

By Prasad Boradkar

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Prasad Boradkar is an associate professor in industrial design at Arizona State University in Tempe. He is the co-director and project leader of InnovationSpace, a transdisciplinary laboratory at ASU where students and faculty partner with researchers and businesses to explore human-centered product concepts that improve society and the environment.

InnovationSpace

A COMMUNITY OF LEARNERS

The success of any great idea depends on visionary thinkers, caring leaders and tenacious executors. Arizona State University (ASU) was fortunate to find someone who embodied all these characteristics when it hired Paul Rothstein in 1998. Many people in the design profession knew Paul. Others heard of him through his articles in this very journal on such issues as ethnography, human-centered design and design education. A group of students, faculty and corporate sponsors actually got to work with Paul on a project that has become his most enduring—and inspiring—legacy: a program for human-centered new product development known as InnovationSpace.

A Growing Legacy

Rothstein launched InnovationSpace in 2004 as both a classroom and a research laboratory in which transdisciplinary teams of students, faculty, design practitioners and corporate partners could exercise their passion about design's creative potential and explore its power to improve the lives of ordinary people. The program was part of a larger goal at ASU to engage all the industrial design faculty and students in what Rothstein called a "community of learners." He envisioned InnovationSpace as just one of many new enterprises that would be catalyzed by this great exchange of knowledge and energy. But on March 8, 2005, Rothstein died unexpectedly just as the program's first crop of students neared completion of their final projects.

Programs established by charismatic individuals often flounder in their absence. But that has not been the case with InnovationSpace, largely because Rothstein was a brilliant strategist who devised an extraordinarily clear, but flexible, foundation for the program.



When Rothstein died, I was asked to take over as project leader of InnovationSpace. Working closely with his ideas over the last four years, I have marveled time and again at his programmatic genius. **Embedded in InnovationSpace's DNA is a directional clarity that sets out an evolutionary goal that allows for creative deviation as new opportunities and challenges arise.** I am pleased and proud to report that InnovationSpace is thriving.

Now in its fifth year, the program recently received funding renewals from ASU's College of Design, Ira A. Fulton School of Engineering and W.P. Carey School of Business. The program has enjoyed the support of a devoted cadre of staff and faculty who believe in the value of an InnovationSpace education for students, business, society and the academy. Best of all, the program continues to draw some of the brightest and most motivated students on the ASU campus. Their exciting work has attracted additional financial as well as educational support from several ASU research centers and corporate partners.



Student teams in the InnovationSpace studio

InnovationSpace is a joint venture between design, business and engineering at ASU. The program is built on the premise that a nontraditional, transdisciplinary education provides the right kind of expertise and variation in thinking to handle the complex challenges of new product development. The effort requires teams of students from business, engineering, industrial design and visual communication design to work in educational settings where the boundaries are fluid and the knowledge is integrated. Here, they learn how to create sustainable product concepts that anticipate—and meet—the rigors of real-world challenges on multiple fronts. Three key ideas drive InnovationSpace: transdisciplinarity, integrated innovation and partnerships.

Transdisciplinarity

The terms interdisciplinary, multidisciplinary and transdisciplinarity are often used interchangeably, but there are subtle distinctions between them. Interdisciplinary research, or education, is undertaken when the complexity of a problem necessitates the active engagement of multiple points of view, theories and methodologies. Heavily encouraged in academia today, interdisciplinary approaches are deemed necessary to counter some of the problems of extreme specialization and to encourage creative, nontraditional solutions.

Interdisciplinarity serves as an umbrella term that includes multi- and transdisciplinarity. Generally speaking, multidisciplinary approaches bring together experts from several disciplines to collaborate on a project, but their work may not always intersect. In such situations, large problems may be segmented into smaller tasks that are handled by the appropriate experts. On the other hand, **transdisciplinarity** refers to situations in which the knowledge and tools of one discipline influence and redirect the results of another. Much more disruptive and difficult to manage, this engagement typically dismantles disciplinary boundaries in the hope of generating shared new knowledge.

Students in InnovationSpace operate as teams in which traditional disciplinary roles often are mixed and matched. In the early stages during the fuzzy front end of new product development, all students are required to drop their disciplinary affiliations as they conduct research in a designated problem area. In some cases, they conduct observations and interviews as a team. At other times, the students may work in pairs or individually to gather more detailed data in a specific area. As the project proceeds, the students dip into their disciplinary toolboxes to analyze their research into user needs, the market, potential technologies, and social and environmental issues. For example, the business students will perform SWOT analyses, and the engineers will carry out technology benchmarking. As the information is compiled into one report, all students are required to understand the research and analysis tools used by their teammates. As a result, design students might use market mapping to critique products, while engineers help develop a hierarchy of user needs.

Such transdisciplinary learning creates a diversity that is tremendously beneficial to the class. Students and faculty contribute new resources, theoretical approaches, specialized methodologies and unique tools that advance the knowledge of the entire group. In the end, students understand a valuable lesson: that other areas of expertise can improve the quality, depth and impact of their own work. Jonathan Mendoza, a 2008 InnovationSpace graduate and now an industrial designer with frog design, observes: “Working with the three other disciplines in my senior year prepared me to hit the ground running at frog design. I use so much of what I learned in school on my job that it feels like this is InnovationSpace—only magnified!”

Integrated Innovation

In the summer of 2004, Rothstein developed a model of innovation, known as integrated innovation, that has

become the cornerstone of our program. He stressed the importance of addressing the needs of all stakeholders in new product development. At ASU, the industrial design faculty begin teaching this model in the first year and build it up in greater detail as students advance in the program.

The integrated innovation model is a holistic framework that asks four key questions: What is valuable to users? What is possible through engineering? What is desirable to business? What is good for society and the environment?

Using the integrated innovation model, students aim to create products that satisfy user needs and desires, apply innovative but proven engineering standards, create measurable value for business and benefit society while minimizing impacts on the environment.

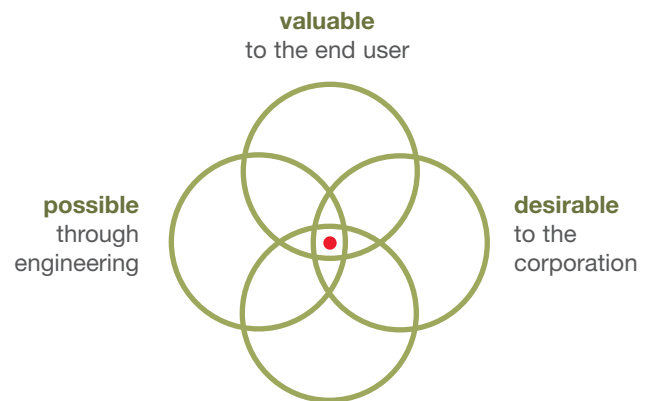
The integrated innovation model is a multipurpose tool. The framework helps students collect exhaustive and relevant research. Once students begin generating product ideas, it also serves as an evaluation method for testing the efficacy of their solutions for all stakeholders. In carrying out these analyses, they encounter the dynamic, real-world tensions in new product innovation. For example, they might specify a certain polymer that has the desired material properties and meets manufacturing requirements but may rank high on human and environmental toxicity. Offshoring product manufacturing to a poorer nation might have economic advantages for the corporation but may perpetuate unfair labor conditions for workers.

Partnerships

To help us in this endeavor, a variety of corporate and ASU sponsors provide financial support as well as ongoing mentorship for the student teams. To date, the roster of corporate sponsors has included such companies as Herman Miller, Inc., Procter & Gamble and Intel Corporation. InnovationSpace also partners with research centers at ASU to help them imagine potential product solutions for their technologies. ASU sponsors include the Center for Nanotechnology in Society, the Flexible Display Center and the Center for Ubiquitous Cognitive Computing.

Our corporate sponsors actively engage with the faculty and students in the process of outlining the problem statement, defining deliverables, guiding the research, assisting with resources and evaluating design

Integrated Innovation Model



solutions. In this exchange, the benefits are mutual. Gretchen Gscheidle, research lead at Herman Miller who has been actively involved with InnovationSpace for the past two years, said, “The students and sponsors come at the same project from two points, spread at either end of a continuum: the students with fresh eyes and youthful innocence, the sponsors with a sense of what is possible/impossible through our years of experience. What’s great about InnovationSpace is that we work together, and in the process each takes steps toward the middle ground—to the benefit of all.”

The ability of students to generate new perspectives is a fringe benefit of corporate participation for Doug Bazuin, as well. “I am always energized by the passion and excite-



ment of the students,” said Bazuin, a healthcare researcher at Herman Miller. “They bring a fresh point of view to the design of healing environments. Their process and their ideas deepen our understanding and broaden our perspective. Working with them also forces me to clearly articulate the vision and values of Herman Miller for healthcare.”

In some cases, the InnovationSpace experience offers insights that can lead to programmatic changes in the workplace. Muki Hansteen-Izora, research scientist at Intel’s Digital Health Group, mentored InnovationSpace students for the 2007/2008 academic year. Hansteen-Izora said, “Working with the students in InnovationSpace is both stimulating and inspiring. Many of the connections they draw sync with our own, but often they uncover issues and directions we hadn’t considered. It’s a great opportunity for our team to get out of our own heads and expand our thinking.”

As part of a large public university that boasts some 20 colleges, we are fortunate to have access to a wide array of academic consultants to collaborate with. Psychologists and political scientists from ASU’s Resilience Solutions Group have worked closely with student teams in designing products that enhance the independence of elders. When InnovationSpace teams were developing new solutions to assist nurses perform their jobs better in hospitals, faculty and students from ASU’s College of Nursing and Healthcare Innovation served as expert consultants who assisted with research as well as brainstorming and studio critiques. This fall we launched a major biomimicry initiative in conjunction with biologists from ASU’s School of Life Sciences and staff from the Montana-based Biomimicry Institute.

Negotiating Academic Challenges

The transdisciplinary sponsored-project model offers tremendous educational benefits, but also presents many obstacles. One of the fundamental challenges is securing sustained financial and teaching support from the highest levels of academic administration. We’re fortunate to be a part of a university whose vision aligns with our program goals. The mission of the university, as outlined by President Michael Crow, has identified knowledge fusion, societal transformation and use-inspired research among its top imperatives. InnovationSpace has been cited as one of the university’s exemplary initiatives. Obtaining support from the deans of design, business and engineering also helps the program surmount logistical hurdles, such as establishing faculty co-teaching assignments, qualifying the InnovationSpace course as a substitution for capstone classes and honors theses, and helping to recruit students.

The rewards of running a program like InnovationSpace have far outweighed the effort in resolving even the thorniest challenges. Take the experience of Eric Fields, a 2008 InnovationSpace graduate in industrial design. In a recent interview over lunch, Fields observed: “InnovationSpace provided me with a very unique experience, and it redirected my career focus. I now know that I want to work in environments where there is a significant emphasis on research and on problem solving. I don’t want to do work that is purely sexy and glamorous; I want to do work that is more meaningful to society.”

Paul would have been proud. ■