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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NAPLes Webinar, March 16, 2015

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 → **want** to learn
  - teacher, learner = **f{person}** → 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

"computer teaches the learner"	"learner teaches the computer"
instructionism	constructionism
programmed instruction	programming (in LOGO), Scratch, Agentsheets, …….)
B.F. Skinner, Patrick Suppes	Jean Piaget, Seymour Papert
computer-assisted instruction (CAI)	programming environments
intelligent tutoring systems (ITS); e.g.: PACT Center at CMU	interactive learning environments (ILE); e.g.: Scratch, Agentsheets,
curricula, MOOCs	self-directed, problem-based learning, Maker cultures

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)

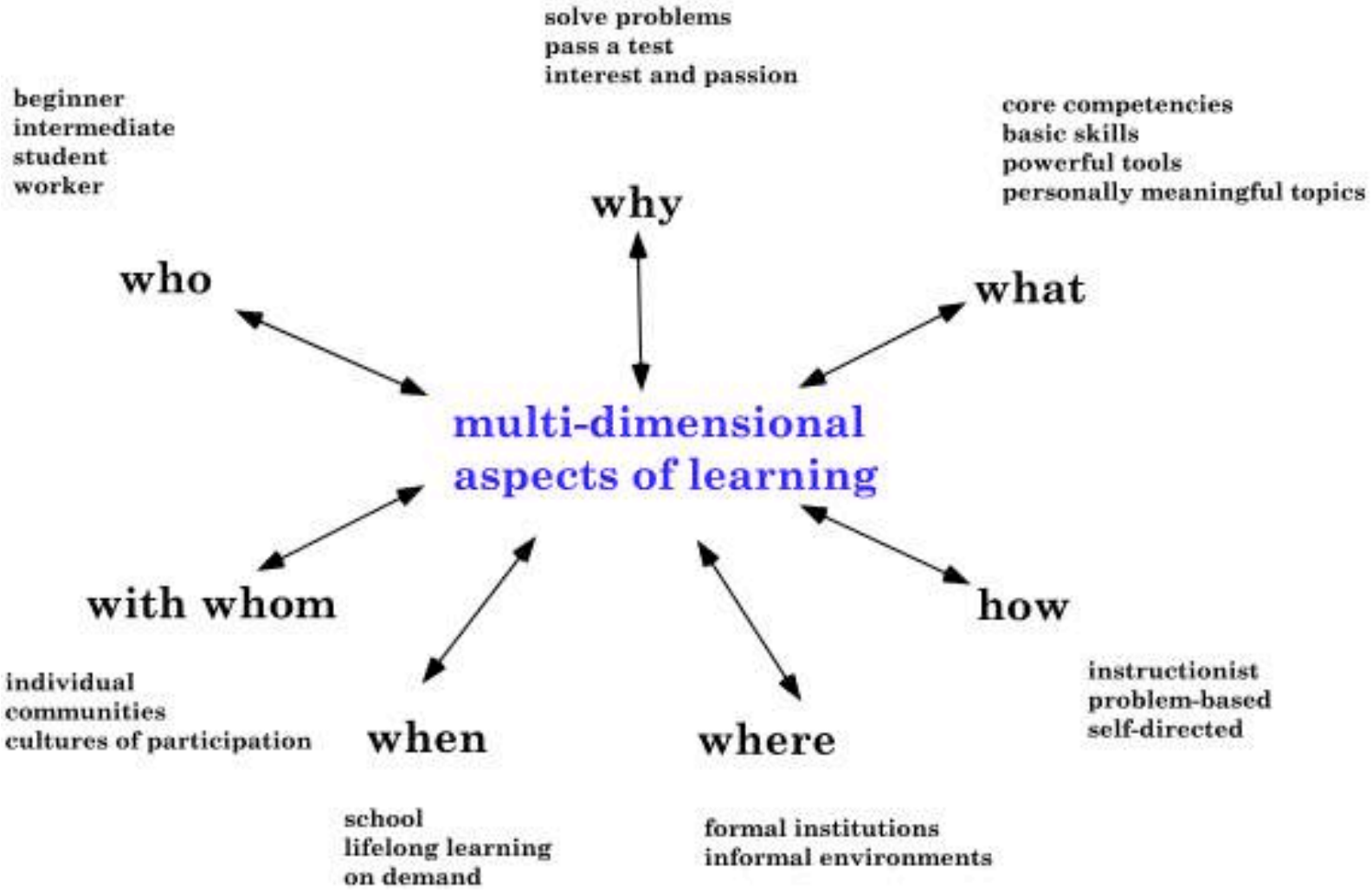
- 1974-1977: Research Institute for Educational Technology, Darmstadt — PhD: "Learners Solving Complex Problems with Interactive Programming"

- 1977-1978: Post-Doc: MIT and Xerox-Parc — Learning by Doing (Seymour Papert, Alan Kay)

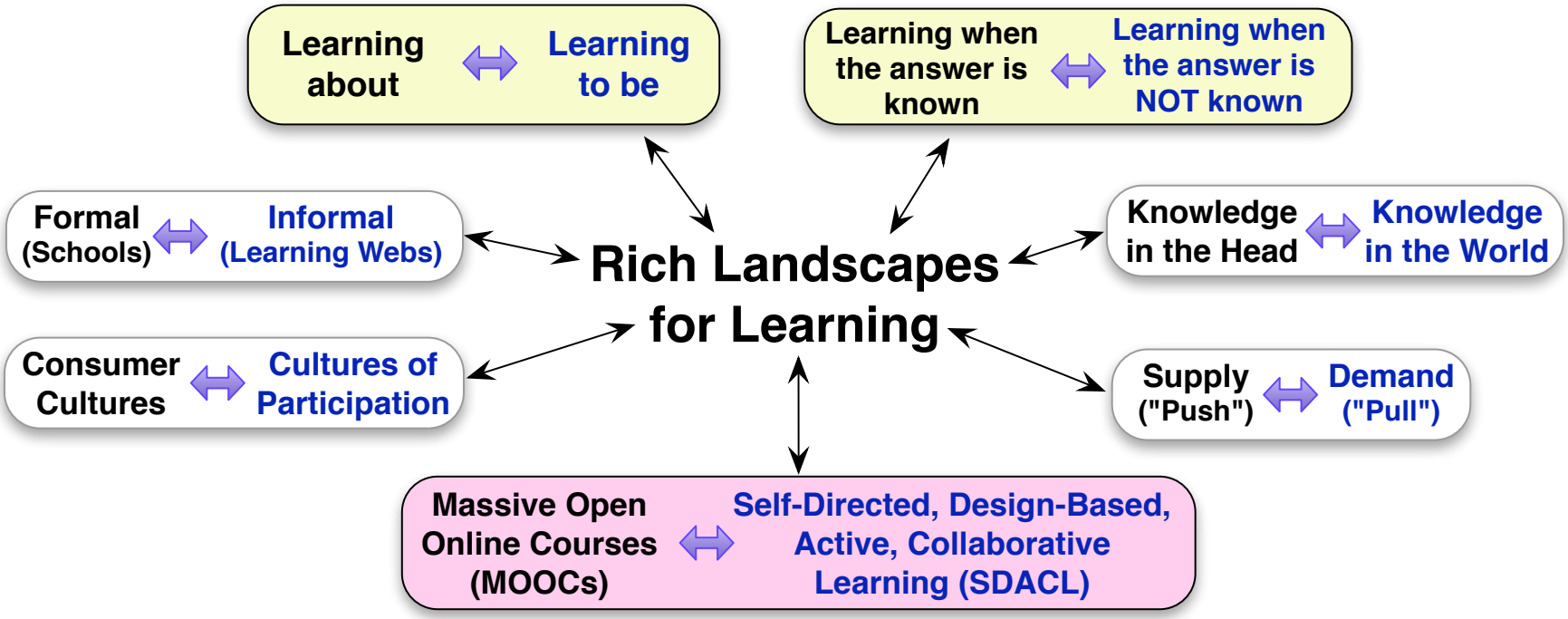
- 1978-1984: Assistant and Associate Professor, University of Stuttgart — Habilitation (Herbert Simon as Advisor): "Human-Computer Communication"

- 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



Different Dimensions and Objectives Defining 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."*

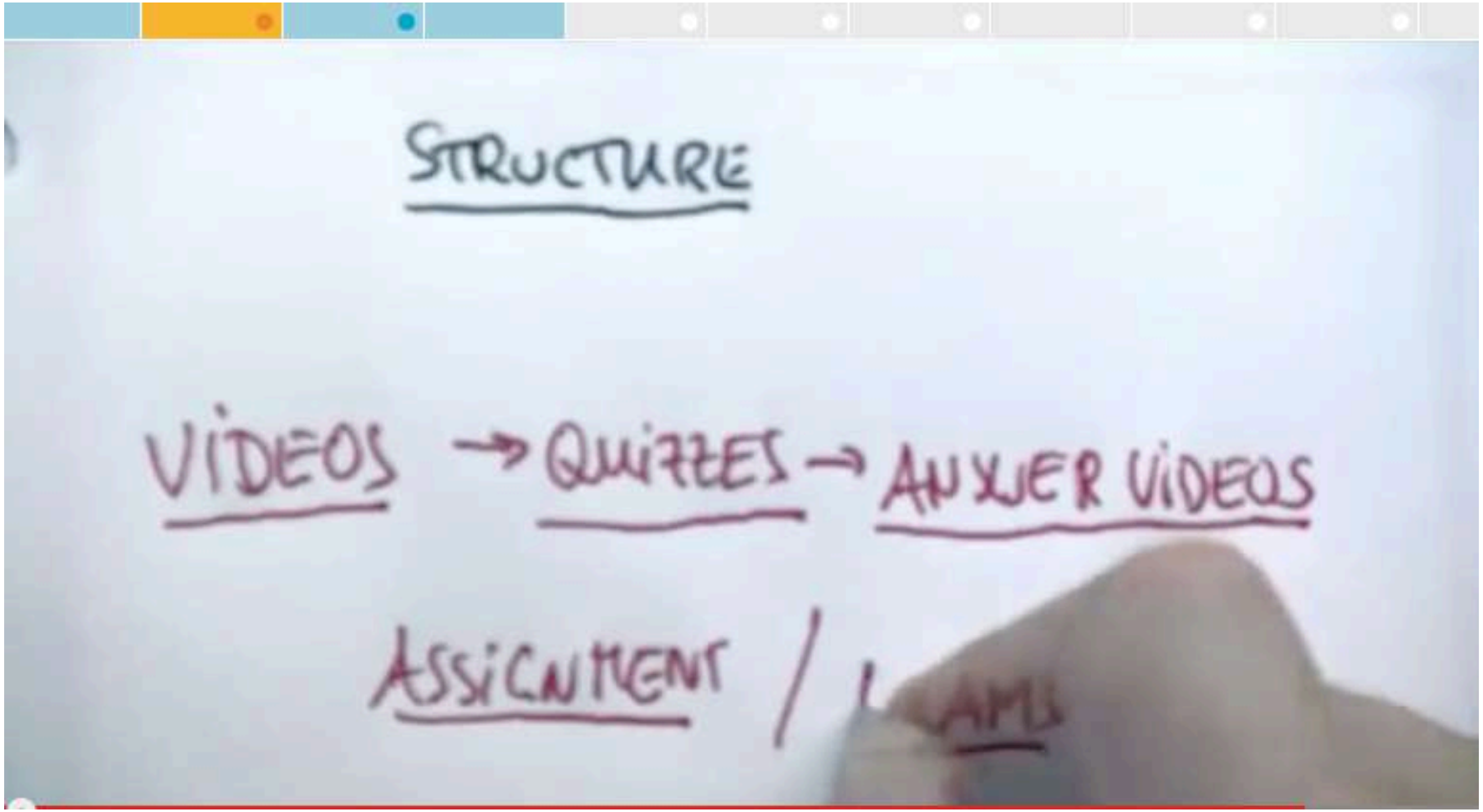
- **Sebastian Thrun:** *"Udacity's courses are often a "lousy product."*
  - *"Udacity's Sebastian Thrun, Godfather Of Free Online Education, Changes Course" — http://www.fastcompany.com/3021473/udacity-sebastian-thrun-uphill-climb*
  - *"The King of MOOCs Abdicates the Thron: Sebastian Thrun and Udacity's "pivot" toward corporate training" – http://www.slate.com/articles/life/education/2013/11/sebastian_thrun_and_udacity_distance_learning_is_unsuccessful_for_most_students.html*

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**

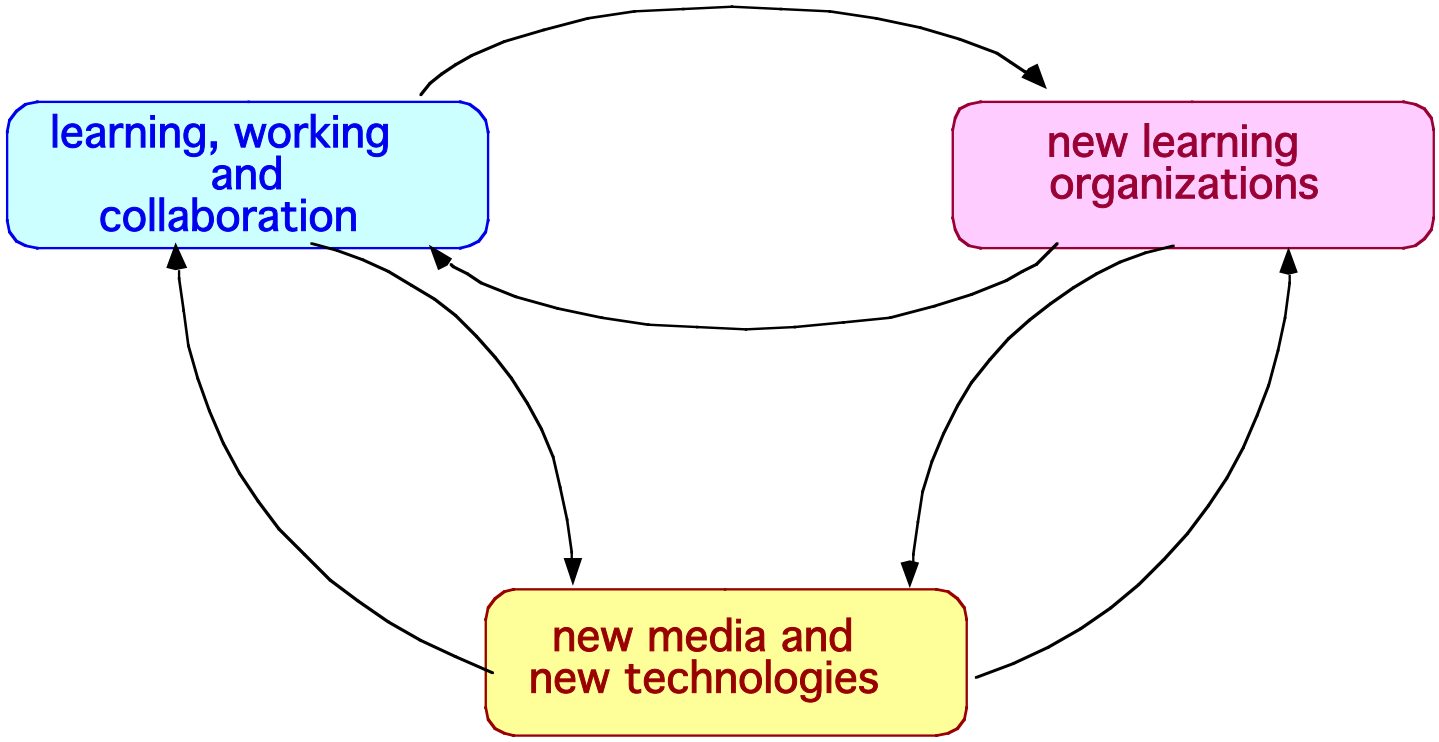
- they might be able to force residential, research based universities to reflect and focus on their **core competencies**

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

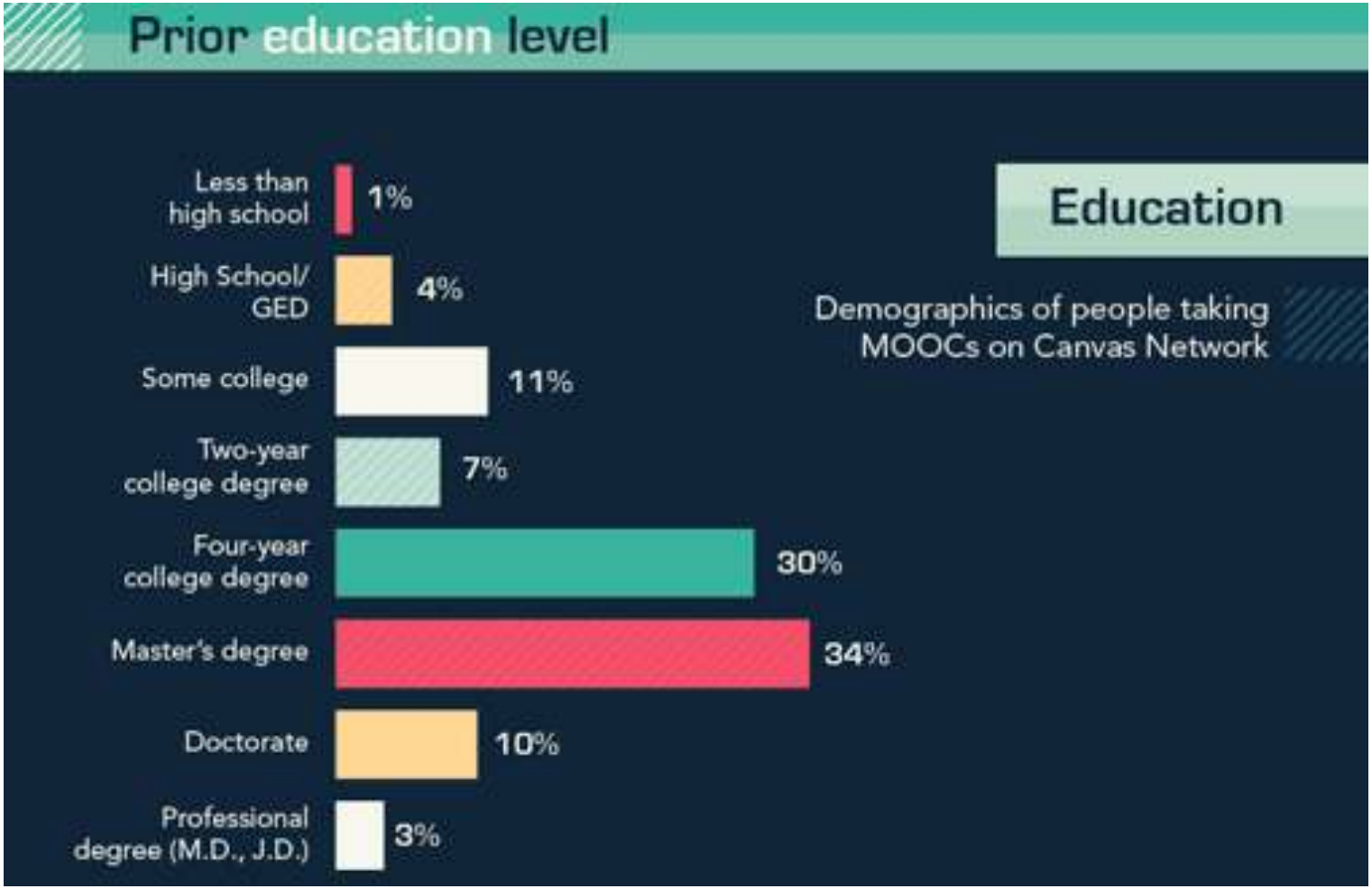


Open Issues and Questions

- **what kind of different MOOCs exist?**
  - cMOOCs (**c**=**c**onnectionist)
  - xMOOCs (**x**=e**X**tended)
  - SPOCs = **S**elf-**P**aced **O**pen **C**ourses
  - 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. **Basic Services**

- **potential business models for MOOCs:** **Premium Services**
  - **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**
  - Sandel, M. J. (2009) *"Justice — What's the Right Thing to Do?"*
  - Sandel, M. J. (2012) *"What Money Can't Buy: The Moral Limits of Markets"*
  - the course "Justice" has enrolled more than 15,000 Harvard students

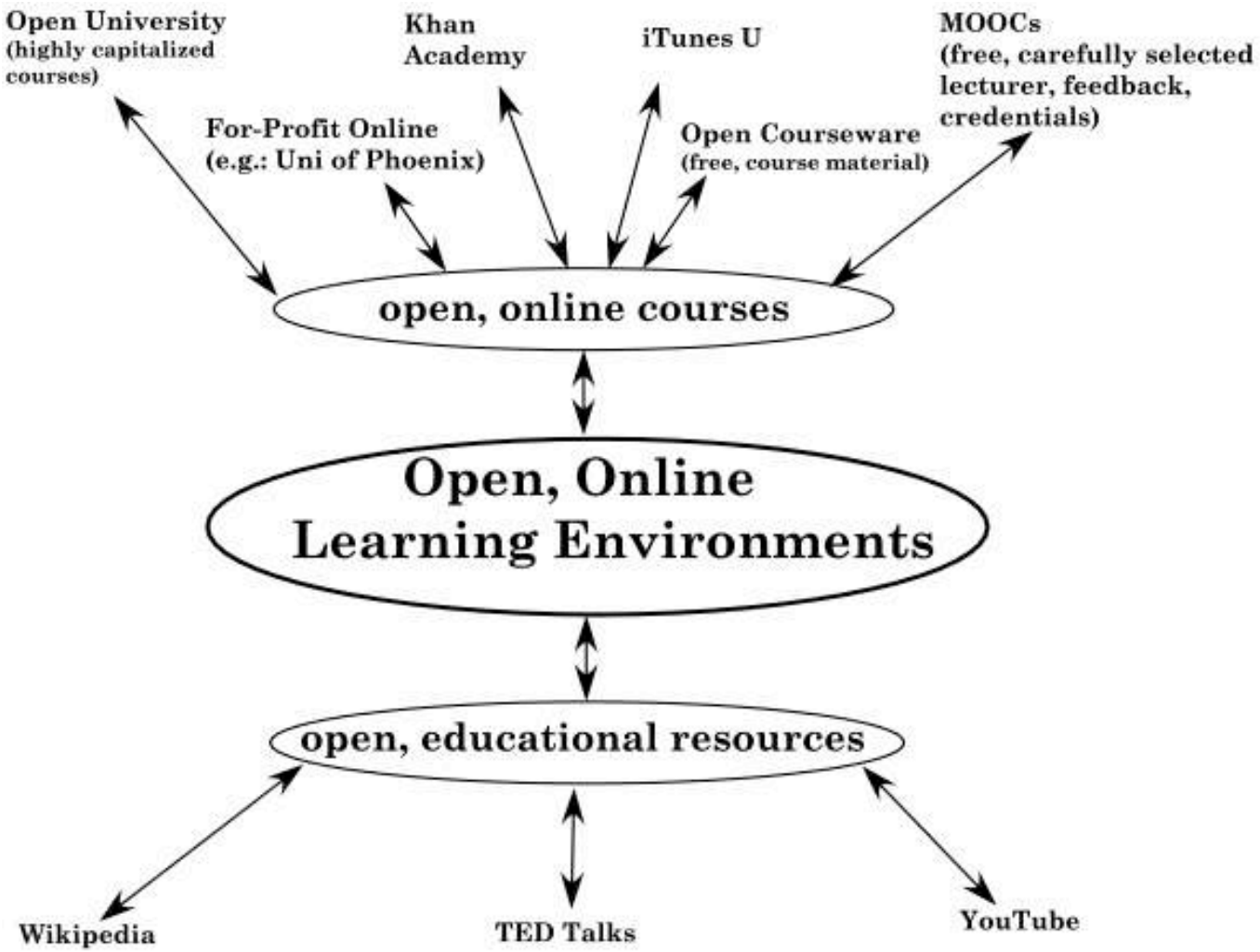
Arguments for the Rejection of Michael Sandel's Course by the San Jose State Philosophy Department

http://chronicle.com/article/The-Document-an-Open-Letter/138937/

- *"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) "Promises, Limitations and Synergies of Rich Learning Landscapes—Exploring Frames of Reference for MOOCs"* *http://l3d.cs.colorado.edu/~gerhard/reports/moocs-draft2013.pdf*

- *Eisenberg, M. & Fischer, G. (2014) "MOOCs: A Perspective from the Learning Sciences" in J. L. Polman et al. (Eds.), Learning and Becoming in Practice: 11th International Conference of the Learning Sciences (ICLS) 2014, Boulder, pp. 190-197.* *http://l3d.cs.colorado.edu/~gerhard/papers/2014/ICLS-MOOCS.pdf.*

- *Siemens, G., Dillenbourg, P., Fischer, G., McNamara, D., & Rummel, N. (2014) "Where Are the Learning Sciences in the MOOC Debate?," ICLS Conference 2014 (University of Colorado Boulder), June 23-27, 2014, pp. 15-17.* *http://l3d.cs.colorado.edu/~gerhard/papers/2014/ICLS-panel.pdf*

- *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* *http://l3d.cs.colorado.edu/~gerhard/papers/2014/distance-ed-journal.pdf*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