MOOCs: History, Hype and Reality

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Discussion roadmap

- Predicting the future
- Sociology and economics
- Technology mediated education and MOOCs
- A few thoughts on the issues
Not long ago ...

There were few or no experiences with...
- Web sites, email, spam, phishing, computer viruses
- e-commerce, digital photography or Internet telephony
- Streaming audio and video on mobile devices

HiFi was more common than 4G and Wi-Fi

Your phone did not answer questions

Books did not need batteries

A “friend” was someone you actually knew

The world is changing, and so are norms and behaviors ...
- ~5B mobile phones today and ~50B Interconnected devices by 2020
- Content of an academic library in the palm of your hand
Looking back ~50 years ...

The Civil Rights Act of 1964 was still in the future
• Ole Miss is integrated when James Meredith enrolls ...
  • … with support from federal marshals

Communications
• 90% of US households now own a television (almost all black and white)
• First live transatlantic television broadcast via Telstar

Average household costs and income
• Average income: $5,556
• New house $12,500 and new car $3,125
• Gasoline 28 cents/gallon

College tuition
• Harvard $1,520 per year
• Iowa $290 per year
The big questions don’t change ...

... but the approaches and answers do
Understanding the future

Some rules of thumb
• In the near term, we overestimate change
• In the long term, we underestimate change

Outside their field of expertise
• Experts are often better at predictions
  • The contra-Delphi effect

Sapir–Whorf Hypothesis (SWH)
• A language's nature influences the habitual thought of its speakers
• Widely debated and questioned, but drove investigation

Inventing the future is far more successful
• But, it is easier said than done
Educational sociology and economics

Major players in the higher education space
- For profit institutions
- Community colleges
- Public and private colleges and universities
  - Teaching and four year colleges
  - Research intensive universities

Diverse attributes of university education
- Socialization and networking
- Knowledge and skills transfer
- Certification and branding

College/university education is not just about marketable skills
- Important though those skills are
Different constituencies have different expectations
Educational sociology and economics

Rising earnings differentials
- Secondary school
- College/university
- Post-graduate education

College funding and costs
- Declining state investment (due to budget woes)
- Federal budget pressures (Pell grants and research funding)
- Increasing tuition and fees to offset budget reductions

As a result
- Overall student cost rising faster than inflation/CPI
- More students with part-time jobs and greater time to graduation
- Increasing student debt loads, dropouts and loan defaults
Rapid economic shifts
• Disruptions and globalization
• Structural unemployment
• Rapidly shifting skills requirements

Large wage and income disparities
• Economic premium on certain skills
• Many traditional “blue collar” jobs disappearing

Lifelong skills refresh
• New job skills required
• But not necessarily new degrees
• In situ, just in time delivery
Public research universities: punctuated equilibrium

Nine “Colonial Colleges”
Servicemen’s Readjustment Act of 1944 (GI Bill)
National Defense Education Act of 1958
Civil Rights Act of 1964

Morrill Act of 1862 (Land Grant Act)
Agricultural College Act of 1890 (HBCUs)
Smith-Lever Act of 1914 (Cooperative Extension)

1945-1950 Science: The Endless Frontier Federal Research Programs

Quo Vadis

Higher Education Act of 1965

Title IX 1972
Technology mediated education

It’s been around since civilization's beginnings
  • From cave painting and early writing

Long and rich history
  • Books and libraries
  • Correspondence courses
  • Radio broadcasts
  • Cable access television (CATV)
  • Computer assisted instruction (CAI)
    • University of Illinois PLATO (one of my personal favorites)
  • <MANY OTHERS>
  • Streaming, non-linear video
  • Games for learning
  • Massively open online courses (MOOCs)
University of Iowa educational TV

First to U.S. university to broadcast (1933)

University of Iowa’s radio and television stations WSUI and W9XK are now ready to present the first scheduled series of sight and sound educational programs ever given by an American university. This announcement was made by the department of electrical engineering last Friday. The first broadcasts will probably be made once a week between 7 and 7:30 p.m., exact evening to be determined upon later. Details of the broadcasts are now being arranged and it is expected that a regular schedule of illustrated lectures will commence next week. Illustrated lectures have been chosen for program material because they are adaptable to radio and television synchronization pictures being confined to small areas with details. March 16, 1933

Monticello Express (Monticello, IA)

http://blogs.smithsonianmag.com/paleofuture/2012/05/predictions-for-educational-tv-in-the-1930s
Art instructor Aden Arnold of the Plastic and Graphics Arts Department sketches a portrait during his lecture on W9XK television, University of Iowa, 1933
Programmed Logic for Automated Teaching Operations

- Begun in 1960, led by Don Bitzer
- Illinois classroom use until 1985
  - 10 million hours 1978-1985
  - Over 3 million hours in Notes
- Plasma touch panel displays

Early online community

- Forums, message boards, online testing
- e-mail, chat rooms, picture languages
- Instant messaging, remote screen sharing
- Multiplayer games

Lessons gave us

- Lotus Notes™ and Mosaic™
Challenges

- Equipment teething
- Material preparation time
- Non-standard hardware/software

PLATO IV System Progress
Report on Field Testing

by Eric Hinshelwood
National Science Foundation

Approximately two and one-half years ago, the Computer-based Education Research Laboratory (CERL) at the University of Illinois at Champaign-Urbana committed itself to preparing and conducting a large-scale field-test of the PLATO IV system of computer-aided instruction (CAI).

- Developing and integrating the hardware and software required to support roughly 1,000 PLATO panel consoles;
- Installing, operating, and maintaining a network of at least 500 PLATO panel consoles, in university, community college, and elementary school settings;
- Developing and operating CAI lessons (courseware) and educational programs (including software training, consultation, evaluation services, etc.) for instruction in elementary reading and mathematics, community college accounting, biology, chemistry, English, and mathematics, and university physics, chemistry, and foreign languages.

For this two-year period, the Federal government committed $5 M to these activities, the University of Illinois committed an equivalent amount, to pay for university lesson development and use on at least 200 of the proposed 500 consoles. The field-test, originally scheduled to begin in September of 1972, has been delayed by an independent trial involving 200 consoles at the University of Illinois at Urbana-Champaign in order to provide data concerning the processes, problems, and effects of developing and operating the PLATO system and courseware.

Much has been accomplished toward meeting these objectives,

- A sophisticated system of hardware and software (PLATO IV) has been implemented and operational to serve several hundred CAI consoles simultaneously. Performance data indicates that this system is capable of serving about 1,000 operating CAI consoles;
- A platoon panel console capable of providing extremely clear graphical displays using ordinary telephone lines has been perfected and placed into production. A network of roughly 300 platoon panels to each console has been installed and tested;
- Designers, programmers, and other CAI specialists have been organized into teams responsible for producing the courseware for the elementary and community college fields.

http://platohistory.org
Today’s technology enablers

Broadband penetration
• Ubiquitous, high-speed and low cost
• Steaming video capable

Consumer devices
• PCs, tablets and smartphones

Cloud and web services
• Service scalability and economics

Socialization and acceptance
• “Born digital” culture

http://www.broadbandmap.gov
Kahn Academy

Created by Salman Kahn
• Began to tutor his cousin

Format
• Brief YouTube videos
• Mixed illustrations
• Practice exercises
• Discussion forums

https://www.khanacademy.org
Massive open online course (MOOC)

Massive
- Tens to hundreds of thousands of students
- Geographically and temporally distributed

Open
- Typically free and open to all
- Come and go as desired

Online
- Electronically mediated and delivered
- Automated or peer grading
- Social networks and discussion groups

Course
- Content from art to zoology
- Certificates of completion, and sometimes credit
Current MOOC excitement

Born from a catalyzing event
- Sebastian Thrun & Peter Norvig’s Stanford AI course
- 160,000 students from 190 countries

Powerful social combination
- Thrun’s AI celebrity
  - DARPA Grand Challenge and Google driverless car
- Google connection (Thrun and Norvig)
- Stanford course
- Silicon Valley presence

Led to the founding of Udacity
Typical MOOC structure

Electronic registration
- Formal (credit) and informal

Video lectures (varying length)
- From traditional lectures to 3-7 minute chunks

Periodic assignments and assessments
- Knowledge verification

Social media for student interaction
- Facebook, Google+, Reddit

Automated assessment
- Computer grading of assignments

Varying recognition
- Certificates, badges, college credit ...

http://reediowamooc.appspot.com
Outgrowth of Thrun’s AI course
Certificates, testing certification and credit (San Jose State, ACE)
62 university partners, including Duke, Stanford, Michigan and Illinois Certificates and American Council on Education (ACE) credit evaluation
Coursera example: writing in the sciences

https://class.coursera.org/sciwrite-2012-001/class/index
Duke Coursera experience

What It Takes to Build a MOOC
Feb 19, 2013

MAKE-A-MOOC: What did it take for Duke University to build and deliver its first MOOC through Coursera? According to this report from the university: over 620 hours from the instructor, TA and support staff, 11.3 hours of finished videos, 18 graded exercises, 22 GB of data—and more. The eight-week Bioelectricity course, launched in September last year, saw over 12,000 students across over 100 countries enrolled—1/3 from the U.S. Unsurprisingly, only 346 attempted the final exam and 313 passed. However, the report dives deeper into the different motivations and participation levels among dropouts and those who earned a certificate. (One interesting barrier to student completion: "Making the leap from concept [videos] to application [exercises and quizzes].") And despite putting in more hours than they expected, the faculty found the experience generally positive. Phil Hill on e-Literate called this "the most thorough description I have yet seen from a university about their experience selecting, development, delivering and analyzing a MOOC."

Bioelectricity: A Quantitative Approach
Roger Barr

Nerves, the heart, and the brain are electrical. How do these things work? This course presents fundamental principles, described quantitatively.

Current Session:
Feb 4th 2013 (8 weeks long) Sign Up
Workload: 6.0 hours/week

About the Course
In this class you will learn how to think about electrically active tissue in terms of individual mechanisms, and you will learn to analyze the mechanisms quantitatively as well as describe them qualitatively. The course uses many of the same examples used by Hodgkin and Huxley, who won the Nobel Prize for their experimental

About the Instructor
Roger Barr
Duke University

Stanford Class2Go

Developed at Stanford
- Open source toolkit
- Now used for courses

Building blocks
- Piazza, YouTube, MySQL
- Python Django, Amazon AWS
- Opscode, Github
- Popcorn.js

Welcome to Class2Go! We're Stanford Online's internal platform, designed to be an open platform for online learning and research.

Coming Winter, 2013, free to the world:
- **Introduction to Databases** with Jennifer Widom

Fall 2012, we offered two free courses:
- **Computer Networking** with Nick McKeown & Philip Levis
- **Solar Cells, Fuel Cells, & Batteries** with Bruce Clemens

It's open.
The platform is open source so that anyone who wants to can collaborate with us. We would love to have others use the platform, or to work together with similar efforts in other places.

It's portable.
The platform is open source so that anyone who wants to can collaborate with us. We would love to have others use the platform, or to work together with similar efforts in other places. We believe strongly that valuable course content shouldn't be tied to any one platform. Documents are already portable: the videos are outside our control.
Google course builder anatomy

Course builder web site: http://code.google.com/p/course-builder/

Content
- Python 2.7
- YAML
- JavaScript
- Jingga2 Python template engine
- HTML+ cascading style sheets (css)

Software
- Google App Engine (GAE) PaaS
- Google App Engine Python SDK
- Google Apps
- YouTube
Dynamic web page anatomy

HTML defines content
CSS defines “look and feel”
JavaScript
  • Dynamically instantiates HTML content
  • Specifies “commands” to the browser
  • Reacts to conditions
YAML
  • URL mapping to request handlers and static files
Python
  • Request handlers

Background tutorials
  • http://www.w3schools.com (you can get a badge 😊)
  • https://developers.google.com/appengine/docs/python/config/appconfig
MOOCs: A College Education Online?

Although it has given rise to jokes about cows and an outfielder for the 1986 New York Mets, MOOC is actually an acronym for Massive Open Online Courses. Depending on whom you ask, they point the way to the future of higher education, the end of higher education as we know it, both, or neither.

Currently offered by several distinguished universities through consortia such as Coursera, edX, or Udacity, MOOCs are free online college courses, designed by academic rock stars and “attended” by hundreds of thousands of students from around the world. Colleges rarely grant academic credit for MOOCs. The reward for completion is the satisfaction of acquiring new or necessary information and skills, and connections with students who share your interest. In some cases, for a fee, students also may obtain a certificate or letter of completion.

Professor Leaves a MOOC in Mid-Course in Dispute Over Teaching

February 18, 2013, 4:58 am
By Steve Kolowich

Students regularly drop out of massive open online courses before they come to term. For a professor to drop out is less common.

But that is what happened on Saturday in “Microeconomics for Managers,” a MOOC offered by the University of California at Irvine through Coursera. Richard A. McKenzie, an emeritus professor of enterprise and society at the university’s business school, sent a
Expanding Pathways to MOOC Credit

February 7, 2013 - 3:00 am

by Doug Lederman

From the moment the American Council on Education announced in November that its College Credit Recommendation Service would assess the creditworthiness of a set of massive open online courses, there seemed to be little doubt that such approval would be forthcoming. And indeed, Coursera's announcement today that five of its courses have earned credit recommendations from ACE felt just a little bit anticlimactic.

But the decision -- the latest in a series of remarkably fast-unfolding developments around MOOCs in an industry that historically moves at a glacial pace -- nonetheless has significant implications that are likely to reverberate on campuses around the country.

It represents the initial clearing of what could be the widest pathway yet for students enrolled in MOOCs to cash in "certificates" earned from those courses for credits on college campuses. The credit recommendations for the courses could also create headaches for colleges, though, as they will almost certainly speed up the rate at which current college students ask their institutions for credit for free courses they've taken elsewhere.

Udacity, San Jose State University offer online classes for credit

In June 2012, Calif. Gov. Jerry Brown called Silicon Valley entrepreneur Sebastian Thrun asking for help. The result? San Jose State Plus, online courses for academic credit.
Disaggregating educational functions

Knowledge transfer
- Facts, context and information
- Processes and procedures

Certification and validation
- Grades and degrees

Socialization and acculturation
- Critical thinking and perspective
- Social networks and relationships

Publishing is already being disaggregated
- Review and editing
- Dissemination
- Archives
Network scaling and brand equity

Commodity courses
- Similar content everywhere
  - Chemistry 101, Western Civilization, ...
  - Human Anatomy, Quantum Chemistry, ...

Differences are primarily pedagogical
- Instructor style and quality
- Interactive or lecture

Commodities exist today
- Introductory textbook market
- Transfer credit for core courses

Potential buyer’s market
- Best purveyor wins

Specialty courses
- Unique or less common content
  - Papermaking, Creative Writing, ...

Often tied to institutional differences
- Faculty expertise and/or facilities
- Undergraduate (some cases)
- Graduate (more often)

Potential seller’s market
- Unique expertise and attributes
- Aggregation of global market
We don’t need no stinkin’ badges, or do we?

Badges are a certification mechanism
- “Proof” of knowledge and/or skills

Badges highlight separation of concerns
- Acquisition of knowledge/skills
- Validation of knowledge/skills possession

Each function can be provided by separate entities

Employers increasingly care about competence, not degrees
MOOCs: more than traditional degrees

Economic dislocation is accelerating
• Industries are reshaped frequently
• Jobs skills become obsolete quickly

Lifelong skills/knowledge refresh
• Just in time workforce education
• Knowledge certification, not degrees

Needs continuum
• General background remediation
• Domain-specific skills acquisition
We’re gonna need a bigger boat ...

Broader educational participation
Affordability and reduced costs
Rapid response to changing needs
Lifelong education support
Just-in-time learning/skills refresh
Public/private partnerships

... because societal expectations are shifting
Discussion