For all that has changed over Harvard's 375 years, one thing has remained roughly the same: It's still a place where many of the brightest students come to learn from some of the best teachers.

But if anniversaries are a good time to reflect on what has gone well, they're also a time to set challenges — to imagine what could become even better. If anything, 2011-12 was the year when Harvard began to focus more heavily on how students learn and teachers teach.

Evidence of a renewed commitment to teaching and learning could be found across the University. Rita E. and Gustave M. Hauser's $40 million gift, announced in October, led to the launch of the Harvard Initiative for Learning and Teaching. In November, the Harvard Innovation Lab opened its doors to the public, drawing students, faculty, and researchers across the Charles River to collaborate across disciplines.

And this month, Harvard and the Massachusetts Institute of Technology unveiled their joint education venture, edX, which promises a future in which online learning both opens Harvard's doors to the world and provides valuable data and insights to make traditional classrooms even more effective.

"The vast technological and societal changes of recent years require us to rethink our role in educating our own students, to reconfigure higher education for a global century," said President Drew Faust. "Harvard has a responsibility not just to educate our students, but to determine how young people learn best, and why the best teachers are so effective."

As the 375th anniversary draws to a close, the Gazette asked 11 professors to answer the question: "What's the one big idea that will transform teaching and learning before Harvard celebrates its 400th?"

Their answers varied as widely as their disciplines, but they share an excitement for new technologies and insights, a willingness to experiment, and a desire to position Harvard at the forefront of the educational future.

— Katie Koch | Harvard Staff Writer

Photo by Jon Chase | Harvard Staff Photographer

Ahead of the LEARNING CURVE

Harvard faculty members envision the next big ideas in teaching and learning.

A SMARTER NETWORK

Jonathan Zittrain *is Harvard Law School professor of law, School of Engineering and Applied Sciences (SEAS) professor of computer science, and co-founder and faculty co-director of the Berkman Center for Internet & Society.*

Imagine a world where students learn not from pricey textbooks, but from a priceless community. We will transform teaching by making course texts digital and networked, among professors as well as students.

Professors will be able to browse syllabi from around the world, and then drag and drop the most fitting elements for their own classes. They'll contribute their own changes back to the commons, making for rapid microevolution of the texts and criticisms that spark student reaction and discussion. And, thanks to the networked system, a teacher can be alerted when an assigned text is being read and digested elsewhere, creating opportunities for well-defined debate and criticism from students in Harvard Yard to those in Singapore or Saudi Arabia. Machine translation is becoming good enough to allow communication not just across culture but across language, too.

Universities were central to building the Internet. They can build networked teaching, too, in the public interest, free and open to all who want to learn.

Jonathan Zittrain: Professors will be able to browse syllabi from around the world ...

BRINGING THE WORLD TO HARVARD

Maya Jasanoff *is a professor of history in the Faculty of Arts and Sciences (FAS).*

Digital initiatives like edX, the new Harvard-MIT online learning platform, let Harvard open its classrooms to the world. I use digital technology to confront another challenge: How can I bring the world into the classroom?

My course "Societies of the World 14: The British Empire" covers 200 years in the history of an entity that once dominated a quarter of the earth. I have to show students the great diversity of this empire while also conveying broad, overarching themes.

Maya Jasanoff: While millions may enter virtual Harvard classrooms by 2036, I believe students on campus will enjoy an enriched classroom experience ...

Google Earth offers a great way to do both. I can "fly" students to different locales, and animate these with embedded video, images, and music. To understand the imperial dimensions of World War I, for instance, we "visited" war memorials from Flanders and Gallipoli to Basra, Dar es Salaam, New Delhi, and Ottawa. To appreciate the sweep of decolonization, we "traveled" to Kingston, Accra, and Kuala Lumpur and watched period footage of new citizens cheering their independence.

While millions may enter virtual Harvard classrooms by 2036, I believe students on campus will enjoy an enriched classroom experience in which digital tools help join multimedia content, interactive learning, and live performance. There's a reason lecture rooms are called theaters. And, thanks to the digital revolution, Harvard students over the next 25 years are in for a rewarding show.

GETTING OUR HANDS DIRTY

Gu-Yeon Wei *is Gordon McKay Professor of Electrical Engineering and associate dean for academic programs at SEAS.*

Engineering is about solving real-world problems. More often than not, these problems are messy, ill defined, and fraught with practical constraints. Instead of focusing on the transfer of knowledge from teacher to student, we are shifting our educational paradigm to engage students with the problems they face and to encourage them to get their hands dirty.

During this past January term, a "design thinking" workshop brought students together with industrial designers for a week of creative thinking — an excited flurry of activity by teams with diverse skills, who scurried about an open-seating venue, posting notes on walls to document iterations of the design process. In our junior engineering design practicum, a group of students developed computational tools to tackle the problem of gang violence in collaboration with the Massachusetts State Police. Some courses have experimented with clickers, iPads, and even automated recognition of facial gestures to understand how students learn from one another. Others have used new classrooms, a simple approach that nonetheless makes it easier to encourage dialogue, teamwork, and active problem solving.

In short, experimentation is what will transform teaching and learning over the next 25 years. At Harvard's School of Engineering and Applied Sciences, we are refining how we learn, think, and do.

Gu-Yeon Wei: ... experimentation is what will transform teaching and learning over the next 25 years.

PRACTICE, PRACTICE, PRACTICE

Iris Bohnet *is academic dean and professor of public policy at Harvard Kennedy School (HKS) and director of its Women and Public Policy Program.*

Harvard's reach has always gone well beyond the walls of the ivory tower. I expect that our engagement with the world of practice will completely transcend these walls before this University turns 400. At Harvard Kennedy School, we are increasingly trying to solve problems rather than problem sets. Under the leadership of Professors Linda Bilmes, Marshall Ganz, Jeff Liebman, Lant Pritchett, and others, our students have worked in, learned from, and advised a number of local, state, and federal governments in this country and abroad on how to improve public service delivery, budgeting and accounting, and general public management.

Activity-based costing, for example, allows cities to understand better how much it costs to plant a tree, fix a pothole, or collect the garbage, and then to allocate money wisely and identify potential savings. Mayor Joseph Curtatone, M.P.A.'11, and his team "are turning little Somerville into one of the most innovative and dynamic places in the country, in terms of its budgeting," Professor Bilmes said.

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Iris Bohnet: ... our engagement with the world of practice will completely transcend these walls before this University turns 400.

Photos: (above, center) by Kris Snibbe, (right) by Stephanie Mitchell | Harvard Staff Photographers

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And our students love it. They engage with real problems and spend countless hours studying conceptual frameworks, collecting data, interviewing people, crunching numbers, running regressions — applying what they have learned in class to the problems in the world.

But it is not only off campus that new forms of collaboration between academics and practitioners are emerging. A group of behavioral and decision scientists at HKS and Harvard Business School is working on workshops focused on co-developing policies, products, and organizational practices that address the problems the practitioners bring to the table. Ideally, several of these new ideas will then be implemented and evaluated in the laboratory and the field, maximizing the learning for the scientific community, the organization, and the world.

PORTABLE, VISUAL INFORMATION

Peter Manuelian *is Philip J. King Professor of Egyptology in FAS.*

Traditional instruction sometimes forces a kind of "tethering" onto students: tethering to the classroom, the lecture format, the textbook, and to linear modes of study. Detaching the tether presents the greatest opportunity, and also perhaps the greatest challenge, to education in the years ahead.

Portable devices, 3-D visualization of data, and nonlinear modes of knowledge acquisition are all here already. But when will the infrastructure catch up to truly support all students — and teachers — everywhere? When will our devices truly take us from the paragraph to the picture, to the slideshow, to the movie, and then to the interactive exercise and back to the text? In some of my classes, we take students to the Giza pyramids, courtesy of a large screen, 3-D glasses, and a real-time navigation system — not a linear video — that allows for visits to any part of the site. No two classroom sessions are ever the same.

But wallowing in technology for its own sake is never the answer. How do we balance these new approaches while preserving the fundamentals of a given subject? Untethered options will require instructors to rethink some very basic assumptions about teaching.

Peter Manuelian: Untethered options will require instructors to rethink some very basic assumptions about teaching.

Nancy Kane: ... changing the role of the instructor in the classroom from the "expert" delivering knowledge to the "enabler" of learning.

WHERE EXPERTS BECOME ENABLERS

Nancy Kane *is professor of management and associate dean for educational programs at the Harvard School of Public Health (HSPH).*

The ideas I am most excited about involve changing the role of the instructor in the classroom from the "expert" delivering knowledge to the "enabler" of learning. Education is evolving from an individual to a team sport, where the instructor as coach designs a curriculum that guides active student learning through multiple channels. Students learn not only from readings and lectures, online vignettes and videos, but from discussions with each other, and sometimes with a global community of learners. Class time is spent exploring the gray areas of knowledge, the places in every discipline where theories conflict or remain incomplete, or where judgment is required to come to meaningful understanding of a concept.

It is not so much one big idea but a collection of ideas, reflecting significant advances in the science of learning — of how adults learn and think — that are likely to transform education in the 21st century. I don't have the one big idea that will transform our educational institutions into organizations that embrace this kind of change, but leadership and investment are critical ingredients. The Hauser gift and the Harvard Initiative for Learning and Teaching together represent a great beginning.

FROM MULTIDISCIPLINARY TO INTERDISCIPLINARY

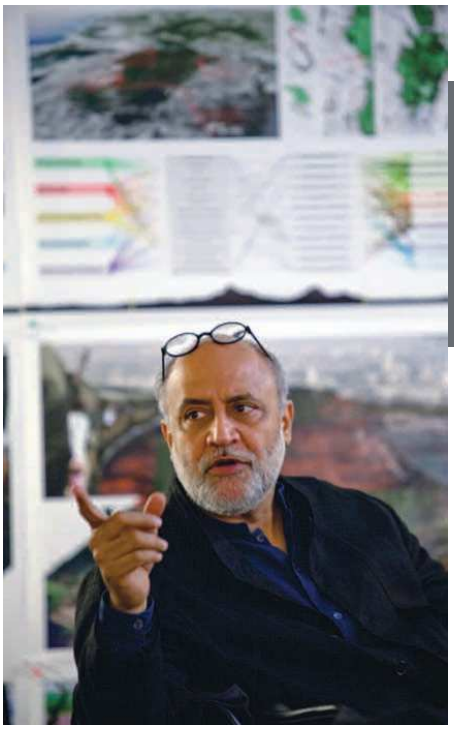
Robert A. Lue *is professor of the practice of molecular and cellular biology and director of life sciences education in FAS.*

Long before Harvard celebrates its 400th, we will witness a novel unification of interdisciplinary research with teaching and learning.

As a world-class research institution that grew up around an undergraduate college, Harvard presents

Robert A. Lue: ... we will witness a novel unification of interdisciplinary research with teaching and learning.

Photos: (left) by Rose Lincoln, (above) by Kris Snibbe, (right) by Stephanie Mitchell | Harvard Staff Photographers



an exceptional opportunity to transform what it means to receive a liberal arts education. We have an academic milieu that is rich with interdisciplinary connections. Our research centers in the sciences, humanities, and social sciences provide abundant evidence of how deeply we have embraced interdisciplinary collaboration with colleagues.

While multidisciplinarity has long been at the core of a liberal arts education, in which students learn how different disciplines might separately tackle the same issue, Harvard's burgeoning interest in interdisciplinary research is increasingly expressed in our teaching as well. Interdisciplinarity provides synthesis born of collaboration, as it integrates the perspectives of several fields in the service of solving a problem.

The creation of our foundational life sciences courses was an unparalleled interdisciplinary effort, and their content largely reflects the power of a more synthetic approach when it comes to understanding biology, chemistry, genetics, and evolution. Our General Education offerings include many new courses that similarly express interdisciplinary perspectives, and as we see 100 flowers bloom in this regard, it is a growing reflection of Harvard's research environment. It is this interdisciplinary transformation of the liberal arts in the university context that will be one of Harvard's ongoing contributions to the wider world of higher education.

STRADDLING WORLDS

Rahul Mehrotra *is professor and chair of urban design and planning at the Graduate School of Design.*

As virtual reality moves from the domain of individual engagement to that of social networks, new forms of interaction will transform teaching and learning in the next 25 years by blurring the physical boundaries of the classroom. This will enable teachers and learners to engage with multiple conditions across the globe where innovation will arise in unexpected locations.

Rahul Mehrotra: Different cultural sensibilities and conditions will coexist and collide, and the real world will be intrinsically linked to the virtual world, more than ever before.

In this construct, we will be able to access, engage with, be challenged by, and immerse ourselves in multiple realities as part of our educational repertoire in real time, every day. Different cultural sensibilities and conditions will coexist and collide, and the real world will be intrinsically linked to the virtual world, more than ever before. Teaching will then take the form of facilitating open-ended and unpredictable interactions. Equipping learners to slide effortlessly between these worlds — to empathize, speculate, synthesize, and project new realities — will prepare them well for leadership in the future.

PUTTING TEACHING IN THE SPOTLIGHT

Xiao-Li Meng *is Whipple V.N. Jones Professor of Statistics and chair of the Department of Statistics in FAS.*

For an institution, no pedagogical idea can be truly transformative without the progressive endorsement of the vast majority of its faculty. One way to effectively promote new pedagogical ideas is to encourage and incentivize a culture where the competing demands for time and energy between research and teaching are not perceived as distinct from those of conducting multiple research projects.

In theory, we understand well that both research and teaching are essential to the discovery and dissemination of knowledge. Research engages us in specific-purpose creativity, while teaching inspires general-purpose creativity. In practice, we already integrate the two effectively in our advanced research courses. Online methods of dissemination, such as iTunes U, now make it possible for classroom teaching to be as globally and permanently visible as research articles, permitting broader exchanges of pedagogical ideas and external evaluation of our teaching activities, just as we do with research findings.

The rapid advance of technologies has highlighted the necessity of ensuring the relevance of the university experience for future generations. It is therefore more critical than ever for Harvard to continuously lead the effort of building institutions where faculty are universally known both for their beautiful minds for research and beautiful hearts for teaching.

CONNECTING WITH THE COMMUNITY

Ronald Ferguson *is a senior lecturer in education and public policy at the Harvard Graduate School of*

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Xiao-Li Meng: It is ... more critical than ever for Harvard to continuously lead the effort of building institutions where faculty are universally known both for their beautiful minds for research and beautiful hearts for teaching.

Photos: (top) by Stephanie Mitchell, (right) by Jon Chase | Harvard Staff Photographers

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Education and Harvard Kennedy School, and faculty director of the Achievement Gap Initiative at Harvard University.

Before Harvard celebrates its 400th anniversary, advanced electronic media will bring the world into our classrooms and our students into the world to a degree that we cannot now imagine. Authentic learning experiences will become increasingly feasible at the same time that simulated experiences will become increasingly realistic. These experiences will teach our students about the challenges awaiting their talents and build their skills to become effective problem-solvers across a range of important domains.

My own work with the Achievement Gap Initiative at Harvard and the Pathways to Prosperity project at the Graduate School of Education is focused on achieving excellence and equity in pre-college education and smoothing transitions from school to career. I hope and expect that the technological and cultural changes I anticipate will increase the involvement of Harvard students from across the University in this important work.

For example, I imagine holograms of Harvard students in virtual visits to their home communities, to help 15-year-olds understand why topics in mathematics, science, art, and literature are interesting and important to understand. More generally, Harvard students from all racial, ethnic, and sociocultural backgrounds will be involved routinely with children and youth in their home and other communities across the globe. Much more so than today, our students, staff, and faculty will debate ideas, confront challenges, and provide inspiration through these connections. Along with like-minded others, they will serve as models of intellectual engagement in a global community of learners focused on achieving shared ideals.

Jules Dienstag: In the future, universities will rely not so much on an online delivery model publicized by for-profit universities, but instead will incorporate the enhancements of digital technologies to perpetuate an environment that is compellingly interactive ...

SOME THINGS NEVER CHANGE

Jules Dienstag *is Carl W. Walter Professor of Medicine and dean for medical education at Harvard Medical School.*

In 25 years, Harvard will be at once both very recognizable in its adherence to core values and very different in its adoption of new pedagogy that engages students and enhances learning. We can imagine but cannot know what the technology of the future will be, nor do we really know the best way to incorporate current technology into the classroom. Accordingly, while our Schools can provide a physical scaffold of technology-capable classrooms and innovative, multipurpose learning spaces, we will rely on the inventiveness of creative, change-embracing faculty and students to explore and tell us how to use new technologies and learning environments to imagine the classroom of the future.

In the future, universities will rely not so much on an online delivery model publicized by for-profit universities, but instead will incorporate the enhancements of digital technologies to perpetuate an environment that is compellingly interactive, that fosters critical thinking, that allows students to take ownership of — and make a committed investment in — their own learning. Online-only education, which leverages the opportunity for students to work at their own pace and schedule, does not have the same intimate, interactive, very personal ingredient that characterizes an in-person learning experience. Even when technology allows asynchronous participation in large and small student teams, the physical isolation of students working exclusively "at home," rather than on campus, is a poor facsimile of the face-to-face university experience in all its richness.

Incredible students of promise and faculty of distinction will continue to be drawn here. And, from the unique cauldron in which they interact, unimagined approaches to pedagogy will emerge. Although we will embrace, even thrive upon, innovations, one constant that will continue to distinguish an institution like Harvard well into the 21st century and beyond is the environment of scholarly inquiry, discourse, and discovery — a presence between faculty and students that anchors a unique, inspirational teacher-learner partnership. This is the true measure of an education, whether in 2012 or 2036.

Ronald Ferguson: I imagine holograms of Harvard students in virtual visits to their home communities, to help 15-year-olds understand why topics in mathematics, science, art, and literature are interesting and important to understand.

Photos by Stephanie Mitchell
Harvard Staff Photographer