

The Role of Universities in the 21st century — Eric Mazur
Address given at the 2014 STS Forum in Kyoto ([Video](#))

I am delighted to welcome you to this session on the Role of Universities in the 21st century. It is a pleasure to introduce to you a panel of distinguished speakers. From left to right, we have

1. **Hakubun Shimomura**, Minister of Education, Culture, Sports, Science and Technology in Japan
2. **Thomas Rachel**, Parliamentary State Secretary, from the Federal Ministry of Education and Research in Germany
3. **Joseph Aoun**, President of Northeastern University in my hometown of Boston
4. **Michinari Hamaguchi**, President of Nagoya University in Japan

A few years ago, my daughter was an undergraduate student at Harvard University. On the weekend we would drive back home together and the following Monday morning she'd drive back to campus with me. One Monday, she was in the passenger seat next to me and I saw her studying using flashcards. Now, you may know that I don't place much value in memorization using flashcards and my daughter and I had frequently spoken about education, so I blurted out "Natalie! What are you doing with *flashcards*?!" "I have to know all these amino acids," was her reply. I said "I have an App for that!" to which she immediately retorted, "But Dad, I'm not allowed to use my phone during exams." Now I'm a physicist doing work in biophotonics and occasionally I need to look up the amino acids. Sometimes I remember them for a while, but more often than not, I forget. Why do we force our students to remember information we don't know they'll ever need? Isn't it more important to know how to find and use information than to just memorize it long enough to pass the exam? Why don't we embrace information technology in education the same way it is used in the workplace?

Information technology is seen as an agent of change in academia, especially in education, but I don't think it's being embraced in the right way. There is no question that information technology is having a tremendous societal impact. From the streets of Kyoto to the avenues in New York and the boulevards in Buenos Aires, you can see people walk around staring at the screens of their smartphones. With Wikipedia at everyone's fingertips, trivia games are rapidly losing their appeal. Couples are texting each other from opposite sides of the dining room table. Some envision a future where brick-and-mortar universities are replaced by virtual communities where students learn from massive open online courses, rather than lectures. I don't know about you, but the first time I'm welcomed by a pilot who tells me he's never flown before but has completed a lot of MooCs on flying, I'm getting off the plane.

Frankly, I don't believe information technology will have the impact on education that some have predicted. In that respect it might be illustrative to consider the effect the greatest information technology breakthrough of all time has had on education. I'm not referring to the MooC. I'm referring to the book. James Boswell's biography *The Life of Samuel Johnson*, published in 1791, quotes Johnson as saying:

“Lectures were once useful; but now, when all can read, and books are so numerous, lectures are unnecessary. [...] I cannot see that lectures can do as much good as reading the books from which the lectures are taken.”

He goes on to say that nothing can be best taught by lectures except, perhaps, chemistry and the making of shoes. More than two hundred years later, however, lecturers still write material on the board or project their presentation on a screen, and students dutifully copy the information into their notebooks.

It's not just because educational practices have remained stagnant for hundreds of years that I don't believe in the demise of the traditional university. You see, learning is not a spectator sport. You only have to watch children to see that we are born to learn by doing. Education really is a two-step process. The first step is information transfer, but the second, much more important step is for the learner to make sense of that information. To *do* something with that information. To extract from that information the mental models, the knowledge, the skills that will make learners successful in their future career. The traditional approach to education puts all of the emphasis on the first step, leaving the much harder second step to our students on their own. It's a small miracle we have been able to achieve what we have with this surprisingly antiquated approach. Moving that first step from the lecture hall to the computer screen will never have the profound impact education so badly needs.

I *do* believe, however, that information technology will impact education, but not in the way many see it. The impact will be caused by changes in societal needs. Just as robots have replaced assembly line jobs in the second half of the 20th century, so will computers replace any jobs that involve memorization or rote procedural problem solving in the 21st century. Many jobs that required trained and educated humans can now be automated and consequently future university graduates need a skill set that is very different from that of past generations. As information technology is rapidly changing the workplace, we need to prepare students for jobs that do not yet exist. To do so we will need to focus on adaptability, resilience, creativity and innovation, collaborative skills, ethics, and a global perspective.

The central mission of any university has been — and always will be — education. For some universities — typically the world's leading institutions — another important mission is the advancement of knowledge through original research and scholarship. At these research universities, professors do not just teach current knowledge, but also advance the knowledge that is taught around the world. All this teaching, however, is done using practices that have barely evolved since the Middle Ages. As we begin transforming our educational models for the 21st century, we will need to answer important questions. How do we foster the critical thinking skills required in the 21st century workplace? How do we adapt the learning environment to a changing world? How should we adjust the traditional disciplinary boundaries to prepare graduates for an unknown future? How can we better integrate and leverage the two main missions of universities: research and teaching? How must academic leadership change to effectively manage a changing university?

Unless we answer these questions, we will educate the followers of yesterday rather than the leaders of the future. Luckily we have a wonderful panel here today to address these questions.

Two University Presidents, a Minister of Education, and a Parliamentary State Secretary from a Ministry of Education and Research.

[Remarks from other panelists followed by discussion with the audience]

Well, our time is up. If there's anything that is abundantly clear from this lively discussion, it is that we need many more discussions like this one to agree on the role of universities in the 21st century! I believe everyone agrees that major change is coming. For some these changes will be focused on a shift away from content-based education to a competency based education.

For others the changes will come in the form of employer partnerships and entrepreneurship education.

Regardless of what will happen, I think it is certain that we face an exciting future.

I want to thank my distinguished panelists for their contributions and all of you for coming and for participating in a lively exchange. I hope we can continue our conversation in the next two days in the hallways and over lunch and dinner. Thank you.