatively interesting because they are so different.

Sanitary Pads Project: This project involved four engineering graduate students working with a local non-profit organization, Serengeti (pseudonym). Several years earlier, an organization in India donated a machine to manufacture sanitary pads. Since then, a small group of employees at Serengeti have been using it to produce sanitary pads that they could distribute to schools where students may not afford to purchase pads regularly.

As one of the engineering students working on this project explained, their primary goal at the start of the project was to identify the organization's needs and understand their perspective on the issues they faced so that they could work together to address them. The student remarked:

> Our [initial] focus was to get in touch with [Serengeti], the organization, and to find out [what] their needs [were]. What do they think is the problem with their situation, and how could we help them?

> We started the project by looking at how they experience their work. It's something that they do every day [and] it's important to see what they think is the problem, [rather than from our perspective] as designers looking from the outside [in] and saying, maybe this [method of] production could be more efficient if we reorganized the whole room this way or if we do this or that.

Reflecting on the importance of being able to interact, visit the organization, see the machine and process for producing the pads, as well as talk with everyone at Serengeti who was working on the project, one student explained:

> For us to have a dialogue with them and go through all of the steps of the production and then talk to them about how they work and what they think or maybe not necessarily what they think is the problem with [the machine], but observe how they do things [was really important]. Also, later [after we returned from our visit to the organization] we were able to talk about what we saw with one another. What do you think about this?

This previous point is further clarified in Images 2 and 3 below, which depict a hand-operated machine used to manufacture sanitary pads. The students in this picture are learning from a staffer at a local community organization about how the machine is used to produce sanitary pads. During this presentation, the staffer explained that the labor-intensive process has become increasingly unsustainable as the organization's staff numbers have dwindled. These interactions among the staffers, students, and equipment for producing sanitary pads inspired several engineering students at this meeting to collaborate with the organization to improve the machine's efficiency and enhance the production process.

Image 2: This image shows students learning about a hand-operated machine that makes sanitary pads.

Image 3: This image showcases one of the hand-operated machines used to manufacture sanitary pads.

Rammed Earth Project: This project involved working with a local construction crew using a building method, illustrated in image 4, that was initially developed a few years earlier by faculty and students from the Studio program and local community members. They worked together to develop what they referred to as the "rammed earth" building techniques using regional materials.

The students involved in this project were interested in better understanding how the process worked so they could experiment with different techniques that might contribute to the building process or provide alternatives. They were also interested in learning about structural challenges and how the crew addressed them. This hands-on approach, they believed, would allow them to move beyond the theoretical concepts they had learned in their studies and gain insights into how collaborating with local builders could improve home-building practices.

Reflecting on their experiences in Kenya with this project, one student explained that observing the entire construction process and having conversations with the crews working on the project was highly educational. The student emphasized, "We learned more things directly from the experience" than from hearing our teachers discuss it before our field study trip.

However, just a few weeks into the field study, the two architecture students working on this project had to leave Kenya and return to Sweden because of the pandemic. The project

goals/topics and partners/stakeholders between the student groups varied greatly, affecting the complexity and difficulty of adapting their projects and collaboration from a distance.

> If we'd stayed, we would have been able to do so much more because when you're working on these projects, it's your life. [It also] meant that we couldn't test anything out [on-site with our partners]. The process of developing the end result [of our project] took so much longer than if we had been able to stay in Kenya [and work on it] every day, and the end result would have been much better, and they [i.e., local partners] would have felt much more ownership.

As a result of the pandemic disruptions, the students working on this project were not able to continue experimenting and working with rammed earth construction techniques that they had focused on while in Kenya, even though they brought some soil back from their field site in Kenya and attempted to continue their investigations with it. This was partly because their project approach relied heavily on local knowledge, conditions, earth properties, and partner organizations' capacity. Once the students left the site, their connection to these conditions and understanding was challenging to recreate remotely.

Image 4: *This image features students visiting the Rammed Earth project.*

Women's Collective Project*:* The third example involves a collaboration between engineering and architecture students and a women's collective who produced artisan products and sold them to tourists.

To develop this project, the students drew heavily on participatory principles of engagement, which they had been introduced to in previous courses. This approach helped them identify a topic and methods that reflected local interests and needs. However, they were also concerned about power differentials that could easily sneak into their project. Several of the students in this

group had informally brought up references to decolonizing design methods during the first few weeks of the field course activities. As a result, they spent considerable time in the first two weeks of their project visiting the women's collective and talking with its members about their needs.

However, the research, including several collaborative workshops planned with the local community organization to better align with local interests, was cut short when the students had to pack up and return home abruptly. As a result, they had to shift the project's trajectory, working remotely to develop digital resources instead of working on-site to design and build something physical that the women's collective could use. The changes they implemented included using digital graphics and online meetings with a community organizer in Kenya who was not part of the collective but who had worked with them for several years on other projects. This local contact helped provide insights that reflected the general needs of the women's collective. This generalist approach provided an alternative since neither the students nor the local Kenyan contact they were remotely communicating with, could interact with each other or those in the women's collective due to pandemic restrictions. As a result, they completed their project, but many felt that something had been lost along the way.

2021-2022 Course: The disruptions caused by the pandemic in 2020 provided lessons for reimagining how the course could continue to be implemented in 2021, when it was conducted entirely online due to continuing pandemic restrictions. As a result, students were asked to focus on specific contexts and communities. However, they tended to take a more global perspective because they could not travel to their field sites and carry out fieldwork. This was reinforced by the course structure, which allowed students to work in one of five different contexts worldwide (Argentina, Kenya, South Africa, Lebanon, Bangladesh). With the help of communication platforms like Zoom and WebX, students were introduced to partners from each of the five sites that served as consultants and advisors. A series of workshops and follow-up meetings with key informants pre-identified by the instructors in the course allowed the students to gather information about existing challenges and the ongoing work of each of the local partner organizations.

One of the significant differences between the 2020 and 2021 courses was that students in the 2020 course could be on-site and carry out participatory research with local partners for 3.5 weeks. Reflecting on the value of being on site in 2020, several students felt that it transformed their initial ideas of approaching design. For instance, several students from the 2020 class felt they gained a more nuanced understanding of the "culture" even though it was an abbreviated period. When they were forced to collaborate on their projects virtually, they had to navigate the cultural considerations of their projects from afar. In 2021, students' connection to their field site was strictly through local partners and mediators. As a result, their understanding of the cultural context they were working in was filtered through local actors so that students could not experience and interpret themselves (as much).

Nevertheless, although conducted entirely online, several instructors felt that the 2021 course could create a situation where students could employ participatory approaches. However, something was also missing. For example, when asked whether not being on-site inhibits learning, one teacher replied:

> Yes, in my opinion simple aspects of 'time culture', how to shake hands, social distances (not covid distances), food preparation/types, eating habits, travel, and movement in the community (how to get around), feeling the climate for oneself, money/tipping/haggling, etc., etc. affect greatly how one understands and interprets and in turn designs.

In 2022, it was possible to offer an on-site field study course in South Africa. Students spent 7-8 weeks on site, then returned to Sweden to finish their projects at their home institution. However, because there was another similar studio program at a local university in the South African site, students could continue collaborating virtually with these students after they returned. Reflecting on this change to the curriculum, one instructor explained:

> We kept a series of online workshops and meetings with stakeholders in South Africa as well as in Kenya and Bangladesh. The number and length of these meetings have been shortened, but by continuing to follow them students are able to gain a more global picture and interpret for themselves [or] make sense of common challenges when working in different communities around the world while at the same time understanding local differences.

The 2022 courses' mixed approach, which combines on-the-ground and enhanced virtual opportunities for interaction and collaboration, reflects one of the key changes in the curriculum inspired by adaptations made during the pandemic. As a result, students in the 2022 Studio course experienced a broader range of interactions with stakeholders in their field sites and from working with experts in other global sites. One instructor noted that "these different cultural backgrounds bring more varied ideas, approaches, and interpretations of the challenges and proposed solutions." However, they also questioned whether this diversity impacts the actual outcome of the projects.

Discussion

The pandemic has sparked renewed discussions among the faculty about collaborating with local universities. Such partnerships would enable Swedish students to work alongside students from local institutions, allowing them to maintain connections with community partners even after the Swedish students' time in the field has ended. A key aspect of this discussion is the challenge of sustaining these partnerships and the difficulties faced by faculty who oversee semester-long field study courses. Instructors must balance the educational objectives of their programs with the needs of the communities they serve while also considering equity issues when distributing responsibilities among diverse student design teams. Interestingly, the instructors involved in this research project have long been concerned about the ethical considerations surrounding the sustainability of course projects.

In the early 2000s, instructors received external funding to establish a joint course collaboration with a local university in Kenya. However, once the funding ended, it became impossible to sustain the partnership. In 2020, just before the pandemic began, a new partnership was formed without funding in order to explore ways to integrate students from a Kenyan university design program with students from a Swedish institution participating in that year's field study course. This collaboration was set to include one week of site visits in Nairobi in late February and one

week of charrettes (feedback sessions on design projects) in early April. This timeline was designed so Swedish students could return to their university to complete their projects remotely by the end of their semester, which followed the charrettes. However, before the pandemic disrupted the plan, faculty began debating whether this model was equitable, mainly because students in the Kenyan program worked full-time during the day and attended classes in the evening.

What requires further investigation is whether this plan would yield the same educational outcomes for both groups of students or if one group would gain experiences of greater value. In this context, "value" extends beyond the grades students earn upon completing the course, though that is undoubtedly important [10]. Beyond the fundamental value of receiving a grade, these students also come away with social capital that they can leverage as they enter the professional design world. This aspect is crucial because field study design experiences, like the Studio program, viewed through the lens of higher education, carries a type of value that cannot be replicated by the communities where these projects are implemented.

Consider the following quote from one of the 2020 engineering students who graduated that year and, when interviewed in 2023, was working for a company on a topic related to her field study course project.

> Thanks to that project, I gained a lot of experience from looking into the different materials using [sanitary] pads and pads in general. And [our group] did some training materials for how to inform locals in the community about periods and the work on the taboo or moving the taboo from the subject.

She went onto explain that this work overlapped with the work she is doing now.

> [The company I work at now] is a big hygiene and health company who is producing pads and other sanitary products. So, the experience working on the [sanitary] pad project [in Kenya] was a big part of my application. The interviewer talked [with me] about my experience working with this Kenyan organization on this project. So basically, I think it had a huge impact on me getting this job.

Another important factor to consider is how the course's mix of engineering and architecture graduate students shaped their learning experiences. This was particularly evident in 2020 when students were observed integrating different knowledge practices and developing participatory approaches with community stakeholders in Kenya. According to an instructor who had taught this course multiple times since it began in the 2000s, the opportunity to work in mixed disciplinary groups often fostered collaboration between architecture and engineering students, and sometimes landscape architects and physical planners, who participated in this course. Additionally, they argued, that these interdisciplinary learning experiences often broadened the scope of students' projects and encouraged them to explore unconventional types of projects.

Reflecting further on the interdisciplinary value of the course, another instructor stated:

> Collaboration between architecture and engineering students brings different perspectives and approaches to the same problem. For instance, engineering students may use design thinking techniques, matrices, etc., while architecture students may take a systems thinking approach, looking at the broader systems surrounding the problem at hand. These students learn from one another and tend to adopt and adapt these to create innovative approaches (and thus solutions) to a problem that would not have been achievable without collaboration.

Finally, in examining the pandemic's impact on this course, it is important to highlight how this breach in pedagogical practice inspired new curricular developments among the faculty. For instance, a new course focused on design principles and methods was developed from a master's thesis in industrial design engineering within the Studio Field Study course. The thesis explored how artisans in the informal sector in Kenya utilized limited resources.

After graduating the thesis student worked with a former faculty member from the Studio course to co-develop a curriculum that incorporated methods typically used to carry out design projects within resource-limited contexts. This course was launched in 2021, and it focused on applying this curriculum to address local issues in Sweden. Moreover, while it did not involve students traveling to other field sites, it provided opportunities for experts from Sweden and Kenya to mentor and supervise student activities throughout the course.

While further exploration of this course's curricular outcomes is needed, it serves as an interesting example of how the disruptions caused by the pandemic inspired new pedagogical experiments and models.

Conclusion

This paper examines the pandemic's effects on a field study design course involving graduate engineering and architecture students. Developed initially as an opportunity for students to travel to the Global South to collaborate with community members on sustainable design projects, the participatory ideals and goals of the course were forced to go online during the pandemic. As a result of this change, students worked remotely with stakeholders in several different countries, and a new approach to developing cross-cultural design projects emerged. In tracing out this shift from in-person to remote learning, this paper critically reflects on how this change opened new vantages into the course's participatory design aims while raising further questions and the need for additional inquiry.

Acknowledgement

This material is based on research conducted by Nicewonger, which was supported by the Wenner-Gren Foundation for Anthropological Research under Grant No. 9955. The opinions, findings, conclusions, or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the Wenner-Gren Foundation.

References

[1] T. Fry, *Design Futuring, Sustainability, Ethics, and New Practice*. UK: Berg, 2009

[2] A. Escobar, *Designs for the Pluriverse*, Durham, NC: Duke University Press, 2018.

[3] A. Escobar, "Designing as a Futural Praxis for the Healing of the Web of Life," in *Design in Crisis*, T. Fry and A. Nocek, Eds. UK: Taylor and Francis Group, 2021, pp. 25-42.

[4] D. Nieusma and D. Riley, "Designs on development: engineering, globalization, and social justice," *Engineering Studies*, vol. 1, pp. 29-59, 2010.

[5] D. Nieusma, "Alternative Design Scholarship: Working toward appropriate design," *Design Issues*, vol. 20, no. 3, pp. 13-24, 2004.

[6] P. Redfield, "Bioexpectations: Life technologies as humanitarian goods," *Public Culture*, vol 24, no. 1, pp. 157–184, 2012

[7] A. Noche and T. Fry, "Design in Crisis, Introducing a Problematic, in *Design in Crisis*, T. Fry and A. Nocek, Eds. UK: Taylor and Francis Group, 2021, pp 1-15.

[8] A. Willis, "Transition Design: the need to refuse discipline and transcend instrumentalism," *Design Philosophy Papers*, vol. 13, no. 1, pp. 69-74, 2015.

[9] A. Gutierrez, "When Design Goes South. In *Design in Crisis*," T. Fry and A. Nocek, Eds. UK: Taylor and Francis Group, 2021, pp. 56-73.

[10] P. Bourdieu and L. Wacquant, *An Invitation to Reflexive Sociology*. Chicago, IL: University Chicago Press, 1992.