



Running AMOOC

Vinton G. Cerf • Google

It has become popular to explore the Internet's potential to change the face of education. Ever since my colleagues, Peter Norvig and Sebastian Thrun, launched an online course in artificial intelligence in partnership with Stanford University – to which 165,000 students worldwide enrolled¹ – the notion of massive online open courses (MOOCs) has become a new touchstone in educational evolution. New institutions are forming around this idea, such as the Khan Academy,² UDACITY (www.udacity.com), and Coursera (www.coursera.org), and others are sure to follow.

The basic idea raises many questions: What are the economics of this method of delivering education? What is the impact on traditional universities, colleges, and community or junior colleges? How might this affect or encourage continuing education? How should students receive credit and be evaluated? How will students learning via MOOCs perform as compared to those taking traditional courses? How will this change how faculty teach and interact with students? Will remote students cheat (any more than those in traditional courses)? How can we detect this?

Many additional questions no doubt remain. Here, I'd like to explore at least a few of the ones I've posed. To begin with, evidence exists of a reversal of classroom practice, at least at Stanford. Some faculty record lectures for the students to watch (as many times as they like) and reserve classroom time for interactive problem solving. This practice could scale through the use of teaching assistants local to students who might, themselves, be remote from the faculty lecturer. Stanford University used this practice in the 1970s when I was on the faculty. We recorded lectures and distributed the videotapes to remote locations where teaching assistants answered questions and ran problem labs on behalf of the lecturer.

The economics of MOOCs could be quite different from the traditional, multiyear degree program. Given potentially thousands of students per class, subscription prices could be relatively low while producing the same or more income as traditional tuition fees. We might even imagine giving away the lectures, but requiring payment for exams to establish academic credit for the class.³ In addition to the traditional student cohort, we can imagine professionals taking enhancement classes to maintain an edge in their disciplines. The so-called “lifelong learning” theory might be realized more effectively in the MOOC context than it has been through correspondence classes or televised lectures. Retirees might be another cohort at whom universities could aim such classes. Stanford President John Hennessy, a self-professed enthusiast for the MOOC movement, has suggested many interesting business models that might make MOOCs sustainable and a useful adjunct to traditional university practice.

A key element in making online learning effective seems to be frequent testing to determine whether students have understood the material. Some readers might recall the so-called TutorText of yesteryear, in which students went through the material in a nonlinear way, depending on their responses to the questions in the text. This style also keeps students engaged, rather than lulling them into unconsciousness with a boring lecture or textbook. Of course, the format is no guarantee that the lecturer or writer will be stimulating and entertaining. A MOOC can be just as uninteresting as an in-class lecture. This observation suggests that really good lectures and lecturers will be in demand and might command a substantial revenue stream. Student choice could increase, and classroom size might no longer be a limitation.

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Lecture times will be set by the student, not the lecturer, adding significant flexibility for students with families, full-time jobs, or other potential distractions. Norvig and Thrun reported that deadlines proved important to provide motivation to students to keep up with the course, balancing the potential for purely student-selected pacing.

The addition of collaboration tools to the Internet environment – for example, with the Google+ hangouts and shared documents – might allow fluid formation of study groups for some class types. Time zone considerations will still be an issue for the online population, but such collaboration frameworks accommodate a wide range of potential participants without much regard to geography. Study and discussion groups can meet in real time or possibly exchange discussion points through email lists or more structured interaction frameworks.

As online instruments, simulation tools, data mining, and presentation methods evolve, we can readily imagine “dry laboratories” in which some experiments are conducted in simulated space. Others might use remotely accumulated measurements and analysis tools to conduct research on data gathered by others. The possibility of replicating scientific results by re-analyzing earlier research data could accelerate the confirmation of theories or their refinement. Such notions quickly draw attention to the importance of archiving data, the metadata characterizing the conditions under which the data was collected, and the analytic tools and software employed to evaluate the information and reach conclusions. This very general form of archiving goes well beyond the traditional notion of libraries to include massive collections of data and software subject to the attention of specialized curators.

The development of the MOOC concept invites extrapolation to all aspects of learning and research. Although all such new notions are subject to hyperbolic anticipation, it seems to me worthwhile to strongly encourage exploration of these ideas in the expectation that the benefits of advanced education might become available, at reasonable cost, to a much larger audience than has heretofore been able to participate. □

Acknowledgments

Readers who have seen the film *Bicentennial Man* will recognize from the article title an amusing scene in which Robin Williams, playing an android robot, says “One is not qualified to run a muck,” in response to a concern expressed that he might run amuck! I’d also like to thank Stanford President John Hennessy for sharing some thoughts with me on the MOOC movement.

References

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