Massachusetts Institute of Technology
School of Engineering

# TESTIMONY OF DR. THOMAS MAGNANTI
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# BEFORE THE COMMISSION ON THE FUTURE OF HIGHER EDUCATION
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> *"I am an African-American single parent who could have never afforded an MIT education, but because of your generosity not only do I have access to this treasure chest, my 6th grader is now learning Japanese through OCW… My future is looking bright."*
>
> **— OpenCourseWare self-learner and parent in New York, NY**

Thank you for the opportunity to speak to you on a topic that is so important to all of us. I am the Dean of Engineering at MIT, where I have been a faculty member for 35 years. Many of my activities before becoming Dean involved developing professional master's programs at the interface of engineering and management. Since becoming Dean seven years ago, I have focused much of my attention on improving undergraduate education at MIT, including initiatives using innovative technology. I have also served as the chair of a working group on Workforce Skills convened by the Council on Competitiveness as part of its National Innovation Initiative.

There is much we could talk about concerning higher education, and especially science, technology, and mathematics education. I could, for example, enthusiastically join with others in endorsing the important recommendations made in the reports *Innovate America* and *Rising Above The Gathering Storm*, and I could recite the recommendations I recently made in testimony before the Congressional Subcommittee on 21st Century Competitiveness (the Committee on Education and the Workforce) (*see* http://edworkforce.house.gov/hearings/109th/21st/mathscience051905/wl051905.htm).

However, today I would like to focus on a simple proposition: *technology and openness make a difference in higher education*. To tell you why I feel so confident in making that statement, I will share some experiences and data from my home institution's continued experiment in open sharing — MIT OpenCourseWare.

A high school computer science teacher in Arizona… A physics teacher in Toms River, N.J… A home-schooling mother in rural Illinois… A management instructor at the University of Idaho… An MIT freshman from Michigan.

This seemingly disparate group of people all has two things in common… The first is a singular motivation to seek the best in learning and teaching.

And the second is OpenCourseWare.

OpenCourseWare is the MIT faculty's attempt to the change the dialogue, an initiative launched in 2001 that has had a profound effect on education around the world at many different levels, and a visible effect on MIT's community of faculty and students. In higher education, technology helps us to assemble and codify knowledge, improve instruction and learning, and provide unprecedented access for learners everywhere. With OpenCourseWare, we are providing open access to our entire curriculum, to the entire world.

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Available online at http://ocw.mit.edu, OpenCourseWare makes the MIT Faculty's materials used in the teaching of almost all of MIT's undergraduate and graduate courses available on the Web, free of charge, to any user anywhere in the world. OpenCourseWare is not a distance-learning program, or a certificate or degree-granting project – it is a large-scale, Web-based publication of the educational materials that support an MIT education.

OpenCourseWare enables MIT faculty to share their lecture notes, syllabi, problem sets, and a variety of other materials – including, in some of our foundational courses, full video lecture series – with a global audience of teachers and learners. We even offer open access to several of our labs through a project called iLabs, which is dedicated to the proposition that online laboratories – real laboratories accessed through the Internet – can enrich science and engineering education by greatly expanding the range of experiments that students are exposed to in the course of their education.

Unlike conventional laboratories, iLabs (conceivably including those in companies and national labs as well as universities) could be shared electronically across the entire educational spectrum, or across the globe. Several of the courses published on the OpenCourseWare Web site include iLabs lessons, enabling students outside MIT access to equipment that they could not duplicate in their local learning environments. Through OpenCourseWare, people from around the world are able to collaborate in their research and learning using tools like iLabs, a model that could serve the United States well in the future as we attempt to improve the state of our science, engineering, and mathematics education

We already know that with OpenCourseWare, educators utilize the materials for curriculum development, while students and self-learners draw upon the materials for self-study. With 1250 courses from 34 different academic disciplines now available, OpenCourseWare is more than 2/3 of the way toward our goal of publishing the entire MIT curriculum, 1800 courses. And we know that:

- In three years, more than 17 million unique users have visited the OpenCourseWare site
- 80% of overall site users indicate the site has had an extremely positive or positive impact on their educational activities
- 92% of learners report OpenCourseWare has increased their motivation and interest in learning
- 96% of educators report OpenCourseWare has helped them, or will help them, improve their courses
- 51 other "opencourseware" projects now offer open access to a diverse array of published courses at institutions in the U.S., China, France, India, Japan, and Vietnam

OpenCourseWare users come from all over the world, but right here in the United States, students, self-learners, and educators are finding MIT's open sharing resource to be an invaluable resource:

- **Allen Kovacs**, an adjunct member of the faculty at Wayne State University in Detroit, Michigan, writes: "We have a problem with students entering our engineering program with deficiencies in math and science. Your offerings may be of great influence and assistance to these kids who don't get enough preliminary training in K-12 curriculums. America has a huge problem educating for its technical needs. It is your OpenCourseWare Web site that may ignite some interest… It is a great extension to learning and knowledge."

- **Elizabeth Rose**, a self-learner from North Dakota, writes: "This is so overwhelming, I want to cry! I know OCW doesn't take the place of a degree, but what a great way for me to get used to formal learning materials again in hopes that I will be able to pursue graduate school. I have followed the progress of various Web projects for over 10 years, and your project is an outstanding example of the best the Web can offer educators and those seeking education."

- And **Coretta Jackson**, an MBA student from New Jersey, shares: "When I first came across MIT's OCW, I pinched my Web browser to check to see if it was functioning properly! The free platform of OCW is fostering a measure of educational parity in higher education by offering access to premium content and course materials otherwise reserved for MIT's full-time student population. I hope I live to see the day when every university will launch and promote its own version of OCW. I believe that by creating new avenues of OPENNESS to educational resources, we better prepare tomorrow's leaders, and greatly improve and encourage forward-focused collaborations."

This data and testimonials from real users of OpenCourseWare demonstrate that this initiative is attracting an increasingly global audience of self-learners, students and educators, including a core group of returning visitors each week. Self-learners and students are incorporating the site into their learning routines, as well as using the site to plan for future learning. Educators are employing the site to improve their own subject matter expertise, plan courses, and prepare teaching materials; nearly a third of educators have already adopted OpenCourseWare materials for use in their own teaching.

We know that high-quality educational materials and Web-based resources can be expensive to develop. When institutions share them openly on the Web through programs such as OpenCourseWare, there are savings to be realized across higher education. But it could be helpful in many other contexts, including the open publishing of technical education and re-training materials, and the open sharing of state-of-the-art K-12 curricular materials (as recommended in *Rising Above the Gathering Storm*).

Thus, I would offer two recommendations to this Commission:

1. **Launch an "OpenCourseWare for Secondary Education" Web site, focused on science, engineering and mathematics**, that would help close the achievement gap in science and engineering education in the United States that concerns us all. Let's assemble and provide open access to the best possible science and mathematics educational material, including iLabs and other educational innovations and resources, and let's add engineering content to secondary education to help motivate and stimulate science and mathematics education and fuel an innovation economy. Let's do so by creating a government/industry/educational partnership to develop and sustain such a project.

2. **Create incentives to catalyze the development of OpenCourseWare projects at universities and colleges across the United States, enabling the open sharing of educational materials from a variety of institutions, disciplines, and educational perspectives.** Imagine if your children and their teachers had a resource – similar to a Wikipedia Web site – that could serve as the first stop for the latest in teaching and learning materials. By providing leadership and modest seed money for pilot projects, this Commission could foster the creation of a network of opencoursewares at institutions across the United States, linked by a one-stop portal for American open educational resources. Such a portal could serve as the leading resource for teaching and learning, and would address issues of Accessibility, Affordability, and Accountability.

At MIT, we have demonstrated that the OpenCourseWare model is an affordable and accessible way to transform education, and our global audiences of users hold MIT accountable to create and share high-quality materials. And, judging by our experience working with and talking to users from around the world, we believe there are tremendous positive implications to open sharing of educational materials for the U.S. workforce.

So our challenge is simple: Can we leverage what is happening on our college campuses to benefit the lives of *ALL* Americans, and close the education gap that we are discussing here today? History has proven that education and discovery are best advanced when knowledge is shared openly, and the promise of OpenCourseWare is an opportunity that I would argue we should not miss.

Thank you for allowing me to contribute to this important conversation.