

An Evolution in Design Education: A 10-Year Experiment in Alternative Teaching and Learning in the Anthropocene

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This paper will outline a specific ten-year experiment in finding transformative teaching and learning methods for design in the age of the Anthropocene. It will candidly share failures and successes of the experiment and discuss the ramifications for mainstream architectural design education. A number of innovations are covered in this paper. *Guiding Principles* replace the concept as the primary driver of design projects. *Transdisciplinary collaboration* replaces the often-contentious *interdisciplinary design process*. *Social equity* replaces *privilege* as the undercurrent of education. *Stakeholder-driven design charrettes* at the start of projects replaces *inequitable final juries*. *On-line education* is used liberally to expand opportunities for everyone. *Design accountability* becomes the norm as students set, and meet, their own sets of goals in a reflective “validation” process. Furthermore, the role of *beauty* remains important, but becomes subservient to *change agency* as the primary metric for defining a successful design student.

The experiment in alternative design education has been a rich and rewarding experience. The lessons learned and examples shared will provide some useful concepts for those seeking to take more action in their programs. In turn, there is an expectation that the urgency of the climate imperative will catalyze other programs to undergo their own transformations, so that we may finally elevate the imperative of sustainability to the forefront of design education, and in turn, spawn a generation of leaders, activists, and designers ready to lead in the face of adversity.

INTRODUCTION

Today we find ourselves in the Anthropocene, the first human-made climatic period in history, and with it comes the greatest existential threat humanity has ever faced. Knowledge of climate change and the effect of the use of fossil fuels upon the environment has ushered in the sustainable design movement. To train the next generation of architects, new types of advanced and specialized built environment design degrees have offered the opportunity to prepare students to be leaders in the fight against climate change. This, in turn, has led to the emergence of new evolutionary models of design education

that feature equitable, integrative, transdisciplinary, reality-based, sustainability-centered teaching and learning pedagogy. This paper will outline a ten-year experiment in developing and delivering a sustainable-built postgraduate degree, beginning with a very brief and perhaps inadequate historical overview of the origins of both mainstream and alternative education approaches. This will be followed by a description of specific principles and practices developed for the MS in Sustainable Design program at Thomas Jefferson University. The exploration of these topics will favor a horizontal approach that explores the interrelationships between the parts of an overall educational approach to from a holistic picture rather than taking a deep dive into a specific strategies. In addition, the ramifications for architecture education will also be shared.

HISTORICAL CONTEXT FOR DESIGN EDUCATION

The story begins 14,000 years ago when the climate changed from an ice age to a very warm and hospitable interglacial period known as the Holocene. Warmer temperatures and advances in human intelligence combined to form the beginnings of the Age of Agriculture in which the jump from dispersed Hunter-Gatherer cultures to centralized agrarian societies saw unprecedented population growth, the beginnings of class structure, and the emergence of the master builder/architect. The master-builder took the lead in the design and construction of buildings – the ultimate integrative model of engineering, design and construction processes.¹ Architectural education was provided through direct, one-on-one training – a master/apprentice relationship. In this way, the deep knowledge needed to provide an authentic integrative design experience was passed down through generations. By the early Age of Industry, the pupilage model emerged as the primary form of architectural education as a continuation of the master/apprentice model.² Even after the advent of the studio or atelier model, the master/apprentice relationship remained the central form of pedagogy.³ However the new studio/atelier model relied upon theoretical projects thereby discarding the centuries-held practice of learning directly through the creation of actual projects, and this marked the beginning of a long held separation between “real architecture” in practice and “theoretical architecture” in design education. Furthermore, as projects became more complex, chasms began to form between the discipline of architecture and the emergence of

the fields of engineering and construction, further eroding the potential for deeply integrative projects.⁴

Despite the emergence of the more equitable closed jury,⁵ the rise of competitions such as the Prix de Rome would sow the seeds for an intensely competitive form of education that would demand long nights and the sacrifice of virtually all other aspects of life in support of a successful architecture project.⁶

Thomas Fisher sums up the state of architectural education from this point forward: “Many of the features of today’s design studio – the unquestioned authority of the critic, the long hours, the focus on schematic solutions, the rare discussion of users or clients – were begotten by that 150-year-old system.”⁷ Add to this the distinct lack of diversity/equity in educational systems along with the absence of interdisciplinary work, and the status quo for architectural education would be set in stone for over a century.

Heading into the 20th century, two schools emerged to challenge the status quo and begin to rediscover the original flame of integrative thinking of the master/builder and included some of the first attempts to build a more inclusive learning experience. The Bauhaus was founded, in part, upon its dedication to craft and a non-theoretical directness of education.⁸ By all accounts, the Bauhaus was also the first transdisciplinary design program where artists, architects, and others were free to collaborate and cooperate.⁹ Women for the first time were not only admitted but given equal status to men, at least in theory.^{10,11}

The School of Architecture at Taliesin, founded in 1932 by Olgianna Lloyd Wright and her husband Frank Lloyd Wright, also pursued an alternative educational model seeking to celebrate and include an integrative mindset where theatre, dance, film were featured in the curriculum.¹² “Learning by doing” and “organic architecture” were the mantra of the school, harkening back to the original integrative master/builder model. Women were offered pathways to education, underscoring the role of inclusiveness in alternative transdisciplinary models of education.¹³

By the 1960’s, the Age of Information emerged, bringing a newfound and long overdue focus on civil rights and an emerging concern over the state of the environment. In many ways, the seeds of sustainability were sowed during this period. The rise of women and people of color would seemingly impact the profession and schools of architecture. Alas, this was not the case as evidenced by scathing quotes by Whitney Young among others.¹⁴ Buckminster Fuller and Ian McHarg offered enlightened ideas and education around environmentalism,¹⁵ and William H. Whyte was a mentor for the Project of Public Spaces, which advocated for design that starts with and includes people in the design process.¹⁶

In 1987, The Brundtland Commission of the United Nations defined Sustainable Development, and by 1993 William McDonough gave his famous Centennial Sermon,¹⁷ ushering in the green design movement. Architectural educators began to tackle environmentally sustainable design and social inequity in very direct ways. Samuel Mockbee’s Rural Studio, Marvin Rosemann et. al.’s E.A.S.E Project,¹⁸ Boyer and Mitgang’s treatise on architectural education,¹⁹ and the Solar Decathlon all emerged as substantial responses to the needs for architectural education to evolve towards new forms that address climate change directly. Each initiative spoke to the need to rediscover age-old integrative models and the key role of cross-disciplinary education. Despite the rise of these examples, sustainability education in architecture programs remained largely absent. In 2006, Kira Gould and Lance Hosey completed a study entitled Education for a Sustainable Future. They lamented the overall lack of initiative and movement towards wider adoption of sustainability in design programs.²⁰ More new forms of education emerged as a response to the growing imperative of sustainability. The Carbon Neutrality Design Project developed by the Society of Building Science Educators (SBSE),²¹ John Quale’s “Real Buildings with Real Budgets,”²² and the Columbia Building Intelligence Project sought to unite various disciplines in the quest to achieve sustainability in the curriculum.²³

A NEW WORLD VIEW, A NEW APPROACH TO DESIGN EDUCATION

In the early 21st century, Hurricane Katrina, \$5 per gallon gas, and Al Gore’s Inconvenient Truth shifted the collective consciousness of society towards sustainability as an organizing principle for companies, nonprofits, and governments. In turn, it changed the way that architecture is understood and it began to reshape how architecture is taught. When a new consciousness emerges, the inertia of architectural education practices and paradigms handed down through generations from a previous worldview becomes open to disruption. A series of new graduate post-professional programs were founded after 2000 to tap into the new mantra of sustainability. The University of Texas, Catholic University, Ecosa, Carnegie Mellon, Boston Architectural College, and Philadelphia University launched sustainable design focused programs. These programs featured a wide array of innovative curricula to address climate change directly and sustainability more broadly.

One of these programs, the MS in Sustainable Design (MSSD) program, was founded in 2006 as a means to discover an alternative pathway to traditional architectural education in order to accelerate the rate of change in the industry and invest in developing leaders as future advocates for sustainability. The program challenged the assumptions of the centuries-old inertia behind architectural design education. After a merger, the MSSD Program is now contained within Thomas Jefferson University, a regional school in Philadelphia, Pennsylvania. The program was founded, in part, as an offshoot of a required sustainable design studio taught in the undergraduate

architecture program, and it also emerged from an off-campus interdisciplinary research center that featured collaborations between architects, engineers, artists, biologists, and others.²⁴ Furthermore, an association with Re:Vision Architecture²⁵ in Philadelphia meant that the faculty had direct experience with actual sustainable design projects and design processes. The MSSD program is a 33-credit post-baccalaureate program open to anyone who wants to improve the world through the use of sustainable design. The program is not accredited by NAAB and was never intended to replace architecture programs nor is it advertised as one. The program's enrollment reached as high as 100 registered students with 20-25 students per year being the average incoming class-size, and the program now boasts over 250 graduates. The typical ratio of disciplines in the program in order is 50% architects, 20% interior designers, 10% engineers, 10% planners/landscape architects, and 10% with degrees in business, English, environmental studies, among others. The program received numerous awards, most notably from the United States Green Building Council and from the National Institute of Building Science.

In founding the program, it was deemed necessary to “start over” and seek an “evolutionary leap” in the development of education as opposed to a safer and slower incremental method of change. The collaborative integrated design process for the new program began with the development of a set of Guiding Principles (Core Values) that comprise the ethical foundation of the program. Out of the Principles, a new set of educational practices would emerge and develop over time. The result is a fundamentally different and perhaps more useful model of design education (for graduate schools, at least) that addresses deeply authentic sustainable design goals. The process of building the program raised many questions about the principles and practices of traditional design education and offered the chance to experiment with largely untested concepts and approaches for higher education.

PRINCIPLES AND PRACTICES FOR DESIGN EDUCATION

The following passages describe the set of principles and practices that were used to create the program. The principles are only as good as the practices that are used to instill those principles in the curriculum. For example, nearly everyone talks about diversity as an important principle in design education, but little, if any, specific practices are initiated to achieve such an important goal.²⁶ The same could be said for sustainability, where programs routinely tout principles of sustainability as “essential” in their programs, but the actual day-to-day implementation of such principles is inconsistent and typically shaped more by the individual studio master's personal beliefs on the subject, rather than upon a broader ethos within the programs.²⁷

PRINCIPLE 1: SUSTAINABILITY IS THE PRIME DIRECTIVE OF GOOD DESIGN

Design excellence has generally been the de facto goal of design education. Good graphics, strong overriding concepts, “the big idea,” a personalized exploratory approach, and a deep level of design resolution are the hallmarks of good design programs. However, issues of sustainability, social equity, and other concerns are typically integrated into, and subservient to, the greater imperative of design excellence. Generations of students have been trained under the banner of “design excellence,” and have gone on to have successful careers as architects. And yet, the result has been decades of “good” buildings that have helped to destroy the planet through unnecessary CO₂ emissions. The dual societal threats of climate change and social inequity demand a new “prime directive” for design. Design excellence must now become a subsidiary component to the larger prime directive of achieving a sustainable future. In the words of Koch, et al. in the AIAS Studio Culture Task Force, “Architecture has to be greater than just architecture.”²⁸ In the figure below (Fig. 1), two models of design education are presented. The awareness of the differences between these two models is nothing short of transformational. Once the leap is made from design excellence over the Razor's edge to authentic sustainable design, the real work of evolving design education can begin.

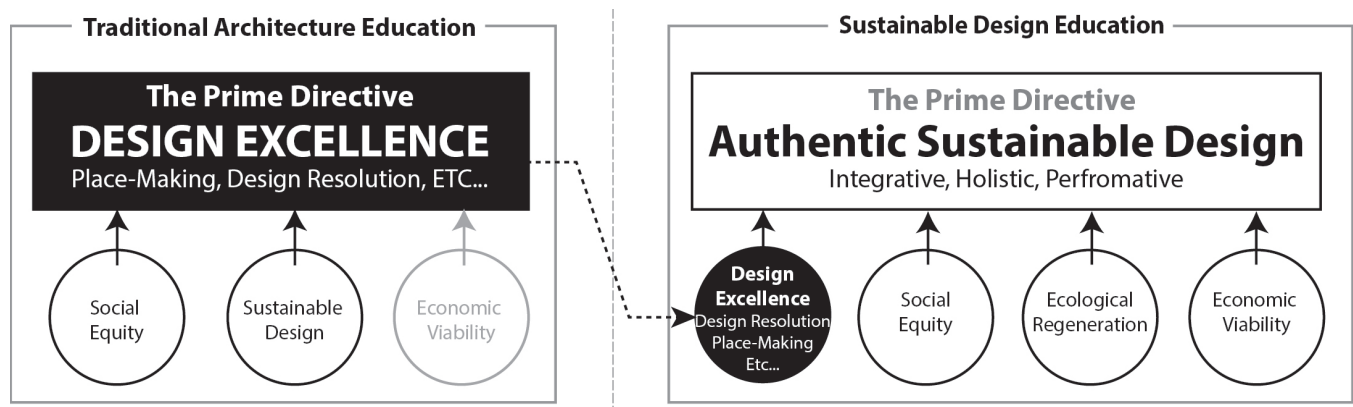


Figure 1. Repositioning design excellence in the new design curriculum

Practice: Guiding Principles replace the concept as the primary driver of design projects

Guiding Principles are aspirational statements developed at the beginning of a project by the students (with actual stakeholders when possible) to help shape the ethical foundations of a design project. Here are a few examples:

- *Performance*: “Create the highest performing project possible to fight climate change”
- *Systems*: “Integrate the building design into the local ecology to regenerate natural systems”
- *Culture*: “Make sure that every person, regardless of difference, can find comfort and feel welcome in the project”
- *Experience*: “Infuse a sense of beauty into every design decision”

The use of Guiding Principles offers the opportunity to embed a holistic set of shared values into the bedrock of a studio project. The Guiding Principles are readily understood by students, stakeholders, and faculty alike and are used to control how feedback is given. Notice that beauty remains a key part of sustainable design, reflecting on Lance Hosey’s famous quote, “If it’s not beautiful, it’s not sustainable.”²⁹

PRINCIPLE 2: PROMOTE EMPATHY AS THE PRIMARY MOTIVATOR FOR DESIGN

The MSSD Program was built on a foundation of empathy as the primary driver of pedagogy. Design studio must become inspirational and empowering so that future architects will replicate that tone in their own work after graduation and as they eventually assume leadership roles in practice and in their communities. We immediately rejected the competitive model of design education passed down for generations to develop a new tone and tenor of design education that is life-enhancing, inspirational and empowering to everyone involved in the process.

Practice: End the use of design juries

It is well documented that the competitive nature of juries do not support an empathetic learning experience.^{30 31 32} Instead, stakeholder-engaged design charrettes, inspired by the lessons from public interest design³³ are introduced at the beginning of studio projects. At the end of the charrette, the work is immediately vetted using specific and agreed upon language using these terms “Clarifying questions,” “Optimisms,” “Cautions,” and “Next Steps.” All comments are written on newsprint so everyone can see what has been said. The tone and tenor of interactions becomes very positive and uplifting and sense of true cooperation is felt by all.

Engage actual stakeholders for real projects

Other innovations include a more equitable and predictable grading scheme and time made in studio for students and

faculty to connect as “people with lives” as opposed to apprentice students working for a master architect.

Ramifications for traditional architectural education

It’s no secret that many architecture programs operate within a contentious hyper-critical environment that is often demoralizing and insulting to students.³⁴ The tone and tenor of architectural education is getting better, but a much broader sea change is needed if we are to graduate architects with the empathy and compassion needed to work across disciplines and equitably lead stakeholders in the fight against climate change.

PRINCIPLE 3: EMPLOY A DEEPLY INTEGRATIVE, HOLISTIC, AND UNIFIED DESIGN PEDAGOGY

Because the term sustainability is so amorphous, commonly defined and shared frameworks are critical to the acceleration of learning among such a diverse group of students, faculty and stakeholders. The MSSD program relies upon three meta-frameworks to serve as a mantra that reverberates throughout every course, studio, and thesis. Without this, valuable time is otherwise spent arguing over the definitions of words and terms. The shared meta-frameworks are described below.

Time

The historical context for architecture as organized by worldview shifts provides a common framework to see sustainability as the logical outcome of the latest worldview shift (Fig. 2). Understanding design across a broader time continuum is necessary to build empathy for future generations through resilient design.

Space

Understanding architectural design from the global perspective will ensure that studio decisions reflect the needs of far way communities impacted by climate change (Fig. 3). A common framework around scale is critical since sustainability projects are understood within a nested set of ecosystems that range from the global scale to the microbiological scales.

Perspective

Seeing the world through multiple lenses will ensure empathetic educational approaches. (Fig. 3) Integral sustainable design, first developed by Mark DeKay of the University of Tennessee, was instrumental in supporting a transdisciplinary learning model for the program. The four perspectives of Integral theory (Fig. 4) unite and celebrate the objective and subjective approaches towards design. Engineers can stand next to designers and pursue a common cause – each drawing upon the other’s strengths and diverse viewpoints.

Practices: The design charrette

Bringing professionals and stakeholders in at the beginning of the design process and allowing them to think through

design options in real time with the students creates a more integrative environment.

Students learn firsthand how to participate in, and eventually facilitate, stakeholder engagement sessions where they see that the design of their projects is shaped not only by their

own creativity but also by the needs of actual people – the communities they serve and the larger environment.

Ramifications for traditional architecture education

Architecture design programs need to do the hard work to develop their own frameworks for defining sustainability and make sure they are reinforced and assessed through the curriculum consistently to ensure a common basis for conversations.

PRINCIPLE 4: HOLD DESIGNERS ACCOUNTABLE FOR THE PERFORMANCE OF THEIR PROJECTS

It is critical that students receive an authentic education where sustainability concepts are incorporated into the design project, not just in topical studios but in every required studio.

Practice: Collaborative goal setting

The goal setting process adds the “teeth” to the studio and sets the standards by which the performance of student design projects are validated throughout the semester. Goal setting is so critical because students are now holding themselves accountable to a set performance metric that will determine a set of appropriate sustainable design strategies. A PV array, which tends to be casually indicated on standard design projects, is now used to achieve net-zero energy or, at least the 2030 challenge.

Practice: Net-zero energy first

Rather than developing a well-resolved building design and then jamming sustainability strategies in at the end, the Net-Zero First approach requires students to reach a net-zero “base building” by mid-semester to be followed with the more normative design studio approaches that focus on the more intriguing and probably more rewarding cultural and experiential design expressions.

Practice: Early and on-going validation of design options

Early and ongoing energy modeling and calculations are used to quantify and compare early design options. Over time, and through much pain, we have learned how to accelerate and rely upon simple energy models early in the process. Final energy models are used to determine whether the projects have met their goals.

Ramifications for traditional design education

Meeting ambitious performance goals steals away the designer’s agency and valuable “design time”. Studio faculty need to integrate building technology information into studio, realign their personal expectations for design resolution, and alter their grading procedures to reward early efforts to use energy modeling to reach high levels of energy performance.

PRINCIPLE 5: EMBRACE TRANSDISCIPLINARY LEARNING

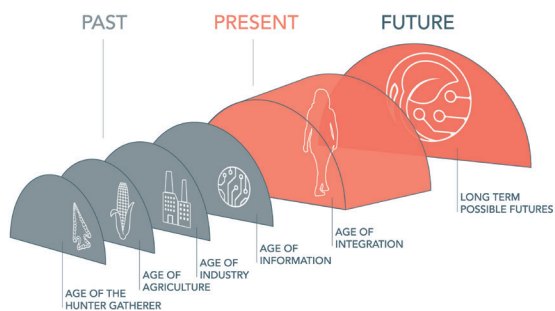


Figure 2. Time Context

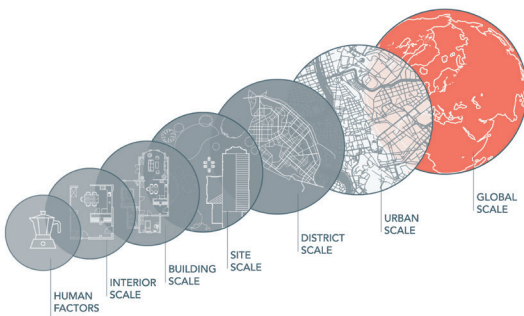


Figure 3. Space Context

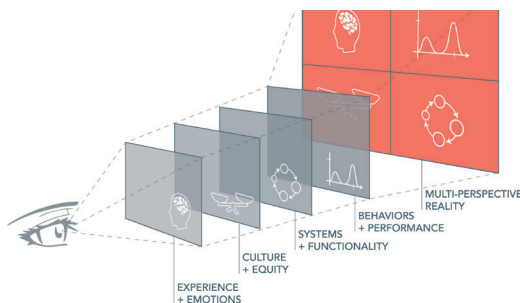


Figure 4. Multi-Perspective Framework

Herbert Simon's famous quote "Everyone designs who devises courses of action aimed at changing existing situations into preferred ones"³⁵ underscores a new mantra of design necessary to achieve deeply integrative projects. The sustainable design charrette used for real projects equalizes the playing field of disciplinary interactions and allows students to directly

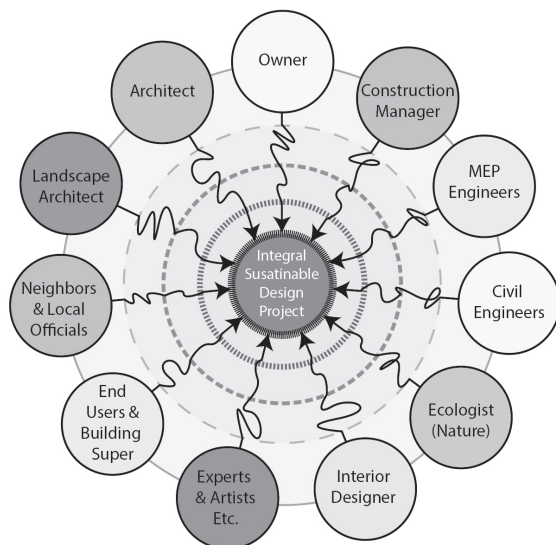


Figure 5. Typical design charrette team

experience the impact of different disciplines and stakeholders on the design process. The figure below (Fig. 5) illustrates the typical "design team" for an MSSD studio project.

Practice

The master/apprentice educational model had to be discarded in order to move towards a collective model of education. This meant lots of design charrettes and other stakeholder engagements and less individual desk critiques, which meant less design resolution.

Practice

The MSSD Program features an "open" admissions policy to any student with a bachelor's degree. This admissions strategy started by accident due to a broadly written website that invited any student interested in applying sustainability values into the design of projects or policies.

Ramifications for traditional architectural education

We found that non-designers, including engineers suffer in the standard studio underscored by statements like, "the work never seems to be finished" and "the goals are unclear" and "grading seems very subjective." Rather than try and "train non-designers" to thrive in a traditional design studio, we evolved

the studio itself to work for all students. Studio spaces must be designed to support collaboration, and the use of clear learning objectives³⁶ so that non-designers and designers can equitably participate on studio projects, needs to be undertaken.

PRINCIPLE 6: ENGAGE DIVERSITY, EQUITY, AND INCLUSION IN THE DESIGN STUDIO

Nadia Anderson, a prominent author on Public interest design concurs, advocates for the values of inclusivity, social justice and equity as critical to the success of transdisciplinary design.³⁷

Over the years we found that transdisciplinary teaching and learning fails when the studio does not engage social equity directly. Group projects can be assigned, but if the student teams and faculty do not strive for a more equitable workflow, tensions arise and the experience is often compromised. Simply increasing the number of faculty and students of color without a comprehensive plan to create an inclusive culture will not succeed in the long-term. It's one thing to talk about diversity, equity, and inclusion in DEI, but it's another to install practices that support a diverse student audience.

Public interest design strategies are routinely used in the MSSD Program to achieve Bill Reed's 4 E's of design: Everyone Engaging Everything Early. We added "with Equity" as a fifth E considering the importance of inclusivity in sustainable design.

Practice

Shift the attention of DEI away from the victims and attack the source of the problem: privilege. DEI trainings are used to set the tone for the program but mindfulness in practice, i.e. confronting sexism and racism directly in the studio is the only way to make permanent and lasting change.

Ramifications for traditional architecture programs

NAAB should put teeth into their defining perspectives and require every architecture program to demonstrate actual DEI efforts.

CONCLUSION

The definition of success for the MSSD program had to be altered to determine if the program is successful. We had to discard the typical deliverables of the well-resolved, beautifully-presented design projects in favor of studying what our graduates accomplished in the real world after graduation. In other words, did our students go on to advocate for a sustainable future through design, activism, entrepreneurship and service. The short answer is yes; MSSD students have gone on to become leaders in the green design movement,³⁸ started non-profits,³⁹ worked as sustainability directors in major design firms,⁴⁰ started for-profit companies,⁴¹ worked in public agencies,⁴² worked for major cities in a variety of sustainability roles,⁴³ worked for top engineering firms,⁴⁴ started their own design

firms,⁴⁵ and countless others work for mainstream design firms where they constantly advocate for sustainability.⁴⁶ Ultimately, fighting climate change will become the “prime directive” not just for architects but for society in general. By reimagining the principles and practices in which design education is provided, a new generation of “designers” can make the difference and restore hope for the future.

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- Morgan Berman founded MilkCrate, a company that helps large corporations engage their workforce to reach ambitious sustainability goals
- Barbara Moore is the Sustainability Coordinator at the Philadelphia Housing Authority (PHA)
- Adam Agallaco is Philadelphia Energy Director, Jen Johnson works for the City of Nashville
- Sonam Shah works at ARUP, working on high performance projects
- Brad Sherman founded the top-rated design firm Float in New York City
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