

## Six Easy Pieces of the Educational Innovation Puzzle

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To truly innovate in education, we need to admit that many of the most fundamental assumptions and traditions of schooling and academic education will no longer serve us in the century ahead. Most of us know this, but are afraid that we cannot find a workable alternative. We need to put aside this fear and begin to envision multiple alternatives. I offer here only six easily identified pieces of the innovation puzzle. Many more will be needed, and they can be combined to make many different pictures of a better future. What we must do is begin.

### 1. Age Mixing

Humans evolved to learn in mixed-age families, groups, and communities. It is artificial and dysfunctional to force people to learn in age-homogeneous groups. Both online and face-to-face modes of social learning need to find effective ways to combine the needs and talents of learners of a wide range of different ages, experience, and backgrounds. To begin with, the traditional distinction between secondary and tertiary education should be eliminated. There should be no barrier to entry into any course or program based only on age or grade-level.

### 2. MOOCs-and-More

Massively Open Online Courses (MOOCs) can give initial entry into the study of any topic or collaborative experience in online projects and problem-solving to people of the widest possible diversity of ages, experience, and backgrounds. MOOCs can greatly improve the quality of content-delivery and the diversity of potential course-peers. What they cannot do is substitute for life experience or high-quality, small-group interaction with peers and effective mentors. These components must be added to learning through MOOCs to provide effective education.

### 3. Scaling-up Mentoring

To bring effective education to large numbers of people globally, content-delivery platforms must be supplemented by adding to the mix of their associated online and face-to-face discussion groups several levels of mentors and tutors. At the first level, there will be peer students who are simply more experienced or better prepared for the course; they must be distributed among groups rather than cluster into groups of only such students. At the next level there need to be successful graduates of the course, brought back with added training in group facilitation, and appropriately rewarded for participation. Beyond this there need to be more senior and experienced mentors and tutors in large numbers who can be available online or face-to-face, and who can help

train other mentors. New mentors should initially be apprenticed to experienced ones.

Identifying and preparing such people should be a primary task of institutions such as colleges and universities and their successors. Research is needed to determine the most effective mix of mentors and new students.

#### 4. Achievement-based Credentialing

Discipline-based degrees, defined solely by academic coursework requirements should be replaced by credentialing systems which evaluate achievement portfolios of MOOC course successes, mentoring reputation, project-based learning, and life experience, relative to multiple alternative systems of publicly stated criteria; for example, systems relevant to employability for particular tasks and systems relevant to admission to special learning programs or advanced courses. Multiple credentialing plans may compete for reputation with various stakeholders.

In general, credentialing systems should assume that relatively few students will pursue only traditional discipline-based learning, and that most will follow individualized, project- and interest-based courses of study, mentoring, and experience. While discipline-specific courses may remain, discipline-specific degrees will be replaced by the new more flexible and broadly applicable credentials.

#### 5. Continuous Learning Opportunity

At any age students may attempt to succeed in MOOCs and repeat or extend their online learning experiences without limit until they succeed or stop. There should be no institutional barrier between secondary and tertiary education, and these categories will in time cease to be relevant. There should be no fixed number of years for completion of any curriculum of learning experiences; each student will complete in their own time, or not. Students may return to study at any point in life or change without penalty to a new interest or direction of learning. All MOOC-based learning will be free to all students in the world.

#### 6. Advanced Apprenticeship Learning

Credentialing systems should in general require non-coursework experiences such as internships, apprenticeships, practicum experiences and longer-term collaborative project completion for the award of significant credentials beyond those associated with individual courses. Advanced learning in many areas will require extended apprenticeships, some of which may occur in online communities, and others may require face-to-face participation. Among these will be interactions with very experienced and high-reputation mentors, such as current university research faculty, who should also be key participants in setting up and monitoring the quality of credentialing systems in their areas of expertise, along with experts from other domains of relevant activity.

These six pieces of the puzzle offer radical alternatives to our existing educational system. They envision an end to the separation between high school and college, the end to university degrees and multi-year degree programs and requirements, new roles for university faculty, and the off-loading of much introductory level instruction to MOOCs and mixed-experience online discussion groups. They propose an end to purely academic course-based education, with credentials requiring appropriate kinds of internship, apprenticeship, and other real-life experience. They foresee mixed-age social learning and project- and interest- based courses of study rather than discipline-based curricula. Secondary school teachers main responsibility will be as mentors to small-groups engaged in project-centered learning and as tutors for students whose backgrounds do not initially prepare them for entry to MOOCs. Credentialed teachers will be assisted by many other online mentors and older-age students.

What is today the norm in all these respects may survive, but as exceptional and specialized choices for a small minority.

These are big changes. They will not come quickly, though more quickly than we probably now believe. They have major implications for the financing of public education. With a commitment to free online education for all, globally, public policy will need to decide what additional components of learning needed for credentialing will be free for all, free for only those who meet stated credentialing standards, or partially subsidized. I believe that at least 2 years of the equivalent of today's advanced undergraduate education will be free to all citizens, with more advanced study free to those who qualify, at any age. In a global competition for talent and an innovation economy, governments which invest most heavily in both the education of their own talented citizens and the recruitment of talent from elsewhere will see the greatest rewards. Others will be forced to change their policies and regret not having done so sooner.

The six pieces of the educational innovation puzzle that I have sketched are easy only in the sense that it's easy to see that they are necessary. But they are by themselves far from sufficient to make a complete and viable picture. I have said nothing about pre-school or elementary school education, or how to meet the special needs of those students whose schools have entirely failed them. I have not described the future of research-intensive and mid-level universities public and private adequately to frame a new financing model for them. I have said very little about how the training and responsibilities of secondary school teachers will need to change, or how much of the face-to-face classroom component of secondary education should survive, if any. Informed and critical observers broadly agree that most classroom secondary education and most lecture-hall tertiary education are boring and inefficient as modes of content-delivery and an abject educational failure in providing deep understanding and meaningful experience with critical thinking. The world cannot afford to let that continue, and it will not.

