HCI Curricula for Sustainable Innovation

The Humanitarian Focus at Amrita Vishwa Vidyapeetham

Insights

- To ensure the sustainable development of rural Indian communities, focus on tailor-made HCI curricula at the bachelor's, master's, and Ph.D. levels involving hands-on international experience.
- This mode of social impact research through student engagements in human-centric processes can guide international efforts in equitable humanitarian applications of technology.

We are an international, multicultural team of educators who draw on more than 25 years' combined experience in training students and professionals in HCI. Our firm belief is that South Asia is a trailblazer in how to conduct human-centered research and design for humanitarian technology. The unique combination of pressing social need, technological expertise, and a deep-rooted wish to serve society comes together in a dynamic way that drives innovation. We acknowledge that "tech for social good" is a global movement, but our hands-on international experience indicates it has a unique vigor in places like India, where the

intensity of social issues, whether urban or rural, is never far from sight. India's technological prowess, allied with the renowned *jugaad* (frugal innovation) attitude, as well as the Vedantic spirit of *seva* (selfless service), creates a highly fertile soil for innovation that supports the United Nations' Sustainable Development Goals 1, 3, 4, 5, 6, 7, 8, 13, and 17 (<https://www.un.org/development/desa/disabilities/envision2030.html>).

Since 2013, Amrita has offered courses with human-centered design training for students from any discipline. This is part of the Live-in-Labs program, discussed below, that lets

students use their skills in tangible projects in service of rural India. In 2015, credit-bearing courses focusing solely on HCI were instituted for M. Tech and Ph.D. students. The courses included more content related to usability, and structured HCI/HRI/HMI studies for high-tech devices. In 2020, with the award of a UNESCO Chair on Experiential Learning for Sustainable Innovation and Development, a wave of international Ph.D. students are undertaking a program of HCI/HCD studies that supports a multiyear program of fieldwork in rural India.

THREE NEW TYPES OF STUDENT

Many students have gone on to jobs in global technology/consulting firms or to Ph.D.s or postdoctoral research internationally. The necessary curricula and pedagogy for those students is largely similar to that of students in the Digital North. However, we see much more diversity of requirements when we look at three other groups of students, all of whom are focused specifically on technology for positive social impact. Each has a unique set of curricular requirements due to their different levels of experience, training requirements, and types of focus.

Motivated local undergraduates undertaking fieldwork in rural India.

Since 2013, Amrita has offered HCI and HCD training for Live-in-Labs [1], an experiential-learning elective course for highly motivated students, including undergraduates. Students go to rural villages in India and use their skills to solve tangible problems related to the design of everyday things, such as a smokeless cookstove or water-related projects [2,3,4,5,6]. We have run this training for seven years with more than 1,000 students, and are currently running a refreshed version with 412 students. Core HCI training elements include how to create relationships with villagers as research participants, observation, design ethnography, interviews, data gathering and analysis, and the creation of personas and scenarios.

We observe globally that young people are highly motivated to make change. Giving them concrete experiences of working for the betterment of society, facing genuine

and severe social problems, is a theme that will become increasingly relevant around the world. Hence, as we learn how to train young technologists in HCI for social good here in India, this knowledge should disseminate from South Asia to the rest of the world.

Curricular challenges: High numbers of inexperienced practitioners, difficult fieldwork, brief time. Fieldwork is usually harder than lab-based studies, due to the more complex environment. Add to this that rural villages can be a very alien environment for an urban, middle-class Indian engineering student. These students are tackling problems with vulnerable populations with their own unique cultural values that we are committed to respecting. There are many students eager to undertake the fieldwork, so we need to train at scale. Nor is there much time for extensive training, given their existing heavy course load. Our approach is to focus on the basic building blocks of human research in HCI: interviews, observations, and walk-alongs; understanding tasks, goals and pain points, as well as peak and pitfall moments; and crystallizing and sharing one's understanding as simple personas and scenarios. The training spans about six weeks and involves multiple practical assignments to try the basic techniques. Pedagogically, the emphasis is on getting a feel for the practice.

Opportunity for South Asia: Young persons' forum for humanitarian HCI/HCD. If more universities adopted programs like this, we can envision a South Asian network of undergraduates sharing and showcasing their experiences in a moderated peer-learning forum. Seeing what others have done can inspire and galvanize, and increase enthusiasm to spend more independent study time learning the necessary techniques. That would let the taught classes be more effective and focused.

Local Indian professionals in humanitarian technology for rural India. Sri. Mata Amritanandamayi Devi (AMMA), chancellor of Amrita Vishwa Vidyapeetham, emphasized the need for sustainable development and humanitarian-focused research in her address at the United Nations Academic Impact (UNAI) Council in 2015. AMMA mentioned that all universities must send their students to

impoverished rural villages to study the challenges faced by these communities and develop solutions. AMMA also mentioned that apart from universities being ranked based on funding, publications, and intellectual caliber, they must also be ranked based on how well they are able to use their research to serve the most vulnerable social strata. It is this compassionate vision that drives the humanitarian technology projects at Amrita Vishwa Vidyapeetham. As such, human-centric methodologies such as human-centered design (HCD) form the basis of all student training, field research, and solution design.

Many of the students in the specialist HCI courses in 2015 were staff members at one of Amrita's specialist research and development labs: AMMACHI Labs (Amrita Multi Modal Applications and Computer Human Interaction). This team focuses on developing tools to support skills training in rural India, especially for women. These students were driven, focused, and already had multiple years' experience in working hands-on with rural village populations and developing technologies with them. They also had specialized areas of technical knowledge, including haptic interfaces, robotics, augmented reality, and coding techniques. In contrast to a regular graduate classroom, where the teacher is more familiar with "real world" work than the students, here the teacher, an international professor, was able to offer technical HCI skills and finesse but primarily supported the students in applying the concepts and methods to their existing practice—to enter the "user-centered headspace" and become familiar with using HCI concepts. The results were positive, in that existing projects could be designed with greater human-centered rigor, leading to further innovation [7,8,9,10]. Also, the ability to think academically about HCI enabled a wave of international publications, such as Haathi Mera Saathi, a system for teaching rural children to code presented at IDC 2016.

Curricular challenge: Conveying the ability for user-centric thinking in a technical college environment. The priority of conveying the spirit and skillful use of HCI principles is a

pedagogical challenge. The prevailing system of grading courses and preparing exams at the university, and the Indian students' prior experience in schooling, were more aligned to a didactic pedagogy. Here, students were given assignments each week that involved getting out of the classroom, observing people doing tasks, and using various lenses and techniques to gather and analyze HCI data. They were given tasks in a constructivist style that would require them to put ideas into practice in various ways, with relatively little emphasis on the "right" or "perfect" way. They were supported to learn directly from end users. We recommend that courses are structured and graded to incentivize practice and that teachers are likewise rewarded for the additional time and effort it takes to do so.

Mature international students. We are currently creating and delivering a new HCI/HCD course to more than 60 Ph.D. students as part of Amrita's new E4LIFE (Education for Life) fellowship program, which is focused on rural India under the Amrita School for Sustainable Development. The fellowship program, along with Live-in-Labs, is part of the recently awarded UNESCO Chair on Experiential Learning for Sustainable Innovation and Development [11]. Many of the students are from other countries in Africa, Europe, North and South America, Asia, and the Middle East. Their focus is intense fieldwork on challenging problems with vulnerable populations, but there is more time to train them, and they have more life and professional experience. Students may, however, be from cultures with very different concepts of acceptable power differences, gender roles, and collectivist versus individual orientations. This must be accounted for in their HCI training.

Curricular challenges: Working cross-culturally at the leading edge of humanitarian technology, producing world-class work. The curriculum needs to be practical as well as support Ph.D.-level scholarship. It needs to support fieldwork and understanding the psychological and social issues of villagers. We are in the early days of this batch's HCI training but have

already committed to a pedagogical approach that is constructivist and experiential. Emphasis is on the regular practice of using the concepts, reflecting on one's own experience, and making connections independently with the taught materials and one's problem space.

ENDNOTES

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