Design Iterations as Material Culture Artifacts: A Qualitative Methodology for Design Education Research

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Abstract

Studying design processes requires the researcher to move with the designer as they negotiate an action-reflection cycle comprised of a multitude of relationships, including the designer's relation to themselves, to human and more-than-human others, and to the beliefs, values, and assumptions that design us every day. This paper's goal is to introduce a qualitative methodology for studying the complex relationality of design, particularly (but not exclusively) in an architectural design education context. This methodology has theoretical and methodological underpinnings in Process Philosophy and Material Culture. It presents a configuration and triangulation of ethnographic methods to reveal concealed relations of design, the designer's ethical and caring thought and practice, and how, if at all, design relationships were valued. This methodology was tested throughout three semesters with undergraduate students in a community-engaged Architectural Technology course.

Introduction

In August 2015, I began an ethnographic study at a large, urban, Midwestern University on how, if at all, concerns with ethics were expressed within an architectural technology course for interior design majors. Entitled *Commercial Construction*, the course utilized community-engaged pedagogy. My research aimed to identify whether and, if so, how ethical thought and practice were present in this particular educational environment. More specifically, I wanted to examine the relations of design and explore how students ethically negotiated these relations as they completed their design work. This project comprised my doctoral research [1].

During the 2015 and 2017 Fall semesters and the 2018 Spring semester, I attended each twice-weekly class meeting either in a classroom or at the course's community partner's facilities. During the two-hours and twenty-minute classroom meetings, both the students and their

instructor, who had warmly accepted my request to be a participant observer in her course, welcomed my active participation in discussions about course content and our shared experiences working with the community partners. For the Fall 2015 and Spring 2018 semesters, the course's community partner was the Kheprw Institute (KI), a local organization aspiring to empower and educate youth in, and other residents of, inner city Indianapolis. Big Car, an Indianapolis non-profit arts organization and artists' collective, was the community partner for the Fall 2017 semester.

The main project for each semester required students to complete a set of architectural construction documents. For both semesters with KI, students were focused on creating designs for KI's headquarters/community center. For the semester with Big Car, students created designs for hybrid houses/art studios/art galleries for artists involved in one of the organizations programs. Both courses involved students having to create plans that completely redesigned existing structures that were owned by the organizations. The courses' scope did not extend to actual construction although the students' final designs were given to the organizations in the hope that the designs could be leveraged in future grant applications to fund construction.

The instructor, who was a professional architect, reported that she had organized the classroom as if it were an architectural firm. This setup led to multiple intersecting conversations in each class period between peers as they navigated the desires of their "clients," as well as the challenges of utilizing new design software and building codes to complete their designs. The logic of designing the class as if it were a firm also contributed to the course having many requirements and discussions related to professionalism (i.e., professional conduct and dress).

Class time was often spent helping students learn Revit 3D modeling software as they created their designs in class. A great deal of time was also spent on supporting students as they learned to negotiate the International Building Code (IBC) and the local zoning ordinance. Each course also included multiple meetings between students and their community partners or "clients." These meetings provided a means for students to gather information on their clients' construction wants and needs. With their instructor in attendance, students did that through group conversations in which clients shared their organizational history and answered student

questions; and through multiple student design presentations that solicited feedback from clients in order to drive an iterative process of architectural design. Students also participated in two scheduled visits to the buildings that they were to redesign. During these visits, they toured the existing structures and recorded measurements. The 2015 course also completed a service project.

My rationale for and approach to this research project was inspired, in part, by (1) my introduction to the philosophy of Alfred North Whitehead in early-2015, (2) my undergraduate training at the University of Wyoming in the four-field approach in American Anthropology (Archaeology, Linguistics, Physical/Biological Anthropology, and Cultural Anthropology), particularly experiences I had had analyzing material culture in an archaeological methods course, (3) my experiences studying the anthropology of ethics and poststructural theory during my Master's program in social anthropology at a postcolonial university (University of Cape Town), and (4) my experiences conducting design anthropology methods throughout my doctoral research, which forms the basis for this paper. I was and remain interested in examining the relational process of learning, especially as it relates to ethics, and the modes by which design(er)s change and grow. In other words, my aim in my doctoral research was to interrogate the relational process of becoming in the context of design.

I am primarily concerned in this paper with introducing the method that I used to examine the relations of design within this community-engaged architectural technology course. The purpose of the method is to facilitate the researcher's efforts (1) to reveal the often concealed or taken-for-granted relations of design and (2) to uncover how students make-meaning of the relationships that constitute designs and why they make the meanings they do. This twofold purpose leads to two research questions that the method is designed to address. First, *what are the key design relationships that affect the constitution of student design(er)s?* Second, *when students are able to identify such design relationships, how, if at all, do they make meaning of these relationships?*

In what follows, I will, first, briefly introduce a bit of Whitehead's process philosophy, as it undergirds the logic behind my research questions and the methods utilized to answer them.

Second, I will briefly explore theory and methods within design anthropology and material culture that inform my methodological approach. Third, I will describe the method itself and provide a brief concrete example of how it works. Fourth, I will examine some of the findings that arose from conducting the method. I will then conclude with a brief discussion of the future potential for the method and how it might be used to redesign the teaching of design ethics.

Theoretical Framework: Relational Process Ontology

The method outlined herein is grounded in the relational process ontology of Alfred North Whitehead [2, 3]. A mathematician with formal training in theoretical physics, Whitehead shifted focus to metaphysics in his later years. This was in response to late 19th and early 20th century scientific and mathematical discoveries – such as relativity and quantum mechanics – that he believed destabilized the "metaphysics of scientific materialism" so that a new ontological system, aligned with contemporary scientific findings, was needed [4].

Whitehead offers the foundation for an ontology built upon the idea that reality is a never-ending process of relational becoming. This is a process rich in experience from the tiniest atom to the constitution of civilizations and beyond. That said, the difference between say an atom and me is a difference of degree not kind [5]. Whether our concern is an atom, a design, a human, or a civilization, each is relationally constituted and each varies in complexity. For example, as I comprise a complex "society of actual occasions" [4: 101], I am capable of a level of consciousness not possessed by an atom – by virtue of how all the various relations that constitute me work in association with each other. Moreover, my complex nervous system enables me to entertain a variety of potentialities at play in any given encounter and to exert my will to some extent on the present's becoming. My becoming is not (or does not need to be) simply conformal, in which the past is basically recreated. I am capable of the production of complex expressions of novelty, meaning simply that I, as a subject immersed in relational process, possess the capacity to select for and decide against immanent potentialities that may push beyond the production of sameness. I am a relational subject and, yet, so is an atom and even a design. Whether simple or complex, all is relationally constituted in Whitehead's thought.

Whitehead's [3: 220-221] notion of "prehension", an operational feature of the process concept, is concerned with the grasping or ap*prehension* of an object (e.g., an individual "datum" in Whitehead's terminology) by way of what Whitehead calls a subject's "subjective aim": the mode of "feeling" by which a subject demonstrates "concern" (i.e., a provoked compulsion to act) toward an object. As a becoming-subject interacts with data, it is affected by these data and *prehends* them, thereby creating something new: the subject (or, in Whitehead's terminology a "superject"), which is a concrete actualization of potential [3, 4].

The way in which a becoming-subject is affected by and prehends data can be characterized as "negative" – a "decision" that limits or excludes potentialities – or "positive" – the "feeling" that embraces a potentiality for inclusion in a process of becoming [4: 99]. According to Whitehead [3: 29], once a newly constituted subject becomes, it "acquires objectivity" – it is "immortal objectively" – as a datum (i.e., a past becoming) to be prehended by the new becoming-subject within a subsequent present overflowing with relations.

Following Latour [6: 75], I see Whiteheadian data as "actants" in that they possess the capacity to "intervene" or "modify" – or *affect* – other subjects via prehension. I conceptualize all data/actants as possessing what I refer to as *affective force*, or the power to influence/inform what becomes in any given present moment. Steven Shaviro [7], Shaviro [8] has made a similar observation regarding the role of affect in Whitehead's thought – i.e., the Spinozian "capacity to affect and be affected." According to Shaviro [8: 1], Whitehead's emphasis on *feeling(s)* (i.e., prehension) results in the idea that subjectivity is "affect-laden." What Shaviro is referring to here is that, in the feeling or prehending of data, a becoming-subject is affected and has the capacity to affect.

In this Whiteheadian relational process ontology, the subject is perpetually and processually constituted through its relationships with the affective force of its own past and of all the other subjects it encounters in the present [Fore & Hess 9]. The becoming of a subject within the present is, as Deleuze [10: 78] puts it, "a prehension of prehension" by which he means that the subject should be conceptualized as a unification of many iterations of itself since, as it proceeds through each of a continuous series of events, its "many become one and are increased by one"

[3]. What this indicates is that the affective elements of the past that populate the aggregated line of inheritance flowing through the history of that continuously constituted subject's becoming-self continues to reverberate through each succeeding present moment, exerting influence over the manner in which that subject responds to and prehends the new data encountered in its experiences of a shared world. What Deleuze [10: 77], following Whitehead [3], refers to as a perpetual "extension" of an emergent subject along a continuum of events echoes John Dewey's [11] concept of an experiential continuum and his formulation of continuity and interaction as fundamental elements of all experience.

I see Whiteheadian concepts like prehension, datum/data, and relational becoming as playing a fundamental role in how I define the questions guiding the methods of this research, as well as how I reflect upon my ethnographic data. At various times throughout this research project, I have asked: as they go about designing, how are my student interlocutors affected or lured by a variety of data/actants? How and why did the students prehend that data? How did the students participate in the actualization of some potential within that data, both within their own subjectivity and within their designs? How are designs affecting their designers and the clients they are being designed for/with? How, if at all, did the design education experiences of my student interlocutors both reproduce the status quo of design and design education and introduce opportunities to map new ethical and aesthetic trajectories?

As I will explore in the next section, designs and their various iterations are a kind of material culture that evolves over time. As such, I argue that they can be seen as maps revealing the circulating relationships (i.e., prehensions), and the latent potentialities, that animate the design process. In other words, through the methods introduced in this paper, I aim to explore the complex ways that students prehended the affective forces of actants throughout the design process and, in turn, how their prehensions were both etched upon and prehended by their designs.

Design Anthropology and Material Culture

I situate this methodological paper at the intersection of anthropology and design [see 12, 13-16], which includes material culture methods. While there are far more detailed histories of design anthropology than I can offer here [see 16, 17, 18], I aim in this section to introduce some of the history of thought related to the intersection of anthropology and design and how by engaging with the materiality of design, the researcher can come to understand pedagogical problems and redesign curriculum to address those problems.

According to Otto and Smith [18: 5], anthropologists and other social scientists have been utilizing their knowledge and skills to support the design of the industrial landscape, particularly regarding questions of productivity and efficiency, since as early as the 1930s. Such studies conducted by these early "industrial anthropologists" contributed to the design of industrial structures and management practices [18]. This tradition continues through to the present in articulations of business anthropology and design anthropology, as well as in the utilization of ethnography in corporate contexts. Design, business, and corporate anthropologies are not intended, however, simply to reproduce the existing relations of production, nor to make them more efficient and cost-effective. Rather, design anthropologists have together constructed a rich discourse that, over the course of several decades, has critiqued the power relations within these corporate/business design environments [19] and has argued for actual participation from end-users in the design process [20].

Much of design anthropology is performed in industry settings, where anthropologists might give design professionals "social context, value propositions and a sense of appropriate change" [16: 238]. Design anthropologists, then, often are engaged in work that "open[s] up the appreciation of design as a global and largely corporatized knowledge economy, of manifest concepts exchange between mutually anonymous people and groups" [16: 238]. In these anonymized and relational spaces, design anthropologists must negotiate the tensions and roadblocks that might and do arise as design "objects" circulate and, in doing so, new matters of concern and change occur. That said, in this research, I am not concerned with design "objects" but with design "actants" and the "affective forces" they possess as architectural drawings/designs circulate between the interior design majors doing the designing – which requires a great deal of care and critical reflection or a relation of the student to their own self (particularly their experiences) –

and the community partner and instructor collaborating with the students through guidance and feedback. For me, design – at least in this study's context – is not about a relation between subjects and objects but between subjects, or, if one is so inclined, between human and more-than-human subjects that interact and, through interaction, modify others. This situates my work more within the world of posthuman design that anticipates the need for new configurations of humanity than in the realm of human-centered design [16].

In order to do such work, appropriate methods are necessary. Anthropologists in design have argued in favor of the theoretical and methodological distinctions of design anthropology [13]. While my goals and intentions may differ from industry-situated design anthropologists, the methods they employ are still relevant to my work. Studying design processes does require rather specific methods that enable the anthropologist to, as Escobar [15: 55] states, "tack back and forth between action and reflection." In order to accomplish this, there is a clear need for anthropologists researching design contexts to critically consider materiality. One way of doing this – which is central to the method discussed in this paper – is to engage in design-artifact analysis [20]. In this study, design-artifact analysis was conducted with my student interlocutors, who were the designers of the artifacts (e.g., floor plans) in question. This collaborative artifact analysis was made possible through triangulation of the artifacts with interview data, participant observation fieldnotes, and other course assessments/assignments.

Design as Relational Process: Outlining the Method

In this section, I explore how a set of methods are expressed in the particular processes of architectural design education. Generally, this method boils down to three key components:

1. The collection of multiple types of qualitative data (e.g., participant observation field notes, life history interviews, course/design artifacts, etc.)
2. The triangulation of those data to inform the construction of an extensive and personalized interview protocol that interrogates the evolution of multiple design iterations.
3. The triangulation of the personalized interview protocol data with the qualitative data that was initially collected to inform those protocols.

From these three components, the researcher aims to map the relations that create both the designer and their designs, as well as how the designer seeks to make meaning of the design relations in which they are entangled. Additionally, doing so requires the researcher to master and mobilize a deep understanding of historical and structural/systemic forces and the way those forces affect the design(er), as well as numerous philosophical and critical theories. Such a strategy will help the researcher understand the design process, particularly within the context of design education, holistically.

To explore the relational processes by which students created their architectural documents, I designed and conducted particular research methods to trace the relationships, interdependencies, and affective forces of human and more-than-human actants – their credits and debts – across the iterations of student architectural designs. By analyzing these design artifacts, it is possible to first identify what changes actually occurred and then to determine the subtle causes of those changes. Throughout, I have sought to uncover the relationships that flow and exert influence throughout the design process and to inquire how these relationships suggest expressions of ethical life that are concealed or taken for granted. Which relationships affect design(er)s? How do these relationships affect design(er)s? Which expressions of ethical life are present within the student design process? Which are not? What does the processive actualization of a design reveal about the reproduction of normative professional conduct and the potential for new, ethical and aesthetic forms of design?

In this section, I explain the methods by which I sought to answer these questions. While I do not regard my research as exemplifying Actor Network Theory (ANT), I do draw inspiration from that source. Simply put, I am intrigued at the possibilities that may flow from my efforts, as Latour [21: 179] puts it, to "follow the connections, 'follow the actors themselves.'" By doing so, I aim to interrogate the iterations of students' architectural designs as maps of circulating relationships. In addition, I consider how, if at all, ethical thought and practice – including the sense-making work done by students – pertain to the relational interactions that constitute such maps.

In order to uncover the relationships influencing the lines of students' architectural drawings, it has been necessary to have a research design that provides space for students to ascribe meaning to their designs. Here, I find another connection between my methodology and ANT. Latour [21: 23] states:

> It's as if we were saying to the actors: 'We won't try to discipline you, to make you fit into our categories; we will let you deploy your own worlds, and only later will we ask you to explain how you came about settling them.' The task of defining and ordering the social should be left to the actors themselves, not taken up by the analyst.

In a general sense, this extended quote captures much of what I tried to do with this research methodology. While I, of course, could never enter an interaction without my theoretical convictions and biases, for this method, I strove to restrain myself from prematurely trying to explain and categorize why students designed what they designed or, in other words, to provide space to "think through things [i.e., floor plans]" [22: 4]. It was by letting them "deploy their own worlds" (i.e., create designs) and then asking them to explain how they created those "worlds" that I have sought to trace the relationships circulating as students learned about and legitimately and peripherally participated in – à la Lave and Wenger [23] – design processes. It was only after learning of their explanations and the complex relationships contributing to their design creation that I began to be able to unpack the subtle ways that students reproduced the normative professional standards of design and entertained alternatives that held transformative potential. But I am getting ahead of myself – how does one follow the connections within these designs, these maps of circulating relationships? I argue that it cannot be done without triangulating multiple types of data.

Research Ethics

Before proceeding into a discussion of the multiple types of data present in this method, I want to briefly touch on the ethical practices I undertook as the researcher on this project. When I

recruited students to participate in this study, I needed to do so in a way, as required by IRB, that provided students with opportunities to give consent and reassurance that their participation in this study (or lack thereof) would remain unknown to their instructor, given the instructor-student power relationship. I recruited students on the first day of class. During that first meeting, the instructor would leave the room for about 15 minutes while I explained the study to all the students and gave each of them a study information sheet and a written consent form to sign. By signing the consent forms, students were agreeing to my recording fieldnotes about class experiences and my interactions with them, as well as to being recorded during interviews (given they could make the time to participate) and to consenting to my accessing their course artifacts.

All but three of the 35 students consented to participate in the project. Of these 32 consenting students, 28 were female; and, of those 28, two were Latina, two were Middle Eastern, and one was South Asian – the remaining 23 were of European descent. One of the four male students was Latino, while the other three were of European descent. I spoke to each of the students who declined to participate and told them that I would still interact with them in class at times; however, when I did so, I would not record any notes about our interactions. I explained that this approach would be undertaken to ensure that the instructor was unable to determine who was and was not participating in my research. I assured these three students that I would also not access their course artifacts or try to arrange interviews with them. All three found this arrangement suitable. No students were compensated for their participation in my study beyond any potential learning that they might have constructed due to our interactions.

In the examples that follow the description of how my method played out in the context of this course, I will only discuss three students: Janis, Amira, and Carmen (all pseudonyms). The other 29 student participants in this study, while not directly discussed [1], certainly provided important data that helped me make sense of the method discussed herein and assess its value for understanding how students negotiated the relational processes of design. Table 1 reports on the number of students per semester that participated in each of the parts of my method.

Table 1: Number of Students Participating in Each Part of the Method

Semester	Participant Obs.	Life History Int.	Course Artifacts	Final Int.
Fall 2015	10 Students	4 Students	10 Students	6 Students
Fall 2017	10 Students	7 Students	10 Students	9 Students
Spring 2018	12 Students	7 Students*	12 Students	10 Students*

**While consenting to be participants, two students during Spring 2018 were not available to be interviewed.*

Participant Observation

Participant observation was a key method for this overarching methodology and was carried out across the entirety of each semester. In this project, the participant element most often took the form of my attempts to learn how to create architectural documents using Revit software while collaborating with students and considering the reported wants and needs of the course's client/community partner. Following DeWalt and DeWalt [24: 20], I practiced a kind of "active participation" as opposed to characteristically more distant or hands-off approaches.

My participation in the courses as a "student" of architecture and interior design was intended to enable me to gain insight into the implicit ethics embedded in the learning of design processes and how, if at all, students practiced and even grew their ethical capacities. My own design experiences in the courses gave me insight into how students negotiated the exigencies of integrating the learning technical content with caring for client desires and meeting the expectations of professional practice, including the proper utilization of both Zoning Code and the International Building Code (IBC). As stated earlier, students in these courses carried heavy loads which I could not carry in exactly the same way due to the needs of my research. That said, I experienced enough to recognize the intensive technical challenges of the course, the testing of personal and intellectual limits, and how students filtered their design work through their pasts into the present – all for imagined futures.

Throughout the three semesters, I wrote hundreds of pages of field notes containing much of what I observed and also reflections on my own feelings about what I was experiencing in the class and the relationships I was co-creating. My notes contain, for example, detailed descriptions of many of the instructor's Revit demonstrations; interactions between myself and

students as we puzzled over how to calculate allowable area increase via the IBC; how to design a roof in Revit; and encounters between students and KI and Big Car personnel. When I diarized my own feelings, I most often wrote about how overwhelming it felt to try to learn skills in a discipline with which I had no previous experience – all while working, conducting research, and contributing to the care of my growing family.

With students across the cohorts, I found that building rapport and a common language for our interactions occurred with relative ease as we strove to learn the course content and skills and as we shared the struggles we encountered in pursuit of our respective goals. It seemed, at times, that my willingness to share anxieties and my reflections on them helped me to connect to the students: my opening up to them seemed to empower them to open up to me.

For example: during the Fall 2017 semester, I documented my anxiety around having just become a parent, with my spouse, of three adopted siblings, and how I would combine parenthood with my research and my full-time job. I knew that a couple of that semester's students were parents, and I wondered how they were able to do all of the work for the course alongside the work required for four other classes and to be parents.

Janis, a relatively new mother of a barely one year old son, and I bonded over this issue. She said it was necessary that both she and her spouse work and that she wanted what she called "job satisfaction" from her work. Her decision to pursue a degree in interior design stemmed from that desire. Yet, the degree program kept her very busy, and she now missed spending time with her child. Though unintended, I found that my willingness to be candid with Janis about my uncertainties and anxieties led to conversations in which she shared her dreams and worries with me.

Similar interactions I had with other students helped me to see how the circulation of relationships within economies of neoliberal capitalism (i.e., both spouses must work to make ends meet; pursuit of "job satisfaction" by being entrepreneurial with one's specialized labor power) affect, and are affected by, economies of intimacy (i.e., private interactions and care between oneself and one's loved ones).

Life History Interviews

I conducted life history interviews (60-90 minutes in duration) with students from each semester within the first nine weeks. They were with four students in Fall 2015, seven in Fall 2017, and seven in Spring 2018. When scheduling for a first interview fell through, I typically did an abridged version of the life history interview at the beginning of the second/final interview (see below). Most students participated in two total interviews (occasionally three) but, due to scheduling conflicts, some students in the Fall 2017 and Spring 2018 semesters only participated in one. I did not interview every student in the Fall 2015 semester; rather, it was through my experimentation with the interviews conducted during that semester that I came to formulate the overall method described here. For example, during the Fall 2015 semester, I began experimenting with the idea of exploring with students the transformation of their floor plans throughout the duration of the course.

Ultimately, life history interviews helped me to gain insight into how early experiences shaped each student's educational trajectory and to identify individual student's values. By knowing what they valued and why, I was able later to inquire into how their values and past experiences influenced their design work.

Course Submissions as Design Artifacts

I gathered and analyzed each student's course submissions throughout the entirety of each semester. Combing through each student's *journal submissions*, I identified themes presented in each entry. That enabled me to examine how students were approaching their interactions with their client, how they configured their design concept, and how they interpreted and applied "client" feedback.

During my analysis of each student's various iterations of the *floor plans* they designed, I examined every version (each including at least two floors) and identified changes between one version and the next. That included paying very close attention to changes in the design's lines

between iterations. To be clear, I only conducted this method on the 2D designs students created in Revit, which is a 3D modeling software. In the future, it would be interesting to examine how, if at all, this method might work with 3D models.

I also spent time with students' *code studies* to gain insight into how the IBC was represented in their floorplans. During the Spring 2018 semester, I identified themes present within mind maps. For the Fall 2017 and Spring 2018 cohorts, I also reviewed the digital stories that the course instructor had required of students to obtain additional information on how students were thinking about and justifying their design choices.

Looking at these artifacts together, allowed me also to take notice of how students practiced "improvisation;" or, in other words, how students "respond[ed] with precision to the ever-changing circumstances" [25: 145]. Such improvisation is necessary when outcomes are uncertain and one is forced to deal in potentialities and possible futures, which are at least made partially concrete within a design artifact. As Halse [26: 194] aptly points out, design artifacts, while imagining possible futures, also express "moments of becoming" where the designer's "concerns and aspirations" are projected upon them. Given this theoretical configuration of design artifacts, it becomes possible for a design anthropologist to participate in the co-creation of artifacts that "allow participants to *revitalize their pasts*, *reflect upon the present*, and *extrapolate into possible futures*" [26: 194, emphasis added]. How students did these three italicized actions is of central concern to my methods, discussion of which culminates in the next subsection.

Final Interview – Unpacking Designs

Informed by Medway's and Clark's [27] description of a virtual building (i.e., a design) as a palimpsest, Lloyd [28] argues that a design is "a fluid entity, an agglomeration of thoughts, agreements, and partial visualizations." He goes on to suggest that whatever agreement a design may represent is merely provisional. For Lloyd, a design is thus what I would call a becoming aggregation, constituted by prehended components (i.e., thoughts, agreements, visualizations) that are neither static nor essential. In other words, a design – or perhaps the geometric plane

upon which a floor plan is designed – is in some sense like a porous and malleable receptacle containing, absorbing, and changing shape with receipt of each of an emerging multiplicity of components born from countless relationships. It is from that understanding of a design that I wanted to craft a method that enables a thorough unpacking of those multiple shifting components and how each relates to and affects the others.

In addition to life history interviews, I interviewed each student who had consented to participate in the study – save four in Fall 2015, one in Fall 2017, and two in Spring 2018 – within the final few weeks of their respective semesters. This was regardless of whether a student had participated in the life history interview(s).

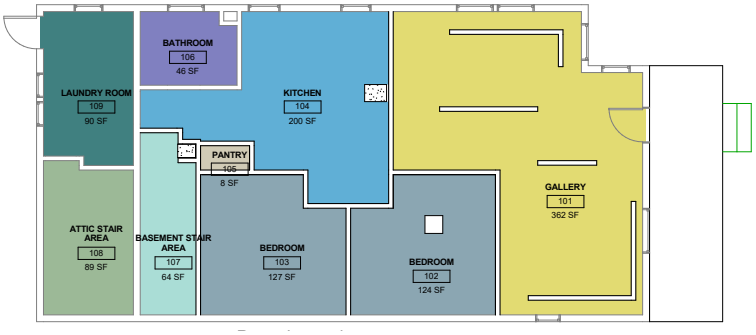
The structuring of this final interview was inspired by a story detailed by Donald Schön [29: 142-154] in his book about teaching reflexivity to practitioners. There he describes a long conversation between two professional architects, Dani and Michal, about Michal's architectural designs created eight years prior when Dani was Michal's teacher. Their narrative illustrates a conversational method where each reflects upon their examination of Michal's architectural drawings (for a field school) and their inquiries into the reasoning behind the design choices Michal had made. Of particular interest to the method I have developed here, Dani and Michal at one point discuss in detail how Michal's design is deeply informed by the qualities (i.e., design concept) she would like to see in her design and how her initial iteration did not communicate these qualities. For Schön, detailing this conversation was specifically about describing an educational scenario in which a teacher supports his student in the identification of what she would like to design, and then encourages her to experimentally realize the qualities she wants in her design. This was a conversation Schön observed; it did not arise through a method he had designed. Rather, his description was there to service his inquiry into how to educate reflective practitioners.

Given that I had a different purpose in my research, I found it useful to ask myself: "how can I operationalize what underlies this informal conversation between Dani and Michal into a more systematic method to collect descriptive data on the meanings of a design's lines?"

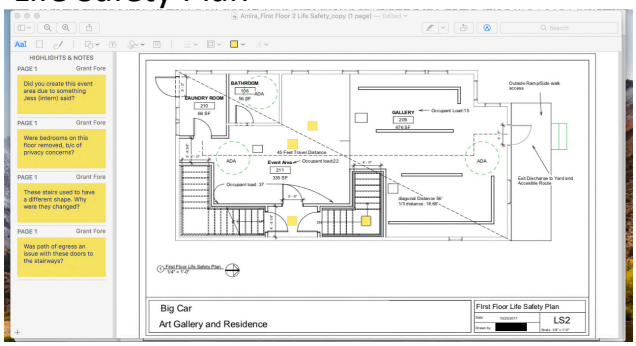
For the final interview, I created a personalized interview protocol for each student that facilitated the student's and my co-examination of the trajectory of their designs across the semester. This was a time-intensive process. To create these personalized interviews, I had to triangulate all the data I had gathered through the methods previously described. This means that I had (1) to review my field notes for documentation of events in which the student in question was involved; (2) if applicable, to review the life history interview recording/transcript; (3) to analyze the student's journal entries, code studies, mind maps, and digital stories (if the interview occurred after digital stories were due); and (4) to map my findings from the analysis of each of these data types, along with my questions designed to build upon these findings, in relation to each student's floor plan iterations from color plan to final construction documents. Since this brief description of my method offers a very high-level view of the process, it might help to offer a specific example of how the process actually played out. I use my final interview with Amira (Fall 2017 cohort) as that example.

As I constructed Amira's final interview protocol, I first opened the files (using the *Preview* application on my MacBook Pro) for each of her floor plans, from the color plan to the final construction documents. I then created multiple desktops and assigned each design iteration to a desktop in chronological order. This enabled me to easily "swipe" back and forth between Amira's design iterations on their respective desktops. As I swiped between iterations, I noted subtle and not-so-subtle differences between the floor plans. Whenever I located these differences, I added a "Note" box, in which I typed a question inquiring about the reasons for these differences. At times, these notes also included brief descriptions or quotes from other data sources (e.g., life history interviews, other course submissions, fieldnotes), which enabled me to make connections between Amira's design and her personal history, her stated values, and her design concept(s). When it came time for the final interview, I would open all of Amira's designs with my annotations, and we would swipe through them together as I asked the questions and prompts recorded in my notes. This is similar to how Ingold [30] characterized – following Gunn [31: 324-327] – studying the history of architectural designs, particularly those created with design technologies (e.g., CAD, Revit). Ingold [30: 167] states that "you can only reconstruct the history of a CAD process by stacking a whole pile of sheets in genealogical sequence." In a way, this is what I did.

Color Plan



Life Safety Plan



Final Construction Docs

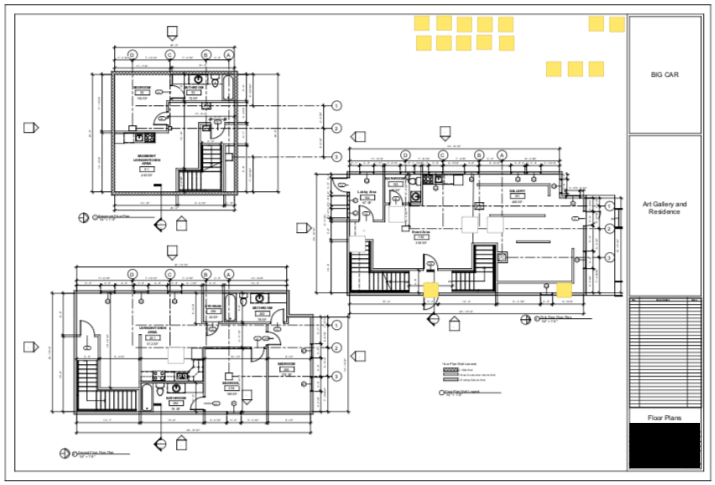


Figure 1: Illustration of the process by which students and I co-interrogated their designs during their final interviews.

Figure 1 illustrates a portion of this overall process. Amira's "Color Plan" for the first floor of Big Car's building is primarily included as a baseline. Notice how in the Life Safety Plan there has been substantial changes – where there were once bedrooms, there is now a double staircase; where there was once a kitchen, there is now a large "event area." The yellow notes I added to the life safety plan inquired into these changes.

When I came to the final construction documents, I identified Amira's additional changes to her floor plan for the first floor and created notes for questions about these changes. The several yellow notes included at the top of final construction documents included several questions and prompts that referred back to personal and conceptual elements. Since I did not know how these personal or conceptual references influenced the lines of the Amira's floor plan, I was unable to map them directly onto the floor plan; rather, identifying how such elements mapped to the floor plan was precisely what my noted questions intended to elucidate. Let it suffice to say that the cluster of notes at the top of the final construction documents inquired into (1) how Amira's design concept informed her floor plans; (2) how her complex relationships with her mother, father, and brother influenced her experiences of learning to design; (3) how the recent death of her best friend influenced her design experiences; (4) how her desire to help refugees (like her half-siblings, who at the time had fled Syria and were in German refugee camps) informed her experiences of learning design; and (5) how her moral and religious values influenced her design. It was inquiries such as these that facilitated my identification and description of the complex ways students designed, their reasons for designing in the ways they did, and their ethical and moral thought and practices throughout the design process.

Putting the Method to Work

By sitting down with students and interrogating the relations of design through engagement with the materiality of floor plan iterations, students and I were able to define several design actants that wielded affective force upon design moments, as well as the design(er). In my larger study [1], I identified several design actants, including community partners/clients, IBC, existing material structures, peers, and personal histories/subjectivities, which were often, though not

always, articulated through students' *design concepts* or the ideas around which their designs were aligned (e.g., "community," "green/sustainable," etc.). In this section, I want to briefly demonstrate how the method helped to identify the ways that various design actants affected the constitution of the designs. The example that follows describes a short span of time for one student, Carmen, as she iterated upon her initial floor plans in preparation for a larger presentation of her interim plans to KI personnel slightly past midway through the semester. The presentation of the data here also attempts, at times, to give the reader the feeling of being involved in Carmen's final interview, which was again created through the triangulation of multiple kinds of ethnographic data.

Carmen's Early Floor Plans

With her initial color plans designed and submitted in Week 8 of the semester, Carmen had one week to prepare for her interim presentation plans (due in Week 9) to KI's staff. Her design changed significantly during that week. The changes appeared to reflect her efforts to manifest the particulars of her one-word design concept (developed in her Week 8 Journal Entry): "community." This concept had gone through a previous iteration, where it had been intermingled with other themes, such as "becoming one," and "sustainability," which were also important themes she reported imagining would inspire her developing vision. She also stated that "[jigsaw] puzzle pieces coming together into one" was an image of particular power in her thinking about designing for KI. In her third journal entry (Week 8), regarding her one-word concept, she had written:

> Now the question is, how does one incorporate "community" into a space? Well by keeping the space open and inviting will help. So, [a] "no close[d] doors" open concept. Also having spaces for people of the community to come hang and learn. Which I have incorporated lounge rooms for that purpose and meeting rooms for groups to come and work and teach.

Carmen's efforts, in her Week 9 interim presentation plans (see Fig. 2), to make the first-floor plan feel "open and inviting" were evident in her having removed the wall between the "meeting area" and the "conference" room as also most of the hinged doors, thus leaving only open entryways between interior rooms. Her reduction of the "kitchen" space's area, from 264 ft^2 on the color plan to 184 ft^2 on the interim presentation, also spoke to a privileging of shared public spaces over KI's other significant – and, arguably, core – desire for a large kitchen for teaching. Yet her having joined the "meeting area" and "conference" room did bring in a key piece of KI's organizational history while also embodying her design concept and its call for openness.

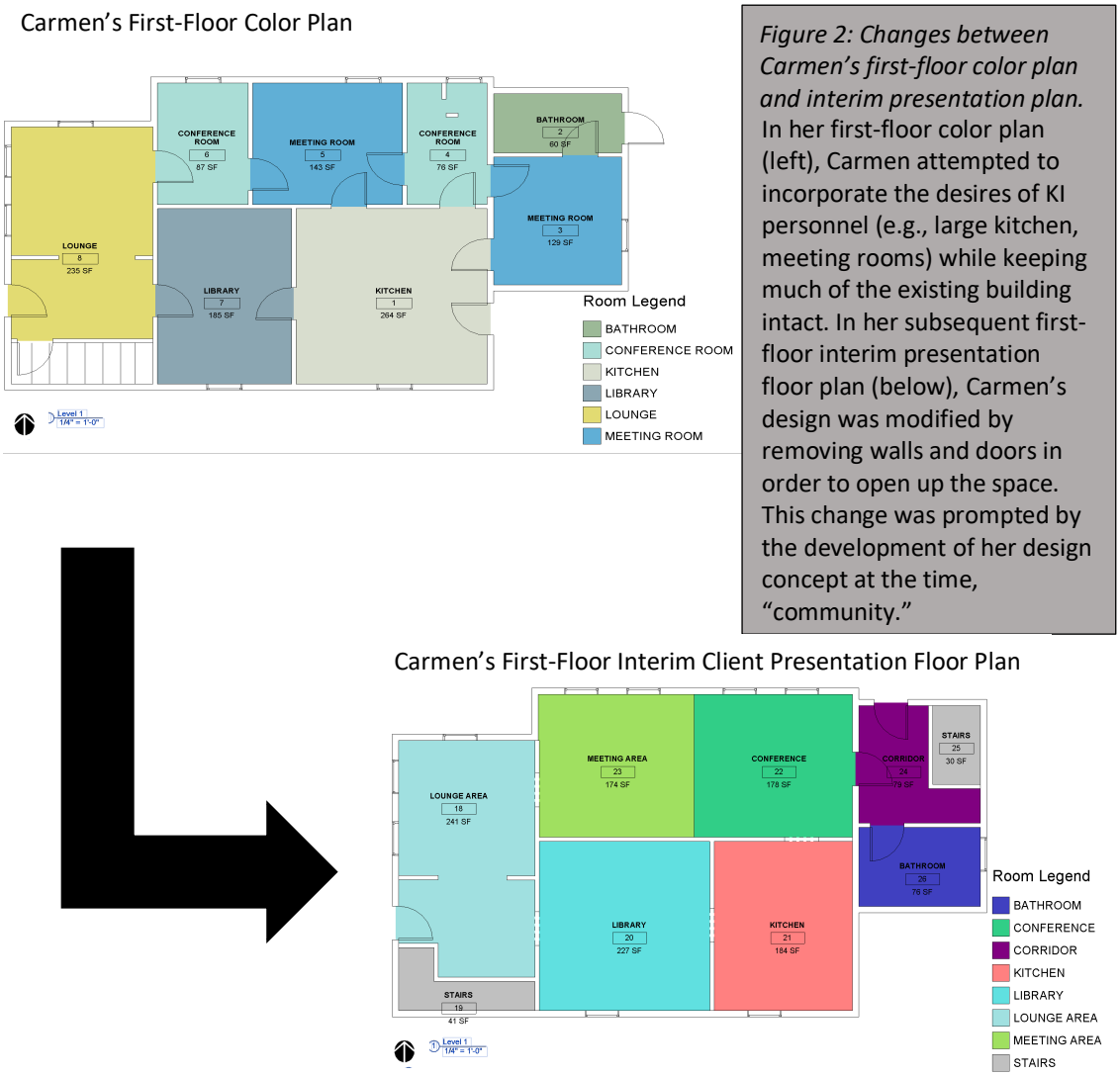


Figure 2: Changes between Carmen's first-floor color plan and interim presentation plan. In her first-floor color plan (left), Carmen attempted to incorporate the desires of KI personnel (e.g., large kitchen, meeting rooms) while keeping much of the existing building intact. In her subsequent first-floor interim presentation floor plan (below), Carmen's design was modified by removing walls and doors in order to open up the space. This change was prompted by the development of her design concept at the time, "community."

> **Carmen**: From what we had talked about, they wanted a place for meeting and conferences, so I decided, why not make one big space for that. So, then you could have the private library and more of a sitting area ["lounge"] and then that whole big space ["meeting area" and "conference"] where they could have their -- um, what is it called? -- their table meetings, or something like that. They said that like twelve of them come in...
> **Grant**: Their founding table?
> **Carmen**: Yeah, the founding table that's what it's called. So, I wanted to have this big area that would be able to suit that many people, and I felt like taking that wall down [walls between conference rooms and meeting rooms on first floor color plan] would create that space [362 ft^2].

Carmen's efforts to secure a space for KI's "Founding Table" speaks to the influence that I had on her design. When the Fall 2015 cohort had worked with KI, they had encouraged the students to try to include space for their 18 foot "Founding Table," around which the first incarnation of their organization had been born. However, during their first meeting with the 2018 cohort, KI personnel did not highlight the "Founding Table" as something students should keep in mind while crafting their floor plans. When the class visited KI's property to take measurements of the existing structure, I noticed half of the disassembled "Founding Table" propped up against the inside of the house's north wall and asked someone from KI, during a tour of the property, whether they were still interested in including it in the building. She confirmed that they were. What this shows is both that my own prior relational experience with KI had left sufficient impression on me to ask what I did, and that my doing so in turn affected the trajectory of Carmen's design as it went through its process of becoming.

In addition to reflecting my impact, the influence of KI staff, and the force of Carmen's own vision, this interim design iteration also displays Carmen's initial negotiation of the International Building Code (IBC). That is evident primarily in her inclusion of an exit from the corridor in the northeast corner of the property. When I asked her why she had included an exit here, she joked,

"…because I forgot there was [an existing] door right there [in the kitchen]." After this bit of self-deprecating humor, Carmen elaborated on her rationale behind putting this exit in this "corridor" area:

> **Carmen**: I was able to meet code because, all my doors, they weren't actual doors…they were just openings. Cause this right here was a door so you needed an exit in this space as well.
> **Grant**: Oh, from the conference into the corridor since that is a proper door?
> **Carmen**: Yeah, and these [the other room entries] are just door openings.
> **Grant:** Ok, so [it was] since you had a proper door to the corridor that you needed to add [it].
> **Carmen:** Yeah, cause if you were stuck in there you needed to be able to get out.

Carmen's last statement illustrates the instructor's oft-mentioned interpretation of the purpose of the IBC: "mitigating the loss of life." Carmen clearly saw the "corridor" area in her interim presentation first-floor plan as having the potential to violate code and possibly be dangerous for occupants. In fact, despite her concern, the design of the egress door in the corridor in this design iteration was still a code violation given that the door did not flow with the path of egress. Carmen corrected egress issues in later iterations.

Carmen's interim presentation plan's second floor (Fig. 3) shows that she had deleted walls from her design, which, on her earlier color plan, had represented actual walls in KI's building. Within her design of her interim presentation plan's second floor, Carmen also proposed the addition of walls that did not, at the time, exist within the building's material structure. This interim presentation iteration of the second floor retained the dorms and kitchenette as requested by KI staff and designed in her earlier color plan, yet Carmen had opened it up considerably by deleting the walls proposed in the color plan's hallway, thereby

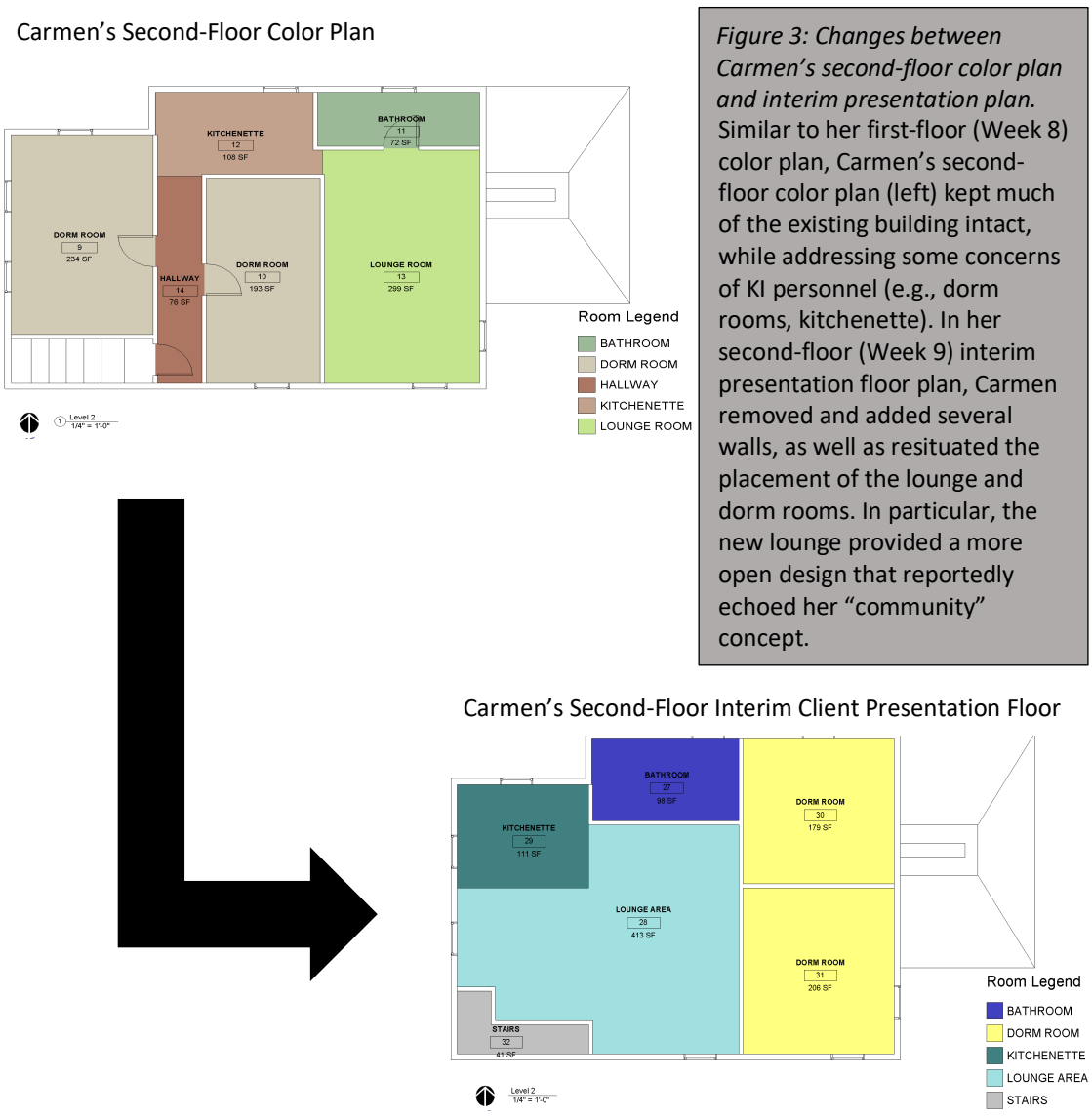


Figure 3: Changes between Carmen's second-floor color plan and interim presentation plan. Similar to her first-floor (Week 8) color plan, Carmen's second-floor color plan (left) kept much of the existing building intact, while addressing some concerns of KI personnel (e.g., dorm rooms, kitchenette). In her second-floor (Week 9) interim presentation floor plan, Carmen removed and added several walls, as well as resituated the placement of the lounge and dorm rooms. In particular, the new lounge provided a more open design that reportedly echoed her "community" concept.

producing one giant "Lounge Area" that opened up onto a kitchenette. After presenting her interim plans to KI staff during Week 9, she received and prehended feedback that caused her to make significant further changes to both floors on her next design iteration: the life safety plan.

There is certainly more to the storylines of Carmen's designs and, if there is interest in learning more about the design and ethical work of Carmen and her peers I encourage the reader to engage with the larger study [1]. That said, before closing out this section, it is important to also acknowledge how Carmen's subjectivity (i.e., the experiential history of her becoming self) influenced her design and led to the expression of the ethical/moral domains of design. It was

through examination of Carmen's course artifacts (e.g., journal entries) and life history interview that I was able to identify potential areas where her personal experiences and values exerted affective force on her designs. When I asked how she had located herself in her design, she stated that she had done that when visualizing how the space would be utilized and, therefore, how it needed to be laid out. For this process of visualization, she had followed the same process she had used in her attempts to empathize with her young scouts and had tried to imagine the space by "looking through their eyes." She stated, "How would I want my boys to feel in that space? I feel that [question] represents me [in the design], cuz if it was okay for my boys, then it's okay for my client." Another way in which her experiences and values were etched into her design was through her design concept of "community," as well as the image of the "jigsaw puzzle, which reflected Carmen's valuing of care and concern, particularly for diverse groups of people, in order to prevent harm. Here, I see Carmen's desire to avoid the cruelty of exclusion, which she had reported being negatively affected by when she experienced bullying firsthand and when she witnessed her close friend, who had autism, being bullied too. The idea of community reflected her values and was integrated into her floor plans, for example, by way of the open floor plan she designed. Following Tronto's [32] articulation of an ethic of care, in Carmen's designs, it was evident that she desired to provide care: (1) she strove to be *attentive* to needs and to do so empathically; (2) she took *responsibility* to address social needs/problems through her design; (3) she sought to do all of this as *competently* as possible; and (4) she was *responsive* to the feedback given by those to whom she provided care.

This example paints a very personal, compassionate, creative, and empathic vision of the ethical care of the design(er) for the actants and affective forces they encounter. Carmen and her design were all of these things, but for her, as well as her peers, there were other modes of meaning-making that co-existed alongside these ethical notions of care. For example, for Carmen and her peers, design as an act of care was often captured by discourses of neoliberalism that framed them as entrepreneurs of self. In many ways, the student designs *were* care: care for the client, for the client's clients, and for the self of the designer in many complicated and, at times, contradicting ways.

Carmen, like her peers, reported being in pursuit of training that would lead to a career with a good salary. Carmen and her peers, at least in part, enrolled in university as entrepreneurs of the self, seeking to maximize a set of specialized skills, which could later be sold as highly skilled wage labor. Individualism, competition, and entrepreneurialism are each hallmarks of the neoliberal spirit embodied in *homo economicus* subjects [33, 34], the kind of subject which Carmen and her peers were becoming both intentionally and unconsciously. This state of affairs led to particular expressions of care in which the care given by student designers was often captured by neoliberal notions; for example, students reported wanting to provide good care to their clients for the purposes of career longevity – in other words, some students reported needing to care for their client, in part, to ensure a good reputation and the kind of "word-of-mouth" recommendations that would lead to success. I mention this not to begrudge these students their desire to make a living and have successful careers. Rather, in pointing this out, I hope to reveal the complicated ways that people make-meaning of their design experiences in order to ask questions about the feasibility of maintaining the status quo, the ideals of ethical living, the features of an ethical subject, and how ethics education might cultivate articulations of the designer that might create ingressions into new, sustainable worlds.

Future Directions and Conclusion

This paper is just a snapshot of a much larger, seven-year project. With this paper, I have introduced a method for interrogating the iterative materiality of designs, the actants and affective forces that influence the constitution of that materiality, and the meanings design students make of the relationships that constitute them and their designs. Future papers will further present empirical results about student design(er)s within the context of the institution/course, national ideologies/interests (i.e., political economic, historical), and discourses of professionalism, art/beauty, and ethics [1]. This future work will aim to mobilize such findings to advocate for transitions into new expressions of architectural and engineering design education, which will hopefully introduce students to new modes of thought and practice with the potential to contribute to the just unfolding of a pluriverse where other worlds are possible. Thorough consideration of such topics is unavoidably beyond the scope of this paper. That said, I would like to introduce a research question that may inform future publications and

research: *Given the meanings students make of their relational experiences of design in the classroom, how do we redesign curriculum to foster additional or new kinds of meaning-making?*

In close, my reason for using the above methods is not "market-driven," which can be the case for design anthropologists working in the corporate sector. I take an "activist" approach to design anthropology that seek to address social issues through design [15: 54] and promote transitions into worlds otherwise. In future publications, I will unpack this activist approach further, as I am ultimately interested in how the method described in this paper might facilitate the design of educational approaches that could cultivate new ethical expressions of humanity as a species capable of addressing issues across multiple scales, regimes of value, and ontological commitments. This marks a kind of activism perhaps best aligned with Fry's [35] redesigning of the human to ward off the "defuturing" effects of modernity and capitalism. Therefore, I see this methodological paper as introducing a kind of *ethnography-as-design* that, by ethnographically interrogating the contemporary thought and practices within the materiality of design education, might be capable of outlining new pedagogical designs for ethics education in engineering design contexts. In other words, I conceive of this method as an intervention into the theory and praxis of ethics education in engineering and engineering design – an investigation, conducted in conversation with students, into the hegemonic structures influencing design and design education and the singularities that may yet transform them.

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