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Addressing Air Pollution Impacts on Senior Citizens in Beijing, China
The International Urbanization Seminar

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China has experienced rapid urbanization and economic growth since 1978, resulting in reduced air quality and growing concerns about air pollution. In Beijing, fine particulate matter concentrations at times exceed World Health Organization safety guidelines (He et al. 2001). Students in the International Urbanization Seminar (IUS)[1] at Stanford University examined air pollution and its impacts on senior citizens in Beijing as a critical question of urban sustainability. Working in a multinational, interdisciplinary team, American and Chinese students collaborated with Clean Air Asia, an international nongovernmental organization (NGO) that promotes better air quality in cities across Asia through technical assistance, to develop public campaign materials targeting Beijing's older adult populations. Over four months, the team researched scientific literature on air pollution impacts, identified barriers and opportunities, translated technical knowledge into public campaign materials, and tested these materials with senior citizens. Through this course, students learned to work across cultures and disciplines to apply **human-centered design** and advance sustainability approaches rooted in cultural humility and respectful collaboration with local communities.

Toward an Inclusive Urban Future

Two-thirds of humanity will be living in cities by 2050, elevating the need for a sustainable and equitable urban future for all (United Nations 2014). Recognizing

that cities are complex and extend beyond the ability of a single discipline to tackle their challenges, the author co-founded the Stanford Human Cities Initiative (HCI) to nurture a pipeline of leaders who understand cities to be responsive to diverse human communities.[2] Through education and research, the HCI uses **design thinking** to envision an inclusive human-centered urban future.

Several courses are offered under the HCI that are open to undergraduate and graduate students from across disciplines at Stanford. Courses such as the IUS are offered for academic credit and count toward degree requirements. The author developed and teaches the course along with a trans-Pacific faculty team from the Program on Urban Studies at Stanford University and the Department of Construction Management and Information Art and Design at Tsinghua University in Beijing, China.[3]

Initiated in 2014, the IUS focuses on design thinking and fieldwork strategies for students from *all* disciplines to apply creative problem-solving approaches to urban sustainability. It is structured around three urban labs that guide students through human-centered design, empathy interviews, user observation, and prototype testing. This chapter refers to the Clean Air Campaign undertaken by IUS students as one of three projects in fall 2015.

Seminar Structure

The IUS consists of three phases: a two-week fieldwork studio in Beijing, a ten-week course involving remote collaboration, and a capstone experience at the Human Cities Expo held at Stanford University at the conclusion of the course.

The course sequence begins with Stanford students traveling to Beijing for a two-week studio. They participate in daily seminars with Tsinghua University students, visit local NGOs and sustainability organizations, and engage in immersive activities that allow them to understand the scale and history of Beijing (see Figure 16.1). The studio emphasizes fieldwork where students are divided into multinational, interdisciplinary teams to meet with community partners and engage in site visits.

After the studio, Stanford students return to the United States and continue with a ten-week course during the fall quarter. Students meet twice a week in class to discuss comparative United States–China sustainability issues and participate in a weekly joint teleconference session with their Tsinghua counterparts. During these sessions, students engage with faculty and invited guest experts from both sides of the Pacific and break out into small group discussions. Students are required to work outside the class on project development, guided by assignments focused on urban observation and prototyping in the city.

The course culminates with Tsinghua faculty and students traveling to Stanford to participate in the annual Human Cities Expo (see Figure 16.2). The expo serves as a daylong celebration of interdisciplinary perspectives and strategies for advancing human-centered cities. The expo features interactive exhibits, class presentations, and keynote talks from sustainability scholars and practitioners.

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16.1
China Director of Clean Air Asia presents the organization's work and meets the students in the International Urbanization Seminar in Beijing, China, 2015.

16.2
Students in the International Urbanization Seminar create interactive exhibits and engage with audience members at the Human Cities Expo as a capstone experience. International Urbanization Seminar, Stanford, California, 2015.

Learning Objectives and Outcomes: Clean Air Campaign

The Clean Air Campaign team consisted of six Tsinghua students and five Stanford students from the fields of environmental systems engineering, construction management, and service design. They partnered with Clean Air Asia to develop a scientifically based educational campaign to reach senior citizens, who are

disproportionately affected by air pollution impacts in Beijing. By engaging in this work, students achieved the following learning objectives:

- comprehend scientific knowledge
- analyze a real-life problem
- synthesize field research into effective ways of addressing air pollution impacts on seniors

Students began the project by researching the health impacts of air pollution on senior populations and effective methods of protection that an individual could take, such as purchasing indoor air purifiers, wearing a respirator mask, or reducing exposure. Students reviewed existing scientific research, interviewed subject experts, and summarized current practices in a technical report.

After the initial literature review, students embarked on exploratory fieldwork to understand the motivations of the senior population. This led to unexpected findings; for example, students discovered that seniors did not initially express concern for their own health but were very concerned about the health of their grandchildren. In turn, the team realized that they could attract the attention of senior citizens by targeting educational materials that describe health impacts on their grandchildren and suggest protections that would benefit the entire family.

Following this discovery, the team analyzed and distilled this knowledge into prototypes of public campaign materials to educate senior citizens about the hazards of air pollution and available methods of self-protective measures. Tsinghua students then tested these flyers at a Beijing senior center (see Figure 16.3) to see if the message targeting the senior citizens' of responsibility as caretakers of their grandchildren resonated and whether they would adapt protection methods as role

16.3
Students in the Clean Air Campaign engage in outreach at a senior community center with their prototypes in Beijing, China. International Urbanization Seminar, Beijing, China, 2015.

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models for the next generation. Stanford students contributed to these efforts by testing the collateral with senior citizens of Asian descent in the San Francisco Bay area.[4] This resulted in a deeper understanding of communication preferences and effective messaging from two sites across the Pacific and helped to inform the work of the Beijing-based team members.

The project concluded with students synthesizing user feedback to design collateral such as a video and a print booklet detailing the causes of air pollution, the air quality index, and techniques for individuals to protect themselves from air pollution. Together, the team generated a playbook of techniques that Clean Air Asia could implement in future public education campaigns.[5]

Teaching Strategies: The Three Es

The IUS focuses on three teaching strategies identified by the author as the three Es of the HCI classes: experiential learning, empathic design, and ethical research. Together, these methods create transformative educational impacts and sustained project benefits long after the course ends.

- Experiential learning involves learning about communities through direct interaction. By traveling to Beijing and making intentional choices such as biking and walking rather than traveling in air-conditioned tourist buses, students were encouraged to learn about Beijing by experiencing conditions firsthand. Unlike in other types of architecture or planning studios where learning takes place through desktop research at a distance or limited direct interaction, in the IUS students are themselves users of the site and engage daily with local stakeholders on the ground with the collaboration of their Chinese counterparts at Tsinghua.
- Empathic design encourages students to put themselves in the shoes of someone other than themselves to understand the diverse experiences of urban dwellers. Through guided exercises, students were instructed to navigate Beijing beyond their normalized ways and engage local community members to understand their daily lived experiences. For example, two students rented a wheelchair and traveled throughout the city from the perspective of someone with limited physical ability. This exercise aimed to encourage empathy for people with different experiences and generate insights for working with local populations.
- Ethical research focuses on the use of rigorous and scientific methods to gather truthful information. Fieldwork was done in conjunction with Beijing-based students and in collaboration with Clean Air Asia as the NGO that shaped and defined the research question. Students were trained in methods of **cultural probes** and reflection strategies to understand the significance and impact of their work on real communities and their roles as students entering a community to amplify existing efforts.

Lessons Learned

The next generation of global leaders must collaborate across cultures and disciplines to address complex urbanization challenges (Steiner and Posch 2006). The Stanford HCI nurtures this pipeline by offering project-based courses such as the IUS and opportunities to partner with stakeholders on real-world problems.

The Clean Air Campaign supports the educational benefits of students applying human-centered design to analyze the needs of local stakeholders and devise culturally sensitive approaches. While students sought to work with humility and respect local expertise, the course also emphasized project deliverables that targeted individual actions, rather than broader advocacy for the public or private sectors to regulate air pollution. Future iterations of the course would need to address the delicate balance of working in a foreign country in regard to politically sensitive topics and maintaining collaborative relationships, while ultimately ensuring that the project is sustainable and impactful.

Notes

1   The International Urbanization Seminar is an interdisciplinary course offered at Stanford University through the Program on Urban Studies as Urban Studies 145 and cross-listed in other departments as Civil and Environmental Engineering 126, Earth Systems 138, and International Policy Studies 274.
2   Based in the Program on Urban Studies at Stanford University, the Human Cities Initiative takes a whole-systems approach to the research and practice of sustainable cities. The initiative identifies urbanization challenges at different stages of development and supports human-centered technological, policy, and design strategies that address those challenges. It develops and practices ethical approaches, using frameworks that are inclusive (for many) and participatory (by many) and striving to benefit diverse human communities. For more information, see www.humancities.org.
3   The trans-Pacific faculty team included Kevin Hsu (Program on Urban Studies, Stanford University), Nan Li (Construction Management, Tsinghua University), and Zhiyong Fu (Information Art and Design, Tsinghua University).
4   Stanford students did not return to Beijing to conduct additional fieldwork. However, they engaged San Francisco Bay area senior citizens of Chinese descent in prototype testing. While they could not assume that these populations had the same lived experiences as those in Beijing, there were many commonalities. For example, many had experienced air pollution in other cities in China. Many were also familiar with those issues through the media or anecdotes from family and colleagues. More importantly, these interviews provided insights into effective communication and public campaign materials for the Chinese-speaking diaspora.

5   Project materials can be found at the International Urbanization website at www.internationalurbanization.org.

References

He, Kebin, Fumo Yang, Yongliang Ma, Qiang Zhang, Xiaohong Yao, Chak K. Chan, Steven Cadle, Tai Chan, and Patricia Mulawa. 2001. "The Characteristics of PM 2.5 in Beijing, China." *Atmospheric Environment* 35 (29): 4959–70.

Steiner, Gerald, and Alfred Posch. 2006. "Higher Education for Sustainability by Means of Transdisciplinary Case Studies: An Innovative Approach for Solving Complex, Real-World Problems." *Journal of Cleaner Production* 14 (9): 877–90.

United Nations. 2014. *World Urbanization Prospects: The 2014 Revision, Highlights*. United Nations, Department of Economic and Social Affairs, Population Division.