Human Sciences and Technologies Advanced Research Institute STANFORD UNIVERSITY

From Knols to Virtual Worlds: Trends, Challenges and Opportunities for Innovation in Higher Education

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Outline

1. What are the key trends in HE?

2. What are the main challenges for innovation in HE?

3. What new technologies are likely to influence the most the HE?

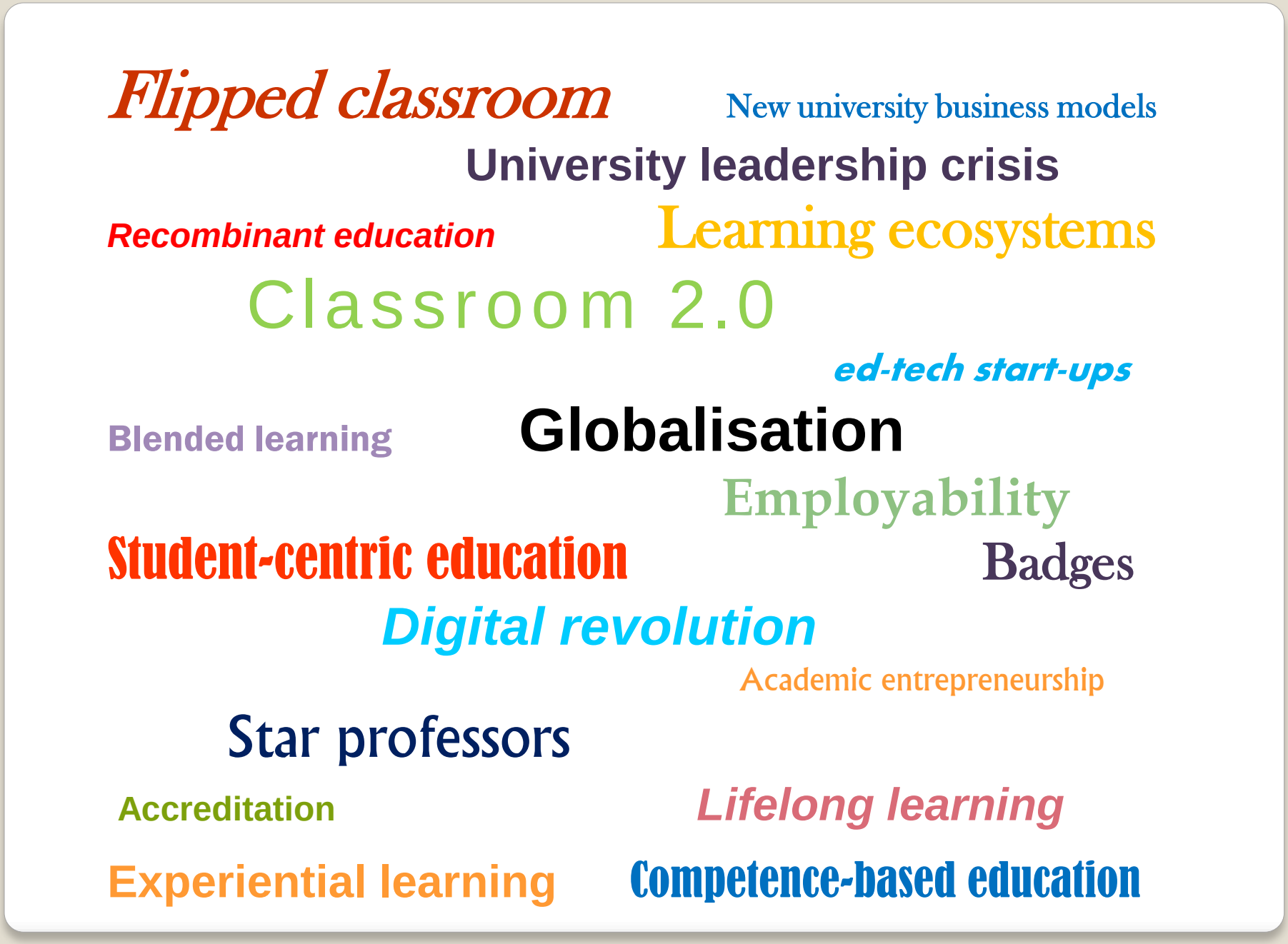
4. How does innovation diffuse in a HE system?

5. What opportunities lie ahead for innovation in HE?

Background:

- *'Innovation in Higher Education'* project for the European Commission, DG Education and Culture (2013)

- *NMC Horizon Report: 2013 Higher Education Edition,* New Media Consortium (NMC) and the EDUCAUSE Learning Initiative (ELI), an EDUCAUSE Programme http://www.nmc.org/publications/2013-horizon-report-higher-ed


Flipped classroom
New university business models
University leadership crisis
Recombinant education
Learning ecosystems
Classroom 2.0
ed-tech start-ups
Blended learning
Globalisation
Employability
Student-centric education
Badges
Digital revolution
Academic entrepreneurship
Star professors
Accreditation
Lifelong learning
Experiential learning
Competence-based education

Digital technologies are dramatically changing the HE landscape

How did it all start? Where is it going?

2009

KHAN ACADEMY

2011

mozilla OpenBadges

2012

UDACITY

coursera

mITx WHAT'S NEXT.

2013

MOOC expansion

“There’s a tsunami coming.”

John Hennessy, Stanford President

Key Trends in Higher Education

1. Openness

- Open content, open data, open resources
- Transparency, easy access to data and information
- New forms of validation to generate meaning in information and media.
- “Open” as free, copyable, remixable, no barriers to access or interaction.

2. MOOCs

- Widely explored as alternatives and supplements to traditional university courses.
- Alternative to credit-based instruction, while some forms of credit also sought (e.g. Coursera)

3. Informal learning

- High demand of skills (e.g. communication, critical thinking) that are often acquired by college graduates from informal learning, rather than in universities.
- Combination of formal and informal learning: traditional assignments + open-ended, unstructured time (experiment, play, explore)

Key Trends in Higher Education (cont.)

4. Learning analytics

- Using new data sources for personalizing the learning experience and for performance measurement
- Real time monitoring of student progress and use of university resources (classrooms, teachers, courses)

5. Changing role of educators

- Vast resources accessible to students via Internet
- Students engage in more informal learning outside the classroom through online devices
- University teachers need to provide content guidance, mentorship and effective tools to navigate students' areas of study.

6. Education paradigm shift

- **Online learning**: increased collaboration, stronger digital skills for students, new teaching formats
- **Hybrid face-to-face / online models**: new student time allocation between campus and network
- Institutions embracing hybrid models can leverage the online skills that learners have already developed independent of academia.

Challenges

1. Insufficient digital media literacy in faculty training as a key skill in every discipline and profession

- Digital media literacy training rare in teacher education, non-existent in faculty training.
- Sometimes offset through professional development or informal learning, but far from being a norm.
- Digital literacy is less about tools and more about thinking → skills and standards based on tools and platforms have proven ephemeral.

2. Emergence of new scholarly forms of authoring, publishing, and researching

- New forms of peer review and approval of research that is disseminated or conducted via social media (e.g. reader ratings, inclusion in and mention by influential blogs, tagging, incoming links, and re-tweeting) can replace traditional scholarly evaluation (citations)
- New forms not yet well understood by mainstream faculty, academic decision-makers, gap between what is possible and what is acceptable.

Challenges (cont.)

3. Broader uptake of new technologies often limited by education's own processes and practices

- Experimentation or innovative applications of technologies often met with resistance, sometimes because of comfort with the status quo, other times (e.g. promotion and tenure reviews) seen as outside the role of researcher or scientist.
- Need for major shifts in attitudes, as well as in policy

4. Demand for personalized learning not adequately supported by current technology or practices

- One-size-fits-all teaching not effective, nor acceptable for today's diverse body of students
- Increasing demand for personalised education, more learner choices, differentiated instruction, individual choices of access to materials and expertise, amount and type of educational content, methods of teaching.
- Novelty/early stage of use of scientific, data-driven approaches hinders personalization (e.g. learning analytics still in the early days in HE).

Challenges (cont.)

5. Unprecedented competition to traditional models of higher education brought about by the new models

- New education models sought to provide high quality of service and more learning opportunities
- MOOCs as prime vehicle for supplementing traditional education at brick-and-mortar institutions with rich, often free, online courses
- Need to evaluate new models and determine how to best support interaction, collaboration and assessment, engage students on a deeper level.

6. Most academics are not using new technologies for learning and teaching, nor for organizing own research

- No training in basic digitally teaching techniques, no participation in professional development opportunities that would provide these techniques
- Lack of time, lack of expectation that they should, apprehension about working with new technologies, fear the tools and devices have become more of a focus than the learning itself
- Cultural shift required, change in attitude among academics

Key technologies and likely timeframe for entry into the mainstream

Near-term horizon (next 12 months)	• MOOCs • Tablet computing
Mid-term horizon (2-3 years)	• Games and gamification • Learning analytics
Far-term horizon (4-5 years)	• 3D printing • Wearable technology

Near-term horizon: MOOCs

• 2012: Coursera, Udacity (Stanford), edX (MIT, Harvard) – aim to provide high quality education, free or at low cost, to large numbers of students all over the world

• Rapid expansion, multitude of emerging pedagogies and tools (e.g. blended learning, open educational resources)

• Draw upon cloud-based services (e.g. WikiSpaces, YouTube, Google Hangouts) to foster discussions, create and share videos, engage in modern online learning.

• Similar pedagogical approaches (mastery learning, high interactivity, peer assessment, peer learning)

• Sticky points:
  - *Regulatory context,* esp. IPRs and legislation encouraging HEIs to adopt MOOCs
  - *High attrition rate (approx. 85%)*
  - *Accreditation* – early days (Coursera, Udacity)
  - *Better understanding of who the MOOC students are, what their goals are*
  - *Impact on the labour market – recognition by employers*
  - *Rise of the 'star professor' and impact on academic incentives, competition*

See EC Report 'Innovation in Higher Education' for further details on MOOCs

Near-term horizon: Tablet computing

- 2010: huge success of Apple's iPad, soon followed by other manufacturers

- Tablets are popular and powerful tools in HE due to apps extending functionality

- Rising popularity in HE partly due to BYOD (bring your own device) – students' use of tablets in class, access textbooks and other course materials, choose apps for a personalized learning environment, all resources on one device.

- Productivity apps (Cheddar, TagMyDoc, Dropbox, etc.) enable learners to take and share notes, create to-do lists, store files, organize academic schedules.

- iBooks Author helps universities design strategies for textbooks and reading assignments

- Many universities now have own branded tablet app that integrates campus maps, access to grades, university news, etc.

- iTunes and Android apps essential to recruiting, student orientation

• I Tunes U catalogues incorporated in the app, easy to download video lectures and other course materials

• Many HEIs offer courses for tablet content development, in view of imminent widespread adoption of tablets

• Mobile apps tightly integrated with social networks, making tablets effective tools for students collaborating and sharing (e.g. Evernote).

• Educators use Edmodo's app to communicate with students about assignments and schedule updates

• Tablets used in fieldwork due to portability, large display, and Touchscreen

• One-to-one pilot programmes providing every student on campus (or those enrolled in a specific programme) with own tablet, pre-loaded with course materials, digital textbooks, other helpful resources.

• Tablets give traction to other educational technologies — from real-time data mining for learning analytics to game-based learning apps.

•Transitioning to tablets relatively painless for students

• Incorporation into coursework sought to maximize the potential of tablets in HE

Mid-term horizon: Games and gamification

• Gaming expanded beyond integrating digital and online games into the curriculum - use of gaming elements (points, levels and badges) to engage with learning

• Video games help stimulate the production of dopamine that stimulates learning by reinforcing neuronal connections and communications.

• Educational games proven to increase soft skills in learners (e.g. critical thinking, creative problem-solving, and teamwork

• By exploring the way people engage with games (behaviour, mindset, motivations), researchers design adaptive games and effective game frameworks that transform learning experiences.

• Game-like simulations in any discipline to reinforce students' critical thinking to solve problems and real world applications of concepts (e.g. "10 Downing Street" at the IE Business School in Madrid)

- **Badging - Mozilla Foundation's Open Badges project** (Sept 2011) (http://openbadges.org/)

• Badges adopted by Purdue (Passport and Passport Profile), Carnegie Mellon, University of California, the Smithsonian, Intel, Disney-Pixar.

• Degrees and certificates often do a poor job of communicating detailed information about graduates' knowledge and skills to potential employers. A badge indicates specific knowledge and skills → challenge traditional diplomas

> •Jeffrey Young, 'Badges' Earned Online Pose Challenge to Traditional College Diploma, *The Chronicle of Higher Education*, Jan 8, 2012. http://chronicle.com/article/Badges-Earned-Online-Pose/130241/

• Is gamified learning merely a trend, or can it become a real game-changer?

• More universities partnering with game design organizations and companies to develop and integrate games relevant to the curriculum and to students' lives.

Mid-term horizon: Learning Analytics (LA)

- LA uses student-related data to build better pedagogies, target at-risk students, assess effectiveness of retention-improving programmes.

- Multiple benefits and relevance:
  - Educators and researchers gain insights on student interaction with online texts and courseware
  - Students benefit from new mobile software and online platforms that suit their learning needs, real-time progress monitoring, more engagement in course material.
  - University administrators, policy-makers – better admin, new regulations

Examples:

- Purdue University (US): Course Signals for improving student success in class
- University of Derby (UK): strategies to improve student enhancement processes
- University of Amsterdam (UvA) and Free University of Amsterdam (VU) (NL): pilot study on user requirements for LA
- eAdvisor at Arizona State University (ASU): electronic advising and degree tracking system.

See EC Report 'Innovation in Higher Education' for further details on LA

Far-term horizon: 3D printing

- 3D printing enables more authentic exploration of objects that may not be readily available to universities.

- Practical applications estimated to take hold in the next 4-5 years:
    - Geology and anthropology students can make and interact with models of fragile objects, such as fossils and artefacts.

    - Organic chemistry and x-ray crystallography students can use rapid prototyping and production tools to print out models of complex proteins and other molecules

    - Engineering researchers (U Warwick) can design and print products with the circuitry system already built into the model

    - HEIs are designing dedicated laboratories to explore creative uses of the technology (e.g. the Fab Lab programme at MIT's Media Lab for digitally-enabled fabrication, now scaled up to create similar labs all over the world).

Far-term horizon: Wearable technology (WB)

• WB: devices that can be worn by users as an accessory, e.g. jewellery, sunglasses, backpack, shoes, jacket.

• Existing WB: Bluetooth necklaces, video game vests, Bluetooth-enabled jeans that can update the wearer's Facebook status, shirt collar or pocket cameras, etc.

• WB can conveniently integrate tools, devices, power needs and connectivity within a user's everyday life and movements (e.g. Google's "Project Glass")

• HE just beginning to experiment with, develop, and implement WB:

- Smart jewellery to alert chemistry students of hazardous conditions
- Wearable cameras to capture photographs or data for geology students
- Productivity-enhancing WB to help students and educators communicate with each other, keep track of updates, and better organize notifications.
- Sensory improvement (e.g. gloves that enhance responsive feeling when performing surgery or interacting with scientific equipment)

How does innovation diffuse into a HE system?

• **A two-way process of change:** the HE system elements influence innovation success, and innovation success induces further changes in the HE system

• **New technologies impact primarily the education function; no clear evidence of how advancements in education can affect the research and 'third mission' functions**

•**The change is incremental:** new technologies do not radically modify the traditional HEIs' education; rather, they tend to provide new ways of doing traditional things, that respond more efficiently to changing requirements in HE.

• **As innovation diffuses within the HE system, the system needs to be better managed:** need for better university management and leadership

• **Blockages**: at the micro-level (e.g. lack of institutional support) and at the macro-level (e.g. HEIs autonomy, national regulatory framework)

• **New technologies accelerate the development of partnerships between HEIs and other innovation actors, especially businesses**.

See EC Report 'Innovation in Higher Education' for further details

Opportunities

KnowledgeWorks Forecast 3.0 http://knowledgeworks.org/future-of-learning

Recombinant Education: Regenerating the Learning Ecosystem

This forecast previews five disruptions that will reshape learning over the next decade

Democratized start-up	Hi-fidelity living	De-institutionalised production	Customizable value webs	Shareable cities
• Investment strategies and open access to start-up knowledge, expertise and networks will seed an explosion of disruptive social innovations	• As big data floods human sense-making capacities, cognitive assistants and feedback systems will help people target their interactions with the world	• Activity of all sorts will be increasingly independent of institutions, as contributions become more ad-hoc, dynamic, and networked	• Innovative, open business models will leverage complex networks of assets and relationships to create ultra-customer-centric experiences across industries	• Next gen cities will drive social innovation, with urban infrastructure shaped by patterns of human connection and contribution

THANK YOU!

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