Teaching to Transition Design: A Case Study on Design Agility, Design Ethos, and Dexign Futures

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Abstract: Design educators struggle to teach basic skills in traditional design courses needed for Transition Design practice. Transition Design's systems level change for societal sustainability poses three challenges: (a) What design experiences best prepare students to engage in systems-level change for societal-level sustainable futures? (b) What might be a scaled down Transition Design project for a semester-long studio course? (c) What design skills are needed to facilitate diverse human coalitions to pursue societal-level sustainability? In this paper, I describe fundamental design skill exercises introduced through three design courses to prepare students for Transition Design-type challenges.

Key words: design pedagogy - Transition Design - values based-design - design ethos - design agility - dexign futures - futures thinking - short-term horizon design - long-term horizon design - temporal design alignment.

[Abstracts in spanish and portuguese at pages 131-132]

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The world is changing at an exponential rate and design curricula and courses are challenged to keep up. Increasingly, designers are engaged in broader societal problems, for example, environmental degradation (e.g., Ortbal, Lange, Carroll, & AIGA, 1996), toxic chemicals (e.g., McDonough & Braungart, 2002), climate change (e.g., Steffen & Gore, 2008), voting rights (e.g., Lausen, 2007), and so forth.

Design disciplines are engaged with broad societal challenges, examples of which include architecture for humanity (2006), industrial design (e.g., Papanek, 1970), communication design for good (e.g., Berman, 2009), organizational change (e.g., Brown & Kātz, 2009), and instructions for continued life on planet earth (Fuller, 1969), among others.

The scale of design is changing. On one hand, some of the design problems are getting smaller and more specialized, while on the other hand, the problems on which designers work are getting bigger (e.g., Brown & Kātz, 2009), connected to global supply-chains, with global social, economic, and environmental impact. Designers are engaged with systems-wide implications of designed products and services (e.g., Mau, 2005). Such changes influence professional practice and require design schools to adapt their courses and curricula to better prepare for changing environments. Teaching students to engage with larger scale problems requires emphasis on collaboration between multiple disciplines and methods of design research that work at small and larger scales.

Design Evolves to Engage with Complex Large-Scale Problems

John Chris Jones described four levels of design –components, products, systems, and community– to advocate for new design methods for challenges such as traffic congestion and air quality (Jones, 1992). Jay Doblin described three levels of complexity: (a) products, the simplest form of design; (b) unisystems, coordinating products and the people that operate them; and (c) multisystems, the sets of competing unisystems (Doblin, 1987). Richard Buchanan introduced the four orders of design to contrast the traditional understandings of the disciplines of communication design (symbol), industrial design (product), interaction design (action), and systems design (thought) with new understandings of design that blur the distinctions between types of design (Buchanan, 1992).
Arnold Wasserman (2011) describes four versions of design to include design 1.0 as artifact centric (e.g., making and selling stuff); design 2.0 as human centric (e.g., strategic field building and embedding); design 3.0 as socio-centric (e.g., changing the world); and design 4.0 as the post-Anthropocene (e.g., sustainable prosperity for everyone on one planet). Elizabeth Pastor (2013), co-founder of Humantific, articulated the differences between four types of design that shift as levels of complexity increase: design 1.0, traditional design thinking; design 2.0, product/service design thinking; design 3.0, organizational transformation design thinking; and design 4.0, social transformation design thinking.
Others more recently have added the "X" nomenclature to create designX to get beyond the number of designs (e.g., Norman, 2014). The designX manifesto argues for a broader version of design that shifts from a focus on products and services to a broader range of societal issues. Such changes in understanding of the field of design require students to grasp how conceptions of design as a human activity have evolved over time and presumably will continue to shift as time passes.
Challenges such as societal-level sustainability require new thought, temporalities, and action. There is a tension between ever shortening design product cycles and long-term thinking. Examples in design industry include fast fashion (e.g., Luz, 2007), continuous beta (e.g., O'Reilly, 2005), and lean start-up (Ries, 2011). In large companies, designed products might be conceived for different timescales ranging from three months, to three years, or seven years. Much design education focuses on teaching students to craft products or services that can be made in a short time horizon. Plans for societal-level sustainability instead are on long horizons, such as 2050 or even 2100 (e.g., WBCSD, 2009; IFTF,

2015). Design for change requires aligning near-term design actions to long-term visions. Our current efforts are focused on developing pedagogies to teach these new skills.

In 2014, the School of Design at Carnegie Mellon University introduced Transition Design as an emergent field of design. *Transition Design* is described as the process of using *design thinking* and the *design processes* to transition to a sustainable society (Kossoff, 2011). In Wikipedia, *Transition Design* was defined as:

> …design led societal transition to a more sustainable future. It applies an understanding of the interconnectedness of social, economic, political and natural systems to address problems that exist at all levels of scale in ways that improve quality of life. Such problems can include poverty and economic inequality, biodiversity loss, decline of community, resource depletion, pollution and climate change.

Designers addressing larger scale problems in general and Transition Design in particular create a tension in design schools to cover traditional artifact centeredness and larger systems perspectives implicit in areas of societal concern (Scupelli, 2016). Such a tension requires the introduction of new courses and curricula. As is clear from this overview of changes to the field of design, there are many new topics to be addressed. This poses the challenges of what to teach and how to best teach it. In the next sections, I describe three themes relevant to preparing for Transition Design–type challenges: societal problems that require multiple perspectives, values embedded in design, and timescales aligning short-term with long-term horizons.

Societal Problems Require Multiple Perspectives

Human-centered design as it is often taught in design schools can easily default to customer-centered design. While it is helpful to begin design research focused on customer needs and product opportunities, it can be problematic to stop there. In the interest of time, students' focus can default to customer needs, ignoring the richer perspectives that explore what it means to be human and to lead a meaningful life. Students mistake business concerns for the humanities.

Customer-centered design can focus attention away from other people affected by a designed product. Who is making the designed product? Where is the product made? Under what working conditions? A service design framing forces designers to consider both customer needs and service provider needs to deliver a service. Furthermore, complex wicked problems have multiple stakeholders, who likely cannot agree on the problem (Rittel & Webber, 1973). One must focus far beyond customers and service providers to include multiple levels (e.g., individual, group, organizations, communities, public policy), and consider differing values (Bronfenbrenner, 1979). Hence, design educators are challenged to teach explicitly how to design for multiple stakeholders.

Values are Embedded into Design

Values matter. Value is created by design; values and biases are embedded into design processes, and values drive design. Therefore, there are ethical implications that designers must consider (Buchanan, Doordan, & Margolin, 2010). In short, technologies are not neutral; negative unintended consequences are to be considered (Merton, 1936). Anticipating unintended consequences of designed products and services is increasingly important, and the need to proceed ethically is increasingly acknowledged as a priority (e.g., Friedman & Nissenbaum, 1996). Furthermore, designers must consider the environmental implications for designed products (e.g., Shedroff, 2008). Consequently, the question of how to critically engage values in design processes is an important topic for design curricula.

Design educators increasingly have to accommodate new topics that are necessary to keep students up to date with the challenges they will face in their professional practice.

Timescales Aligning Short-Term with Long-Term

Short-term gains gathered much attention in design –namely, how to research and design products faster. Long-term timescales become a major element to consider from a design perspective when focusing on larger scale problems linked to sustainability. Researchers engaged in sustainable development instead describe goals for the year 2050 or 2100. It follows that design students must learn to design for short-term and long-term time horizons. Such challenges require that design educators learn to teach new methods in their courses.

In the next sections, I describe the three courses Design Agility: Speak Lab, Design Ethos and Action, and Dexign Futures[1]. These courses teach students some skills necessary for Transition Design to address multiple perspectives in design, values-based design, and multiple timescales. The three course descriptions are followed by three thematic questions: (a) What meaningful design project experiences might there be that allow students to experience the broad scope of systems-level change towards societal-level transition towards sustainable futures? (b) What minimum level of Transition Design might be a pedagogical experience that allows students to engage with making societal-level change? In other words, what is the way of being in the world that students need to learn to experience to become "redirective practitioners" working towards societal-level sustainability (Fry, 2008)? And (c) what skills are necessary to help design students learn to transition coalitions of unwilling people, groups, organizations, and public policies to achieve societal-level sustainability?

For each of the three courses, I describe the exercises done and provide insights into the pedagogy used.

Design Agility: Speak Lab

Design Agility: Speak Lab taught students to engage with social problems, find a story and audience, and make a pitch for funding a social innovation concept. Students learned to

Figure 1. Design Agility Speak Lab course blog. Course materials are available at: https://speaklab.word press.com/ Image Courtesy of Learning Environments Lab.

engage with large-scale societal-level design challenges from multiple stakeholders' perspectives. They shifted from the designer as service provider mindset, waiting for a commission, to the designer as problem finder and funding seeker.

Below are excerpts describing the course, taken from Scupelli and Rohrbach (2013). More details on the course can be found in the original article.

Design Agility: Speak Lab was a five-week course with a single project. During the first week of the five-week lab, students were exposed to real-world topics that affect the air they breathe, water they drink, and products they use daily (See Figure 1). Environmental problems were framed as unbelievable phenomena such as burning water (hydraulic fracking), mutant frogs (pharmaceutical waste), neighborhood assassins (air pollution), transgender fish (plastics in water), deadly cosmetics (toxic ingredients in cosmetics), killer produce (pesticides use), deadly technology (electronic waste), and dirty cleaning products (toxic ingredients in cleaning products). The unbelievable framing was used to pose the environmental problems as a mystery for the students to investigate (Scupelli, 2015).

Three theoretical perspectives shaped the activities in Speak Lab: multiple viewpoints, socio-ecological framework, and audience values. First, to grasp multiple viewpoints students explored their topic from various perspectives such as: scientific literature, public policy issues, industry marketing and public relations materials, interest and activist

group perspectives, and so forth. Multiple perspectives often become apparent by immersing oneself in a series of information sources that reveal the design space seen from multiple stakeholders' viewpoints and their relative biases.

Second, the contexts where large societal problems exist and decisions are made are often tiered, including individuals, families and groups, organizations, neighborhoods /communities, and public policies. A socio-ecological design approach operates strategically on multiple levels to change the context that shapes action.

Third, action taken by each audience is shaped by their values (e.g., ideology, biases, beliefs, desires, ambitions). Designers must consider their audience to shape a story that will resonate with them. For example, a story aimed to reduce water pollution for the good of the community is unlikely to resonate with individualists. However, it may be more effective with this audience if it is presented as greedy corporations disrespect you by polluting your pure drinking water, reduce your personal freedom, and right to choose.

On the first week of the lab, students were given a one-page overview document that summarized the topic and offered links to scientific papers, popular media articles, documentaries, and industry based misinformation campaigns. The goal of the first week was to dig into the information –gathering, organizing, parsing, clustering, etc.– so that they would have a robust amount of data to review that provided accurate perspectives instead of a narrow, shallow understanding of the subject at hand. Nonetheless, at the close of this phase, students were overwhelmed by the amount of information that they uncovered and quite confused about how to proceed.

During the second week of the lab students were taught how to make sense of the data and find a story worth understanding in it. One method involved asking the six questions (i.e., who, what, when, where, why, how). Another method involves sketching the relationships that exist among between concepts, stakeholders, and issues, which helped students see the topic from multiple perspectives and determine other research questions. The course instructor developed a series of sketching exercises based on Moyer's seventeen ways to structure information: just show it, blob diagrams, hierarchies, timelines, vignettes through time, quantity graphs, location maps, process diagrams, stock and flow diagrams, swimlane diagrams, decision trees, web of connections, gradients, two gradient matrix, comparisons, metaphors, and combos (Moyer, 2010). Moyer describes his information structures as aiding the visualization of big ideas. Students used the structures to identify what they knew about the topic (i.e., known knowns) and in what areas they needed to do more research (i.e., known unknowns). For example, students used simple information structures, such as a timeline, to visualize their current understanding of the evolution of the topic. The goal of making the timeline was to determine what they knew about the topic, and what they did not know, and would like to learn. The act of making the timeline sketch allowed students to visualize their knowledge and gaps in knowledge as well.

The students used Moyer's seventeen structure sketches to identify what they would like to understand and learn more about. They were encouraged to research the issue from multiple perspectives until they understood it well and could explain it to others. They made a second round of sketches to crystalize their understanding of the story. As they clarified the story to themselves, they were encouraged to begin brainstorming various ways that they could use design to communicate their story.

In the third week, the students continued iterating design concepts. After considering their target audience's needs and desires, they established the story's relevance to the audience, framed the message, and proposed its form. They considered what served as critical information to convey, why, to whom, and in what context. They were asked to identify a specific audience, propose ways to communicate the story, the appropriate context to engage the audience, and the type of media that would aid people's understanding, move them to action, and encourage them to think critically. The goal for this week was to get students to grasp the difference between understanding a story, and using stories to engage with a specific audience.

We discussed the students' intended audiences, as they defined them. To understand audience worldview, values, and goals we used the Dan Kahan's worldview framework based on two scales: individualist-communitarian and hierarchical-egalitarian (Kahan, 2008). Broadly speaking, individualists believe that people solely are responsible for their own fate. As such, they should be rewarded/punished for the decisions that they make. Government should stay out. Communitarians on the other hand believe quite the opposite. Hierarchical people believe that society should be highly structured, and ordered according to factors such as: gender, class, racial differences, etc. Egalitarians instead believe that society is quite the opposite and that all people have equal rights. Students determined where their target audience was on the individualist - communitarian scale, and on the hierarchical - egalitarian scale.

We discussed the degree of openness to new ideas scale as well. How open is the target audience to new ideas that clash with what they already know/believe? How threatened are they by new knowledge that challenges their worldview? Scientific knowledge is one way to frame new knowledge, but it does not resonate with everyone. For example, 99% consensus among the scientific community doesn't resonate with a climate change denier who believes in conspiracy theories linked to science. Thus, the question, is how can the story be framed and presented so that it resonates with the targeted audience? Some framings that may be considered alternatives to science are: moral issue, patriotic issue, disgust issue, impurity issue, fairness issue. Therefore, students considered how those framings resonated with their chosen audience.

In week four, the concepts were prototyped and discussed via peer-to-teacher and peer-to-peer critiques in the studio. Students were encouraged to think of the whole system and sketch how their system worked overall. They were then urged to think of what parts of the system they needed to further develop to include more granular aspects.

By week five, the students found a story and an audience that would benefit from hearing the story. They identified a design concept to deliver the story in such a way that the audience hearing it would take action as a result of engaging with the story. The intent was to move a particular audience to take some action. The next step was to find funding for their design concept and make a pitch to an organization that might be willing to fund their concept.

Design Ethos and Action

In the Design Ethos and Action (DEA) course, students articulated values that matter to them, learned to align personal and professional choices to their value sets, and learned to pitch design concepts aligned with specific values with measurable outcomes in a compelling way to organizations. Next is a brief description framing the course, followed by summaries of the four assignments. More detailed descriptions are available in Scupelli (2015a) and Scupelli and Hamilton (2017) (See Figure 2a y b).

Increasingly, designers have the potential to operate as agents of change in a broad range of areas including corporate, government, non-profit, social innovation start-ups, and sustainability projects. With so much choice on the horizon, some designers may wonder: What value do I bring to the world through design? Values often are implicit and may vary across contexts (e.g., profit, efficiency, effectiveness, fairness, social impact, environmental impact). In the excited rush to make things, often there is no time to reflect on how design choices impact the world or what values our choices embody.

Design ethos and action focuses on exploring and identifying the potential for positive and negative impact that design can have in the world around us. How might one link "values" to design action and assess the impact of design action (and inaction)? For example, how might a designer embed values related to sustainability, gender inclusivity, or race relations into his or her design projects and design practice?

The Design Ethos and Action course taught design students to design for a specific value-set finding and argue for a design concept with measures and outcomes that organizations would want to support. How might students intentionally design for specific values? The course is taught as a seminar with studio-type projects. Students study assigned readings and watch videos and discuss them in class. The course is organized around four assignments that allow students to apply the ideas in the readings to design problems.

From a theoretical perspective, the course was based on the idea that design methods can be analyzed from a structuralist perspective. That is, traditional modernist design methods are imbued with values such as efficiency and effectiveness. Can other value sets be embedded into design processes? What might a design process that embeds values related to sustainability, gender equality, or feminism look like? The goal of the course was to have students learn to design explicitly for different value sets.

Design students sometimes focus their attention to the shiny surface of made artifacts that can be presented as polished portfolio pieces. The Design Ethos and Action course problematized such an approach and forced students to consider the broader systems within which design products are situated. Herbert Simon describes design as going from a current situation to a preferred situation (Simon, 1969). Students were asked to explain for whom the situation was preferred: the customers, the manufacturer, the workers, the surrounding community, the environment, other life forms, and so forth.

Students sometimes believe contradictory claims. On one hand, design can change the world. On the other hand, designers in industry do not have agency to change business practices. Some comments students made in the course were that it is too expensive and unrealistic to design for sustainability. In the Design Ethos and Action course, students are confronted with such contradictions. Students are exposed to case studies from the

Figure 2a y b. Course blogs for the Design Ethos and Action courses in 2015 & 2017[2]. Image Courtesy of Learning Environments Lab.

Harvard Business School on companies that excel at sustainability practices. Prominent business leaders argued that sustainable companies have a better return on investment and asked how one could afford to be unsustainable (e.g., Heyns, 2012; Porter & Kramer, 2011; Winston, 2012).

Students learn that there are four responses to sustainability challenges based on a two by two matrix described by Lubin and Esty (2010). The first axis is sustainability vision (fragmented or integrated); the second axis is based on execution (tactical or strategic). Companies that have a fragmented vision for sustainability and little ability to implement such a vision are called *Losers*. Companies that have fragmented vision but are able to execute on such a vision are called *Defenders*. Companies that have big integrated visions about sustainability but are unable to execute are called *Dreamers*. Companies that have integrated visions and are able to execute strategically are called *Winners*. Lubin and Esty's framework helps students to make sense of the broader landscape of companies and sustainability.

The four assignments in the Design Ethos and Action class were the daily measures project, organizational ethos, making change, and your ethos. Below is a summary of the four assignments. More detail is provided on the course blogs (Scupelli, 2015a; Scupelli & Hamilton, 2017).

Daily Measures Project
In the first assignment, students document photographically some aspect of their life for a week (e.g., plastic used, food eaten, waste produced, personal and cleaning products used, transportation, beverages ingested, and so forth). Students then categorize each action according to a value set that they are exploring. For example, are daily actions (a) sustainable or unsustainable? (b) Gender equal or not? (c) Patriarchal or feminist? Such questions about values force students to define the value set and operationalize it (Chapanis, Garner, & Morgan, 1963). They determine how to quantify and measure their definition of values (e.g., Shedroff, 2008). Students inevitably wrestle with larger questions such as sustainable for whom? Sustainable where? Sustainable when? Sustainable why? Sustainable how? Next, they are asked to ponder on what results from their actions. Finally, they are asked to describe the changes if any that they would like to make to their everyday behavior. Students often design something that might help them shift their behavior.

Organizational Ethos
In the second assignment, students look at case studies of companies hailed as industry leaders for the value set they are exploring (e.g., sustainability, gender equity). To have a strong and credible business perspective, the course relies on *Harvard Business School* articles. Students are asked to pick an example of a designed product or organization that they admire (or despise).
A list of articles are provided to students for companies such as 3M, Walmart, Patagonia, Method, Interface, Apple, Stonyfield, KKR, REI, NIKE, Herman Miller, Microsoft, Pepsi, BP, and IDEO. If students are uninterested in the companies listed, they are encouraged to suggest other companies they would like to research. Next, students determine their selected company's *ethos*. Students use Aristotle's definition of *ethos* in the means of persuasion in rhetoric as the character of the speaker (McKeon, 2001). From Aristotle's perspective, the character or ethos is focused on action in the world, not the stated values. In other words, what values are discernable from the way the organization operates? For Aristotle, to act is to know. To know and not act is to be in a state of *akrasia* (Kraut, 2017). The goal of the second assignment was to understand how their case study company is excelling at their value set (e.g., sustainability, gender equity). What are the models used to operationalize the values in question? How do they measure their actions in the world and how are they aligned to their stated values? The next step for the students is to develop a pitch to the company that proposes how the organization could take their leadership even further. In other words, how might the organization take their commitment to the values to the next level?

Making Change

In the third assignment, students evaluate the values and mission of an organization that students interact with on a daily basis. This assignment was introduced because the previous assignment was abstract for some students who felt very distant from the organizations they studied.

The goal of the third assignment was for students to feel agency over the proposals they made. Students sought to identify disconnects between stated values and action in the world. Examples of studied organizations to which the students belonged include academic departments, university administration, fraternities and sororities, and social student organizations. For example, students might identify contradictions in stated values such as sustainability but lack of action concerning such values in the everyday operations of their department.

Once students identified these contradictions between stated values and action, they proposed solutions. Students noticed that many organizations they observed could improve. Students identified key stakeholders that could help resolve the identified problems and proceeded to prepare their pitch. In several cases, the students made presentations to the key stakeholders and were able to have their solutions implemented. In other cases, the pitch was just delivered in class. Students learned to argue for their solution to a stakeholder who could concretely support the proposed solution. They reported feeling quite empowered by the exercise.

Your Ethos

The fourth project in the Design Ethos and Action course sought to have students articulate their professional ethos. In other words, what imprint did they want to leave on the world? This assignment encouraged students to focus on the kind of work they wanted to do and the kind of organization that they wanted to work for. Students made a mattering map of what mattered in their lives and to whom such things matter (Lowenstein & Moene, 2006). Students were surprised by the amount of freedom that they had concerning decisions about their future selves. Students found the exercise to be difficult because many of the questions that they were asking were new and required deep reflection on their part. Students currently looking for jobs and internships found that the exercise helped them prepare well for interviews and to better understand whether their values aligned with those of prospective employers. Some limitations included that they had limited understanding of professional practice. They decided that it would be particularly helpful to examine their professional ethos at critical junctures in their professional careers.
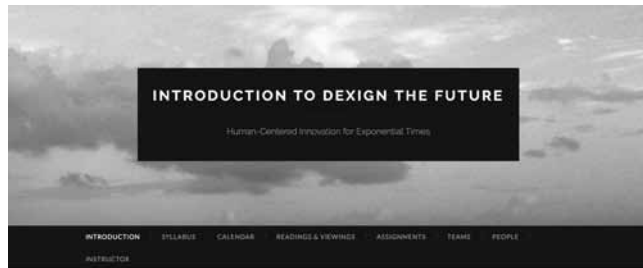
Dexign Futures

The Dexign Futures course focused on exploring the role of time in design. We use the term *dexign* to signify an experimental form combining *design thinking* with *futures thinking*. The distinguishing feature of *dexign* in our usage is the focus on aligning current action with long-term sustainability goals.

Figure 3. Dexign the Future course blog. All course materials are available here: https://dexignthefuture.com/ Image Courtesy of Learning Environments Lab.

Figure 4. Course blog for Introduction to Dexign the Future. All course materials are available here: https://dexignthefuture.wordpress.com/ Image Courtesy of Learning Environments Lab.

The current Dexign Futures course evolved from three courses developed between 2013 and 2016. The core idea for the course emerged while conducting research for the Design Ethos and Action course in fall 2011. Arnold Wasserman and I began to discuss the work that he was doing with his consulting firm, Collective Invention, around sustainability-related projects with the World Business Council of Sustainable Development (WBCSD). Those early conversations led to the co-development of the Dexign the Future (DTF) course in fall 2013 (Scupelli & Wasserman, 2013) (See Figure 3). In DTF, students were overwhelmed by the quantity of material necessary to engage meaningfully in futures thinking methods.

Hence, the Introduction to Dexign the Future course was developed to focus on design futures methods. Below are excerpts that describe the course (Wasserman, Scupelli, & Brooks, 2015[ab]). Figure 4 contains the course materials. More details are available in Scupelli, Wasserman, and Brooks (2016).

The iDTF course focused on six challenges the DTF course students encountered. First, students struggled to imagine the 2050 timeframe in a grounded way linked to existing global trends, establish believable benchmark goals, and articulate forces of change along decade-by-decade pathways. Second, students struggled to connect global forces of change described in the literature (e.g., WBCSD, IFTF) to the Pittsburgh region. Third, students struggled to interpret and articulate early signs in the present as future signals for 2050. Fourth, students struggled to create a believable three-generation persona family to articulate generational needs credibly grounded in 2050. Fifth, students struggled to discover and understand the materials forms, emotional needs, values, and alternative worlds imagined in 2050. And finally, students were challenged to deeply explore and communicate the interconnections between forces of change, three-generation persona families, and 2050 benchmark goals (Scupelli & Wasserman, 2014).

The iDTF course was organized as a seminar-studio course with readings, videos, discussion, and applied design assignments to introduce content necessary to understand global forces of change and provide practice applying such ideas. The course had four assignments: Alternative Worlds and Economies, Three-Generation Personas, Signs of the Times, and Sustainable Lifestyle Scenarios (see course materials: https://dexignthefuture. wordpress.com/).

In 2015-2016, Scupelli and Brooks, drawing on domain expertise from Wasserman, developed Dexign Futures Seminar (DFS)[3] to address some of the learning challenges described above. Through instructional activities, students gained exposure to key concepts with frequent practice and targeted feedback to build proficiency in identifying forces of change.

To deliver the DFS course, we used the Open Learning Initiative online (OLI) learning platform that supports pedagogical design best practices and collects data on student learning. This data (e.g., accuracy measures, engagement with course activities) provided insights as to what aspects of the course supported learning and areas to target for iterative improvement. More details on the Dexign Futures Seminar course are available in Scupelli, Wasserman, and Brooks (2016a, 2016b).

The DTF, iDTF, and DFS courses laid the groundwork for the Dexign Futures (DF) course, required for all third-year undergraduate design students. The Dexign Futures course described next focuses on aligning near-term design action with longer time horizons aimed at sustainable futures. Previously, I described some of the challenges that emerged in teaching with traditional studio pedagogy in DTF, and using mixed seminar/studio pedagogies in iDTF, and the relative successes with the flipped classroom pedagogy experimentally used in DFS. These empirical results led me to pursue the flipped classroom pedagogy in the Dexign Futures class (Scupelli, Brooks, & Wasserman, 2016b).

Flipped courses shift lectures and instruction outside of class while reserving class time for hands-on activities. Online homework helps students to prepare for in-class activities and provides immediate correctness feedback to all students. Such interactive activities
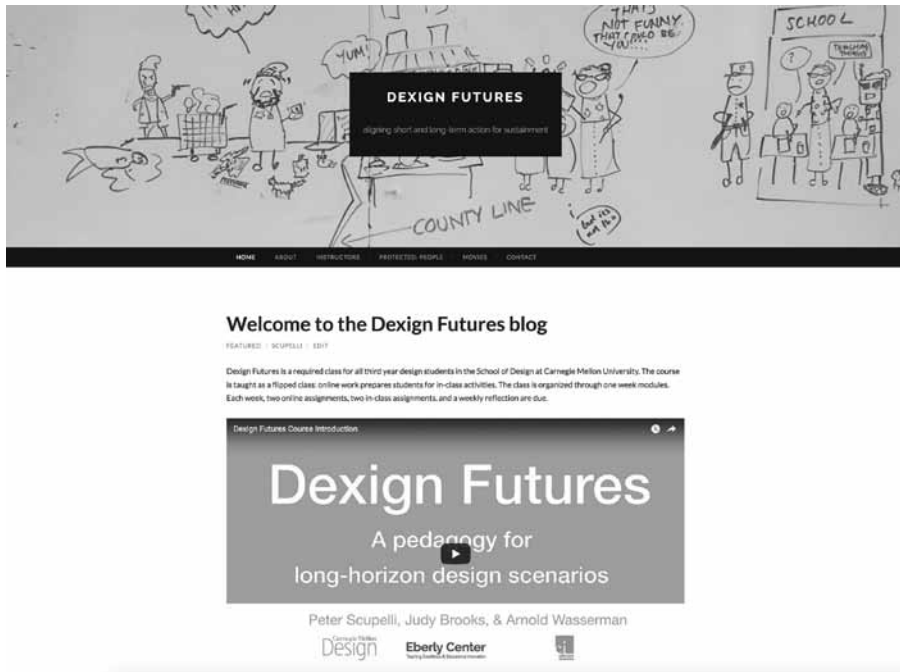
Figure 5. The Dexign Futures course blog. Descriptions of the course materials are available here: https://dexignfutures.com/ Image Courtesy of Learning Environments Lab.

seek to engage students in active learning activities to prepare for class. During in-class activities, the course instructor and teaching assistants can provide students with feedback and answer questions.

Likewise, in-class team activities and peer feedback can enhance student learning by forcing students to engage in applying the course materials to a design problem. Challenges of flipped classroom pedagogy involve an incredible amount of work required of course instructors to prepare online activities with online interactive feedback and in-class activities that can be completed in class. Furthermore, if students are turning in classwork daily, instructors and teaching assistants must relentlessly grade and provide feedback.

The Dexign Futures course is organized around four units. Each unit has weekly topics. The Dexign Futures flipped course has two main parts: (a) online components that serve as homework to prepare for (b) in-class workshop activities. The class meets twice a week for 80-minute sessions (See Figure 5).

The Dexign Futures course covers different approaches to constructing and interpreting futures, ranging from extrapolations of trend forecasting, through risk assessments of

alternative scenario planning, to attempts to connect the present with desirable norma-
tive futures, through backcasting and pathways of change. Students explore the future
through narratives of utopian and dystopian scenarios and learn to create more useful
design-actionable futures. Students learn to identify "weak signals" and "early signs" in the
present and to abstract forces of change that indicate likely future design spaces. Students
also attempt to evaluate forces of change in terms of their longer-term consequences so
as to align short-term design action with desirable longer-term time scenarios. The four
main modules in the Dexign Futures course are Futures Narratives and People, Critiquing
Alternative Futures Scenarios, Critiquing Normative Futures Scenarios, and Making Ex-
periential Futures. The main modules are subdivided into weekly assignments and in-
class activities. More details on the course are available in Scupelli, Brooks, & Wasserman
(2016a, 2016b).

In the section that follows, I describe how the three courses Design Agility: Speak Lab,
Design Ethos and Action, and Dexign Futures helped students develop the basic skills
necessary to engage with aspects of Transition Design. I use three questions to frame the
student learning experiences: scope of the design experience, necessary methods and craft,
and becoming a new type of designer.

Scope of Design Experience

What meaningful design project experiences might there be that allow undergraduate
students to experience systems-level change for the societal-level transition towards sus-
tainable futures? Next, I compare the pedagogical experiences of the three courses Design
Agility: Speak Lab, Design Ethos and Action, and Dexign Futures as they relate to practic-
ing Transition Design.

In Design Agility: Speak Lab, students learned three fundamental skills to engage with
societal-level wicked problems: (a) to frame a wicked problem in relation to an audience
affected by the societal-level issue; (b) to find organizations interested in solving the prob-
lem; and (c) to create a presentation seeking funding to work on that specific societal issue.
In the Design Ethos and Action course, students learned to imagine themselves as design-
based agents of change within their own design practice. Students practiced proposing
values-based design outcomes to organizations within a framing that resonates with the
specific target audience. For example, if a business cares about financial returns, an argu-
ment might be made that furthers sustainability values but that includes financial meas-
ures in a compelling way.

In the Dexign Futures course, students learned to find design opportunities within futures
thinking methods. They also learned to frame short-term design actions with long-term
vision goals. The Dexign Futures course opened up the space of design to include four lay-
ers from causal layered analysis (CLA), ranging from the everyday action around artifacts,
expert opinion, worldview, and myths and metaphors (Inayatullah, 1998).

As is clear from the three courses, students had plenty of practice opportunities to pitch
their design concepts in the three courses described. In the Design Agility: Speak Lab
course, students learned to quickly find stories within societal-level problems that could

be funded. In the Design Ethos and Action course, students practiced articulating and measuring values for organizations. In the Dexign futures, they became confident in translating abstract futures thinking methods into concrete design contexts while aligning short-term action with long-term goals. In all three courses described, students emerged with a broader scope of what it means to design.

Methods and Craft for Transition Design Projects

What minimum level of Transition Design pedagogical experience might allow students to engage with making for societal-level change? First, design students might have to expand their definition of what making means to go beyond making of physical artifacts. In other words, what design methods and artifacts do students need to learn to make to redirect their design practice to engage in pursuing societal-level sustainability?

In the Design Agility: Speak Lab, students were tasked with moving past the paradigm of design as limited to craft and artifact making. Students were asked to imagine the impact of designed experiences within complex societal challenges. Students wrestled with the question: What is the first step in solving a wicked problem for a specific audience compared to the temptation of a one-size-fits-all generic design solution? In other words, how might they shift from "problem solving" to "problem finding" and strategic design action. In this class, students practiced using specific methods to map societal-level problems and find leverage points within everyday experience for a specific audience.

In the Design Ethos and Action Course, students became very skilled in articulating how values could be measured within an organization and how such values played out within a complex system for multiple stakeholders (e.g., customers, workers, management, local communities, the environment). The fundamental shift for students occurred when they developed methods to connect values to designed artifacts, organizations, communities, and the broader environment.

In the Dexign Futures course, students learned to apply specific futures thinking methodologies to design problems. Students developed methods that built upon the novelty of futures thinking methods to inform the strengths that they brought from a design perspective. For example, Jim Dator's four generic futures allowed students to imagine four different futures (Dator 2009), but their ability to visualize a day in a life of a person in such scenarios made the scenarios easier to understand and imagine. In short, students were able to link multiple STEEP forces of change (social, technological, economical, environmental, political) that shape the broader context in which everyday life takes place. This is an example of representing how aspects of everyday experience are linked to broader systems-level challenges. The focus of the Dexign Futures course is to link the present time with future visions set in future long-time horizons. Students learn to interpret futures signs (Hiltunen, 2008) in the present that provide clues about plausible futures. The futures signs in the present are then linked to benchmark goals in the future along a pathway of change. Along the pathway of change, decade-by-decade milestones and barriers are mapped (WBCSD, 2009).

As is clear from the examples in the three courses above, in the Design Agility: Speak Lab students shifted from human-centered and customer-centered design to a broader perspective of design methods that considered multiple stakeholders and multiple levels of intervention. In the Design Ethos and Action course, students learned to shift their design practices to align with values-driven design. This required the development of new design methods and a revised conception of the links between their personal values and their professional practice. In the Dexign Futures course, students learned specific futures thinking methods that allowed students to align short-term action with long-term vision goals.

On Becoming a New Type of Designer

What design skills are necessary to help students learn to transition coalitions of unwilling people, groups, organizations, and public policies? Design students often get stuck in a mindset of designer as a "service provider", waiting for a client to approach them with a framed design problem. In short, designers solve design problems that the client brings to them. In the three courses described, finding a design problem worth solving is part of the assignment. For example, in the Design Agility: Speak Lab course, students began investigating a societal-level problem and mapping the stakeholders involved and affected before knowing who their client might be. They found an organization that had the expertise they needed and went on to find funding sources to work on their framing of the design problem. This is the complete opposite of the mindset of designer as service provider for a corporate client. Students at first were confused by the challenge to find a design problem worth solving, but they quickly became excited by the challenges of framing and solving such higher-level challenges.

In the Design Ethos and Action class, students went from thinking that design practice was fixed to understanding that they can redirect their design practice to reflect their own values (Fry, 2008). They made connections with how their values play out in everyday life, in organizations, and in professional practice. Students realized that it was their responsibility to develop a plan for how they wanted to be in the world as individuals, families, groups, and professionally. In short, they began to see themselves as value-based actors on multiple levels ranging from individuals to groups, organizations, and communities.

In the Dexign Futures class, students shifted their thinking about time in design from a single point in time to imagining how designs may play out over time for the past, present, and future. The shift from imagining only one short-term future to imagining processes that link instances in the present to multiple futures opened new opportunities for thinking and acting as designers. Students found that considering alternative futures opened up the design space they considered.

As is clear from the examples for the three courses described in this section, students shifted their ideas of what it means to be a designer from an artifact-based paradigm to a broader systems perspective necessary for parts of Transition Design. In the Design Agility course, students most radically learned to shift from designer as service provider to designer as finder of a problem that is worth solving. They also learned to create coalitions of stakeholders interested in funding and solving societal-level problems. In the Design

Ethos and Action course, students learned to align their values with their desired design practice. In the Dexign Futures class, students began to imagine their design action having a temporal dimension. They began to learn to imagine how design in the short-term can lead to longer-term design visions.

Summary

In this paper, I've described how the field of design is changing in general and, in particular, how design education needs to change to accommodate emerging design fields such as Transition Design. I provided examples from three courses that I developed and taught at the School of Design at Carnegie Mellon University: Design Agility: Speak Lab, Design Ethos and Action, and Dexign Futures. Three themes emerged from reflecting on the student experience in those courses. First, expand the scope of the students' design experience compared to that provided in traditional pedagogy. Second, introduce new methods and making skills needed to work on Transition Design-type projects. Third, provide students with learning experiences that allow them to re-imagine what it feels like to be a new kind of designer working on larger types of design projects that are rooted in the craft of making. Transition Design is a new field of design. In this paper, I have addressed three courses and some sub-skills that I posit are necessary for the field that is being constituted around Transition Design.

Notas

1. The term *dexign* with an X was introduced by Arnold Wasserman in 2013 to describe an experimental form of design that combines *design thinking* with *futures thinking*. The distinguishing feature of *dexign* is the focus on aligning current action with long-term sustainability goals.

2. In 2015, the DEA course was taught by (a) Peter Scupelli at the School of Design at Carnegie Mellon University, in Pittsburgh, PA, USA, (b) Marty Siegel and Jordan Beck at Indiana University, Bloomington, IN, USA, and (c) Beena Prabhu and Naveen Bagalkot at the Srishti School of Art, Design and Technology in Bengaluru, India. Students from the three institutions provided each other with feedback on their assignments. The exchanges between the different cohorts allowed students to see their works from different cultural perspectives. In 2017, the DEA course explored sustainability, feminism, and gender equality. It was co-taught by Peter Scupelli and Dr. Kate Hamilton from the Eberly Center of Teaching Excellence at Carnegie Mellon University. Dr. Hamilton was the course instructor for feminism and gender theory as it relates to design. Course materials are available: https://designethosandaction.wordpress.com/ https://designethosaction2017.wordpress.com/

3. DFS is an Open Online Course offered through Carnegie Mellon University Open Learning Initiative (OLI). OLI content prepares students for workshop activities to apply the theoretical ideas practically to concrete design problems.

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Resumen: Los educadores de diseño luchan por enseñar habilidades básicas en los cursos de diseño tradicional necesarias para la práctica del Diseño para la Transición. El cambio a nivel de los sistemas del Diseño para la Transición, hacia una sociedad sostenible, plantea tres desafíos: (a) ¿Qué experiencias de diseño preparan mejor a los estudiantes para participar en cambios a nivel de los sistemas para futuros sociales sostenibles? (b) ¿Qué podría ser un proyecto de Diseño para la Transición acotado a un curso de estudio de un semestre de duración? (c) ¿Qué habilidades de diseño se necesitan para facilitar distintas coaliciones humanas que busquen la sostenibilidad social? En este documento, describo ejercicios fundamentales para desarrollar habilidades de diseño, introducidas en tres cursos de diseño, para preparar a los estudiantes para los desafíos del tipo de Diseño para la Transición.

Palabras clave: Pedagogía de diseño - Diseño para la Transición - diseño basado en valores - *ethos* de diseño - agilidad de diseño - futuros del *dexign* - pensamiento de futuros - diseño de horizonte de corto plazo - diseño de horizonte de largo plazo - diseño temporal alineado.

Resumo: Os educadores de design lutam por ensinar habilidades básicas nos cursos de design tradicional necessárias para a prática do Design para a Transição. A mudança ao nível dos sistemas do Design para a Transição até uma sociedade sustentável propõe três desafios: a) Que experiências de design preparam melhor aos estudantes para participar em mudanças ao nível dos sistemas para futuros sociais sustentáveis? b) Qual poderia ser um projeto de Design para a Transição limitado a um curso de estudo de um semestre? c) que habilidades de design se precisam para facilitar diferentes coligações humanas que procurem a sustentabilidade social? Neste trabalho se descrevem exercícios fundamentais para desenvolver habilidades de design, introduzidas em três cursos de design, para preparar aos estudantes para os desafios do tipo de Design para a Transição.

Palavras chave: Pedagogia do design - Design para a Transição - design baseado em valores - ethos do design - agilidade de design - futuros del *dexign* - pensamento de futuros - design de horizonte de curto prazo - design de horizonte de longo prazo - design temporal alinhado.