by L. Rafael Reif,
*President of the Massachusetts
Institute of Technology*

Better, More
AFFORDABLE COLLEGES
Start Online

How digital learning can become a part of every campus.

Everyone would like a solution to the problem of rising college costs. While students worry that they cannot afford a college education, U.S. colleges and universities know they cannot really afford to educate them either. At a technology-intensive research university like the Massachusetts Institute of Technology, it now costs three times as much to educate an undergraduate as we receive in net tuition—that is, the tuition MIT receives after providing for financial aid. To push the research frontier and educate innovators in science and engineering demands costly instrumentation and unique facilities. Even for institutions with substantial endowments, subsidizing a deficit driven by these and other costs is, in the long run, unsustainable.

Some wonder whether today's online technologies—specifically, massive open online courses, or MOOCs, which can reach many thousands of students at a comparatively low cost—could be an answer. I am convinced that digital learning is the most important innovation in education since the printing press. Yet if we want to know whether these technologies will make a college degree less expensive, we may be ask-

ing the wrong question. I believe they will; we are assessing this possibility at MIT even now. But first we should use these tools to make higher education better—in fact, to reinvent it. When the class of 2025 arrives on campuses, these technologies will have reshaped the entire concept of college in ways we cannot yet predict. Those transformations may change the whole equation, from access to effectiveness to cost.

To understand the potential, it's important to focus on what digital learning is good for. At least at the moment, it is surely not very good at replacing a close personal connection with an inspiring teacher and mentor. However, it is incomparably good at opening possibilities for billions of human beings who have little or no other access to higher learning. The global appetite for advanced learning is enormous: MIT OpenCourseWare—the initiative we started in 2002 to post virtually all our course materials for free online—has attracted 150 million learners worldwide. Today learners from every state in America and every nation on earth are actually taking MIT online classes; the edX platform we launched with Harvard 17 months ago has enrolled

1.25 million unique learners—10 times the number of living MIT graduates. With our edX partner institutions, we see an immense opportunity to help people transform their lives.

Yet digital learning also offers surprising advantages even for students with access to the best educational resources. First, digital technologies are remarkably good at teaching content: the basic concepts of circuits and electronics, the principles of chemistry, the evolution of architectural styles. At an online-learning summit at MIT, one eminent professor of physics from a peer university explained that although he loves lecturing and receives top ratings in student reviews, he recently came to rethink his entire approach. Why? Because testing indicated that many students did not come away from his lectures ready to apply the concepts he aimed to teach. By contrast, comparable students taught through online exercises—including immediate practice, feedback, and reinforcement—retained the concepts better and were better prepared to put them into practice. With so much introductory material moving online, instructors can take time that was previously reserved for lectures and

use it to exploit the power of innovative teaching techniques. A 2011 study co-authored by physics Nobel laureate Carl Wieman at the University of British Columbia showed the benefits: when tested on identical material, students taught through a highly interactive "flipped classroom" approach did nearly twice as well as peers taught via traditional lectures.

Digital learning technologies offer a second advantage, which is harder to quantify but is deeply appealing to both students and faculty: flexibility. Just as college traditionally requires four years at the same academic address, traditional courses require large groups of students to regularly gather at the same time and place. By making it possible to break the course content into dozens of small conceptual modules of instruction and testing, digital learning allows students to engage the material anytime, any day, as often as they need to, anywhere in the world. A student can now spend a year immersed in remote field research on an important problem while staying in sync with the courses in her major. A team of students working on a project can now reach for a new concept just at the moment they need it to solve a problem—the most powerful learning incentive of all.

And we are only beginning to benefit from a third advantage of digital learning: the ability to analyze and gain information from the vast data we are generating about how people actually learn best. By providing, on a huge scale, a systematic, data-driven way to learn about learning, online technologies will provide testable conclusions that could improve teaching methods and strategies for both online and in-person instruction.

For all the strengths of today's digital technologies, however, we know that some things—perhaps the most important elements of a true educa-tion—are transmitted most effectively face-to-face: the judgment, confidence, humility, and skill in negotiation that come from hands-on problem solving and teamwork; the perseverance, analytical skill, and initiative that grow from conducting frontline lab research; the skill in writing and public speaking that comes from exploring ideas with mentors and peers; the ethics and values that emerge through being apprenticed to a master in your field and living as a member of a campus community.

Online learning may not help students arrive at such lessons directly—but it may serve to clear the way. At MIT, faculty members experimenting with online tools to convey content in their courses are finding that it allows them more time to focus on education: detailed discussions, personal mentorship, project-based learning. They are developing a blended model that uses online tools strategically—and they are making education more engaging and more effective for more students than it has ever been before.

Digital learning technologies present us with a tremendous opportunity to examine what college is good for, to imagine what colleges might look like in the future, and to strive for ways to raise quality and lower costs. To teach what is best learned in person, do we need four years on campus, or could other models be even more effective? Could the first year of course work be conducted online as a standard for admission? Or could online tools allow juniors to spend a year working in the field? Then there's the question of our physical campuses. MIT has about 200 lecture halls. How many will we need in 20 years—and what different learning spaces should campuses include instead? Should we develop a new kind of blended education that combines the best of online and in-person learning? Would this lead to a new, more custom-ized and valuable model of residential education—and what changes should we make to maximize that value?

Once we answer these questions, the college experience could look quite different in 10 or 20 years. I expect a range of options, from online credentialing in many technical fields all the way to blended online and residential experiences that could be more stimulating and transformative than any col-

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lege program in existence now. Higher education will have the tools to engage lifelong learners anywhere, overturning traditional ideas of campus and student body. I believe these experimental years will produce many possibilities, so that future learners will be able to choose what is best for them. If you're wondering how much these options will cost, a better question might be, How much will these options be worth? I strongly believe that by capitalizing on the strengths of online learning, we will make education more accessible, more effective, and more affordable for more human beings than ever before. ∎