

Teaching to Ddesign Futures in China: A Vision for a Blended Learning Pedagogy to be Deployed at Scale

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Abstract

Many design educators are concerned with urgent problems such as sustainable development [1] and climate change [2]. The Intergovernmental Panel on Climate Change (IPCC) 2018 report clearly states that rapid decarbonisation is needed by year 2030 to avoid climate change catastrophe. Such planetary level problems impact people's everyday existence within the biosphere, and require short-term design action alignment with long-term vision goals. However, many design educators teach to design for increasingly shorter time horizons within consumerist worldviews (e.g., rapid-prototyping, agile, human-centered design). In this paper, we describe a course that teaches design students how to align short-term design to long-term timescales. We leverage Future Studies researchers' work on how to teach students greater agency within long-term timescale horizons [3]. We describe an effective and efficient blended learning design pedagogy (e.g., combining online and face-to-face learning activities) [4] to engage with new global challenges such as climate change and sustainability (e.g., [5],[6],[7]). Ddesign Futures, is a required design studies course for all third year undergraduate students in the School of Design at Carnegie Mellon University. The term "ddesign," refers to an experimental form of design that combines design thinking [8] with futures thinking [9]. Due to time constraints of student schedule, the course was taught as a blended learning course with half the time and three times as many students as a traditional design studio course. Students' first exposure to new materials was an online platform where they watched videos, answered questions, and received immediate correctness feedback. During in-class sessions we discussed homework questions and did interactive hands-on design exercises. Prior research established the efficacy and areas for improvement of the Ddesign Futures course as taught at Carnegie Mellon University to 40-50 students each year [5,6,7]. We are exploring how to share the course at scale in China. We've identified four challenges in our plans: modular design, teaching professors and students, synthesizing content, and deploying a western learning platform in the Chinese internet.

Keywords: *Blended Learning, Flipped Classroom, Open Learning Initiative, Design Futures, Ddesign.*

1. Introduction

Change is exponential in the 21st century. Products and services are developed faster, hold a shorter shelf-life disrupted by new offerings, and exist in the wider environment with global challenges emerging such as climate change and sustainability. Thus, design for the 21st century requires different skills; design educators are challenged to adapt.

What is the best use of limited student time and attention? How should the new topic be taught? How should classes be structured: size, duration, frequency? How should effort be paced and allocated in class and outside? How effective are particular teaching methods? Enlightened course design relies on three pillars: applying the research on what works best for learning, data-informed iteration, and engagement with real-world problems (e.g., [10]). Design educators are examining (and some are radically changing) their teaching pedagogies to engage with global challenges such as climate change and sustainability (e.g., [6]).

Sustainability challenges are often framed as long-term challenges for year 2050 [11]. The *Ddesign Futures* course explicitly focused on aligning near-term design action with longer time horizons aimed at sustainable futures. In the course, students ask: how might a short-term preferred situation lead to a long-term preferred situation? We focus on "ddesign," an experimental form combining design thinking with futures thinking. In particular, how to align short-term design action with long-term vision goals.

Climate change and sustainability are global challenges that must be addressed quickly in the next decade. In 2018, the Intergovernmental Panel on Climate Change (IPCC) issued the 1.5C report that clearly states that rapid decarbonisation is needed by year 2030 to avoid climate change catastrophe [2]. This means that action needs to be taken quickly on a global scale. Since most things within the consumerist world play a large role in the carbon emissions causing Climate Change [2], we posit that



design education needs to change quickly around the world. We believe the *Dexign Futures* course can play a role in combatting climate change from a design perspective for two reasons: content of the course and the way the course is partially taught on an interactive online platform.

The *Dexign Futures* class was developed at Carnegie Mellon University is taught to approximately 40-50 design students each year. In this paper, we explore how many more design students could be reached. For example, in China, the 2018 Central Academy of Fine Art (CAFA) report stated that 1951 universities provide 8208 undergraduate design programs and 2 million design students. We discuss the opportunity, vision, and challenges to translate and deploy the *Dexign Futures* course at scale in China. First, the course will be globally available in English on the Carnegie Mellon Open Learning Initiative platform <https://oli.cmu.edu/> in fall 2019 and then translated into Chinese and deployed on the <http://www.xuetangx.com> online platform.

2. Blended Learning for Dexign Futures

The type of blended learning we describe in this paper is often referred to as Flipped Classroom pedagogy, or student-centered learning. Flipped Classroom differs from traditional lecture based classes. In lecture based teaching, students listen and take notes usually with limited discussion opportunities (e.g., [12]). Students may hesitate to ask questions, discuss, and seek clarifications; thus, limiting opportunities to clarify misconceptions. Limited interaction in class with content and instructor may result in superficial understanding (e.g., [13]).

We chose the flipped classroom as an alternative to a lecture class. The Flipped Classroom pedagogy was first developed for math education [14] but has seen adoption in Science, Technology, Engineering, and Math (STEM) disciplines, medicine, nursing and so forth. Traditionally, flipped courses have two components: interactive online prework followed by hands on applied in class activities. Flipped courses shift lectures and instruction outside of class to use class time for hands-on activities. Online homework prepares students for in-class activities where the course instructor, and teaching assistants can provide students with feedback and answer questions. Active learning based activities and peer feedback often enhance student learning and engagement. But, STEM education differs from Design.

The design centered flipped classroom pedagogy was previously tested in the *Dexign Futures* course [5] and compared to a traditional *Futures* studio course [7]. We augmented the common Flipped Classroom pedagogy by adding a reflective practice component. Reflective practice is critical in design education to embed new ideas and methods firmly into design practice. The design centered flipped class-room pedagogy has three pillars: online interactive prework with immediate correctness feedback, in class hands on workshop activities with instructor feedback, and weekly reflective assignments followed by in-class group discussions to encourage meta-cognition.

3. Deploying Dexign Futures at scale in China

We are exploring how to share a blended learning flipped classroom course at scale in China. To reach a broader audience in China, Professor FU, his PhD student Qing Xia, and Peter Scupelli are collaborating to translate the *Dexign Futures* flipped classroom course into Chinese and pilot it in local Design programs. Professor ZHANG Yanshuo from Wuhan University of Technology, is awaiting funding to be a Visiting Scholar at CMU in 2020-2021 to disseminate the *Dexign Futures* course as an open source course in China. Judy Brooks is helping develop the OLI components for the interactive prework and guiding the learning science best-practices.

We've identified four challenges: modular design, teaching professors and students, synthesizing content, and deploying a western learning platform in the Chinese internet area. First, the modular course design involves creating a seven-week course that can be used as individual modules as well as a whole course. We anticipate that Chinese professors may be cautious about teaching a whole new course, but may be open to adding a new project or exercise in a class they already teach. Therefore, our modules should augment aspects of existing design courses and be easy to integrate.

Second, teaching professors and students at the same time can be challenging. Professors need to feel confident about three things: the material in the course is worthwhile to learn, they can learn the new course materials well enough to teach it, and they can learn to teach with the Flipped Classroom pedagogy. Students' materials need to be efficient, effective, intrinsically motivating, and most importantly engaging.

Third, previous versions of the *Dexign Futures* course on the Open-Learning Initiative (OLI) platform [15] used links to some videos by internationally renowned futurists available on YouTube and Vimeo. There are three challenges: links to online videos are not guaranteed to be online forever, terms of

service for both YouTube and Vimeo do not allow one to download the videos, and both YouTube and Vimeo are blocked in China. Therefore, to avoid copyright and term of service problems, we will have to make our own videos or find new ways to synthesize and communicate ideas in the videos. Fourth, the CMU OLI course student platform is partially blocked in China <https://oli.cmu.edu/>. We are exploring if having a local server in China with the OLI course can overcome such a current limitation. In the meanwhile, we anticipate that since the content is open-source, the Chinese version of the course will be deployed on the <http://www.xuetangx.com> platform.

4. Summary

The IPCC issued a dire warning that decarbonization by 40-50% by year 2030 is needed to avoid the catastrophic consequences of climate change. Designers and design educators need new knowledge and tools to play a significant role in carbon reductions. But, rapid action is needed globally. In this paper, we describe the *Dexign Futures* course developed at Carnegie Mellon University that teaches design students some fundamental skills needed to address such challenges. The *Dexign Futures* course uses a blended learning approach based on the Flipped Classroom pedagogy. We describe our plans to translate the *Dexign Futures* course into Chinese and deploy it in China where there are over 2 million design students. The goal is to teach design students and professors about how to address challenges of Climate Change and Sustainability through university level design education. We described four challenges in our plans: modular design, teaching professors and students, and synthesizing content.

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