Wisdom is not the product of schooling but the lifelong attempt to acquire it.
- Albert Einstein

Massive, Open, Online Courses (MOOCs) as Components of Rich Landscapes of Learning

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Overview

- My Personal Beliefs and Background

- Rich Landscapes of Learning

- Massive, Open, Online Courses (MOOCs)

- Residential, Research-Based Universities

- Challenges for MOOCs

- Conclusions
Some of my Beliefs as a Teacher and Researcher

- fundamental design challenges
  - have to learn $\rightarrow$ want to learn
  - teacher, learner = f{person} $\rightarrow$ teacher, learner = f{context}

- schools are social constructs, not “god-given” entities

- teaching and learning are not inherently linked
  - there is a lot of learning without teaching
  - there is a lot of teaching without learning

- challenges created by MOOCs
  - commoditizing the ‘content’ sharpens the focus on the substantive values of residential education
  - my objective: to identify the core competencies of residential, research-based universities (e.g.: CU Boulder)
My Long Term Interests and Involvements

- **Human-Centered Computing** — empowering people to think, learn, work, and collaborate better

- **Digital Age and Digital Literacy** — will it cause the same fundamental change as the transition from oral to literate culture?

- **Learning about Computers** — support the objective of “disappearing computers” by bring tasks to the forefront (→ computer scientists)

- **Learning with Computers** — all human activities are media-dependent (→ learning scientists)
Two Basic Visions and Paradigms

<table>
<thead>
<tr>
<th>“computer teaches the learner”</th>
<th>“learner teaches the computer”</th>
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<tbody>
<tr>
<td>instructionism</td>
<td>constructionism</td>
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<tr>
<td>programmed instruction</td>
<td>programming (in LOGO), Scratch, Agentsheets, ……</td>
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<tr>
<td>B.F. Skinner, Patrick Suppes</td>
<td>Jean Piaget, Seymour Papert</td>
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<td>computer-assisted instruction (CAI)</td>
<td>programming environments</td>
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<td>intelligent tutoring systems (ITS); e.g.: PACT Center at CMU</td>
<td>interactive learning environments (ILE); e.g.: Scratch, Agentsheets,</td>
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<td>curricula, MOOCs</td>
<td>self-directed, problem-based learning, Maker cultures</td>
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My Background

- 1971: Diploma, High-School Teacher in Germany

- 1971-1973: Scholarships:
  - University of British Columbia, Vancouver
  - University of California, Irvine: *Digital Literacy for All (John Seely Brown)*


- 1978-1984: Assistant and Associate Professor, University of Stuttgart — Habilitation (Herbert Simon as Advisor): “Human-Computer Communication”

- 1984-2015: University of Colorado, Boulder
  - Computer Science and *Cognitive Science*
  - Center for *Lifelong Learning & Design (L3D)*
    - *Lifelong Learning* → Making Learning a Part of Life → Learning Sciences
    - *Design* → innovative media and socio-technical environments
Multi-Dimensional Aspects of Learning

why

who

beginner
intermediate
student
worker

what

core competencies
basic skills
powerful tools
personally meaningful topics

how

instructionist
problem-based
self-directed

where

formal institutions
informal environments

when

school
lifelong learning
on demand

multi-dimensional
aspects of learning

solve problems
pass a test
interest and passion

with whom

individual
communities
cultures of participation
Different Dimensions and Objectives Defining Rich Landscapes for Learning

- Learning about
- Learning to be
- Learning when the answer is known
- Learning when the answer is NOT known

- Formal (Schools) ↔ Informal (Learning Webs)
- Consumer Cultures ↔ Cultures of Participation
- Knowledge in the Head ↔ Knowledge in the World
- Supply ("Push") ↔ Demand ("Pull")

Massive Open Online Courses (MOOCs) ↔ Self-Directed, Design-Based, Active, Collaborative Learning (SDACL)

Rich Landscapes for Learning
Learning About versus Learning to Be

- **learning about:**
  - focused on the accumulation of intellectual capital realized in a curriculum
  - stresses the communication of culturally central theories, facts, and skills
  - **claim:** MOOCs can be effective and are often well suited for “learning about” (e.g., learners getting introduced to domains of knowledge that are new to them, e.g., Math 101, Physics 101, Design 101, etc.)

- **learning to be:**
  - not teaching about mathematics, physics, or design → but: what it means to be a mathematician, a physicist, a designer, a “Wikipedian,” a skier, or a surfer
  - putting students in touch with communities, not only with information
  - in our Center for Lifelong Learning & Design (L3D):
    - Undergraduate Research Apprenticeship Program
    - horizontal and vertical integration (Discovery Learning Initiative and Center)
Learning When the Answer is Known versus Learning When the Answer is Not Known

- **learning when the answer is known**
  - core challenge: learners should learn what the teacher knows
  - answers to the problems exists (this is the case for many problems in the *natural sciences*: physics, mathematics, ....)
  - the answer is known by the teacher

- **learning when the answer is not known**
  - core challenge: all participants engage in collaborative knowledge construction
  - a “correct, final answer” does not exist (this is the case for many problems in the *sciences of the artificial*: design, technology influenced disciplines such as Computer Science)
The Envisionment and Discovery Collaboratory (EDC)
Massive, Open, Online Courses (MOOCs)

- MOOCs:
  - Higher-Ed Courses with Massive Enrollments
  - Education for Everyone

- many of the reflections about MOOCs are based on
  - economic perspectives (scalability, productivity, being “free”)
  - technology perspectives (platforms supporting large number of students in online environments, enrichment components such as forums, peer-to-peer learning support, automatic grading, …….)

- my research objective: to create a learning science perspective
  - exploring rich landscapes of learning by putting MOOCs into a larger context with other approaches to learning and education
The **Promises** of MOOCs

- courses from the top universities
- for free
- learn from world-class professors
- watch high quality lectures
- achieve mastery via interactive exercises
- collaborate with a global community of students
The Major Providers

- **http://www.udacity.com/** — a teaching institution, not a research institution — a company formed by Stanford people (for-profit)

- **https://www.coursera.org/** — another company formed by Stanford people (for-profit)
  - 5,587,609 Courserians
  - 543 courses
  - 107 partners

- **https://www.edx.org/** — EdX is a joint partnership between: MIT, Harvard, UC Berkeley, and …………. (not-for-profit)

- **https://www.futurelearn.com/** — FutureLearn “Learning for Life” (UK)

- **https://iversity.org/** — Iversity (Germany Company)
The Hype: MOOCs will Revolutionize Higher Education

- edX: “most important educational technology in 200 years”

- John Hennessey (President, Stanford University): “there’s a tsunami coming”

- NY Times: “2012: the year of the MOOC”

- Scientific America: “Technology is remaking every aspect of education, bringing top-notch courses to the world's poorest citizens and reshaping the way all students learn” (http://www.scientificamerican.com/editorial/digital-education/)
The Underestimation of MOOCs

- **Vardi in CACM (2012):**
  - “the absence of serious pedagogy in MOOCs is rather striking, their essential feature being short, unsophisticated video chunks, interleaved with online quizzes, and accompanied by social networking.” ……..
  - “If I had my wish, I would wave a wand and make MOOCs disappear, but I am afraid that we have let the genie out of the bottle.”

- **Sebastian Thrun:** “Udacity’s courses are often a “lousy product.”
Michael Sandel (Harvard): “Justice”
http://www.justiceharvard.org/
Peter Norvig and Sebastian Thrun: “Intro to Artificial Intelligence — Learn the Fundamentals of AI”;
https://www.udacity.com/course/cs271
MOOC by Liz Bradley (CU Boulder): “Nonlinear Dynamics: Mathematical and Computational Approaches”

Participation (2,720 Students)
How Many Students Did I Teach in Courses during my Whole Career

- year of teaching: 35
- number of courses per year: 2
- average number of students in one course: 35

Total Number of Students: 2540
Contributions of MOOCs

- they generated a discussion transcending the narrow confines of academic circles by getting the world at large involved and excited

- they represent an innovative, new effort that is shaking up models of learning and learning institutions

- they might be able to force residential, research based universities to reflect and focus on their core competencies
MOOCs: Stuck in “Gift-Wrapping” or Beyond “Gift-Wrapping”

- **stuck** in “gift-wrapping”
  - the same courses taught over the Internet that are taught in residential universities?
  - “moocifying courses” — the underlying rationale: every first generation technology is a copy of the old medium

- **beyond** “gift-wrapping” to co-evolution:
  - “distance learning is different from classroom learning at a distance”
  - MOOCs = text book of the 21st century
  - MOOCs = support “flipped classroom” approaches
Co-Evolution between Learning, New Media, and New Learning Organizations

- learning, working and collaboration
- new learning organizations
- new media and new technologies
Open Issues and Questions

- what kind of different MOOCs exist?
  - cMOOCs (c=connectionist)
  - xMOOCs (x=extended)
  - SPOCs = Self-Paced Open Courses
  - nanodegree programs (Udacity)
  - Minerva University = global cultural immersion (https://minerva.kgi.edu/)

- how interactive are MOOCs?

- for which type of learning are MOOCs a good fit?

- why are MOOCs (or at least some of them) successful and what does success mean?

- how are the participants certified / credentialed?

- will MOOCs eventually make lectures obsolete?
Data about MOOCs

source: http://ideas.ted.com/2014/01/29/moocs-by-the-numbers-where-are-we-now/
A Claim

teaching a class in a residential university with more than 100, 150 or 200 students is not fundamentally different from a MOOC

- **yes — it is different:**
  - students come together in a classroom – they see each other
  - teacher sees the students — senses their engagement level
  - while not every student can ask a question → some students can
  - for the instructor:
    - there are learning opportunities
    - it provides a nicer atmosphere than sitting in a room by herself

- **no — it is not different:**
  - a large class remains mostly instructionist
  - most students will not have an opportunity to ask a question
  - large classes are taught in physically designed instructionist classrooms
Core Competencies (CCs) of Residential, Research-Based Universities

- CC-1: Allowing and motivating learners to engage in authentic, self-directed learning activities
- CC-2: Supporting Active Knowledge Construction
- CC-3: Fostering Enculturation
- CC-4: Framing Problems
- CC-5: Coping with Wicked, Ill-Defined Problems
- CC-6: Grounding Learning in a Distributed Cognition Perspective
- CC-7: Emphasizing Collaborative Learning and Communication Skills
- CC-8: Giving Degrees
- CC-9: Creating Lifelong Relationships between Institutions and Learners
L3D’s Research Agenda to Focus on the Core Competencies of Residential, Research-Based Universities

- **Cultures of Participation** — migrating from passive consumers to active contributors

- **Meta-Design** — fostering and supporting active knowledge construction; transcending the information given

- **Learning-on-Demand** — allowing and motivating learners to engage in authentic, self-directed learning activities

- **Collaborative Design** — “learning when the answer is not known” and transcending the individual human mind

- **Transdisciplinary Collaboration** — to cope with systemic problems

- **Courses-as Seeds** — “flipped classroom”, student as active contributors, peer-to-peer learning, peer assessment, self assessment

- **Undergraduate Research Apprenticeship** — “learning to be”; vertical integration, horizontal integration, fostering enculturation
Challenge for MOOCs — Local versus Global: The Relevance of Culturally Embedded Knowledge

- courses reaching beyond the borders of individual countries need to explore: how to establish **common ground** and **shared understanding** and how to take locally relevant issues, needs, and understanding into account

- example: in a MOOC about energy sustainability → analyzing and comparing the gas consumption of cars
  - USA
    - miles for distance
    - gallons for gas
    - conceptualization: “a car goes 30 miles per gallon” (fixed amount of gas)
  - Germany
    - kilometers for distance
    - liters for gas
    - conceptualization: “a car needs 7 liters per 100km” (fixed distance)
Challenge for MOOCs — Being “Free”

“If you think education is expensive, try ignorance” — Derek Bok (former president of Harvard University)

- **Fact:** education is not free in any society.

- **potential business models for MOOCs:**
  - **certification** (students pay for a badge or certificate)
  - **secure assessments** — students pay to have their examinations proctored (Coursera’s Signature Track)
  - **employee recruitment** — companies pay for access to student performance records
  - **human tutoring** and/or **grading** (students pay)
  - **selling a MOOC platform** to other companies
  - **sponsorships** (3rd party sponsors of courses)
  - **tuition fees** (Georgia Tech’s Master Degree delivered with MOOCs)

- **example** — “How much does it cost to enroll in a Udacity course?”
  - All Udacity courses give you free access to our courseware, but for a select number of courses you can enroll in the full course experience. This gives you access to projects, code-review and feedback, a personal coach, and verified certificates.
Universities: Finding their own Ways

- universities world-wide (administrations, faculty, and supporting organizations) are paying close attention to MOOC developments → they try to establish their own course of action by choosing between the strategies:
  - to calculate the risks of different possible actions
  - the risks of doing nothing
  - many institutions establish MOOCs without exactly knowing why they are doing it (driven by a “me too” mindset)

- Georgia Institute of Technology (in collaboration with Udacity) will offer Master Degrees in Computer Science
  - delivered with MOOCs costing students $6,600
  - regular campus courses costing students $45,000
Universities: Finding their own Ways

- **Amherst College: saying “no” to an edX invitation**
  - not for financial reasons
  - but because of “a number of philosophical qualms. MOOCs run counter to Amherst's commitment to learning through close teachers/students interaction”
  - their belief: MOOCs might perpetuate the “information dispensing model of teaching"

- **San Jose State University: rejection of the integration of an existing edX course by Michael Sandel into their curriculum**
  - the course "Justice" has enrolled more than 15,000 Harvard students
Arguments for the Rejection of Michael Sandel’s Course by the San Jose State Philosophy Department


- "In spite of our admiration for your ability to lecture in such an engaging way to such a large audience, we believe that having a scholar teach and engage with his or her own students is far superior to having those students watch a video of another scholar engaging his or her students."
  - comment: an argument why face-to-face interaction and personal relationships are important

- A social justice course needs to be current since part of its mission is the application of conceptions of justice to existing social issues. In addition to providing students with an opportunity to engage with active scholars, expertise in the physical classroom, sensitivity to its diversity, and familiarity with one's own students are simply not available in a one-size-fits-all blended course produced by an outside vendor.
  - comment: an argument that diversity will be lost if a “standard” (high-quality) course eliminates courses that take local issues into account
MOOCs in the Context of Open, Online Learning Environments
Conclusion

- the future of learning and education in the 21st century is not out there to be discovered — it has to be invented and designed → questions:
  - by pursuing which objectives?
  - by whom?
    - by them? — billionaires and venture capitalists in Silicon Valley
    - by us? — faculty members and researchers in learning science
    - by you? — the PhD students of today and the learning scientists of tomorrow

- the major challenge for the Learning Sciences in the years to come:

  explore, nurture, and support rich landscapes of learning
More Information


- Fischer, G. (2014) "Beyond Hype and Underestimation: Identifying Research Challenges for the Future of MOOCs," Distance Education Journal (Commentary for a Special Issue “MOOCS: Emerging Research”), 35(2), pp. 149-158
Welcome to OnlineConversion.com
Fuel Consumption Conversion

Convert what quantity? 7

<table>
<thead>
<tr>
<th>From:</th>
<th>To:</th>
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<td>liters/100 km</td>
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</tr>
<tr>
<td>miles/gallon(US)</td>
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<td>km/gallon(US)</td>
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<td>km/gallon(UK)</td>
<td>km/gallon(UK)</td>
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<tr>
<td>miles/liter</td>
<td>miles/liter</td>
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7 liters/100 km = 33.6020833 miles/gallon(US)