Innovations in Higher Education: re-imagining learning

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Commonwealth Heads of Government Meeting
Vancouver, 1987
To help Commonwealth governments and institutions use technologies to improve and expand access to education and training
Learning for Sustainable Development
Plan

• Context
• Innovations in Higher Education
• Decade of digital transformation
• Emerging trends
• Re-imagining Learning
GER Tertiary Education - Global


GER Tertiary Education- Trinidad and Tobago (1999 – 2004)

Gross enrolment ratio, tertiary, gender parity index (GPI) (2015)

Women in HE

Data by the UNESCO Institute for Statistics

Source: https://tellmaps.com/uis/gender/#!/tellmap/79054752/2
Figure A6.1. **Relative earnings of adults, by educational attainment (2015)**
25-64 year-olds with income from employment; upper secondary education = 100

### Note
1. Year of reference differs from 2015. Refer to the source table for details.
2. Earnings net of income tax.
3. Index 100 refers to the combined ISCED levels 3 and 4 of the educational attainment levels in the ISCED 2011 classification. Countries are ranked in ascending order of the relative earnings of 25-64 year-olds with tertiary education.

**Source:** OECD (2017), Table A6.1. See Source section for more information and Annex 3 for notes ([www.oecd.org/education/education-at-a-glance-19991487.htm](http://www.oecd.org/education/education-at-a-glance-19991487.htm)).

**StatLink** [http://dx.doi.org/10.1787/888933557375](http://dx.doi.org/10.1787/888933557375)
Figure 1.II.3 — Median Earnings among Post-Secondary Graduates in Canada, by Level of Study and Year of Graduation, 1995–2005 in Real 2007 Dollars

Note: Earnings were measured two years after graduation (1997, 2002, 2007).
Source: Statistics Canada, National Graduates Survey.
Some Countries with High GERs

- South Korea: 93.26
- Chile: 88.34
- United Kingdom: 57.29
Skills Shortage

‘Countries have skills shortages, not degree shortages’

Andreas Schleicher
Skills Gap

Countries where employers have the most difficulty filling roles

- Japan: 86%
- Taiwan: 73%
- Romania: 72%
- Hong Kong: 69%
- Turkey: 66%
- Bulgaria: 62%
- Argentina: 59%
- Greece: 59%
- Hungary: 57%
- Israel: 56%

Source: https://www.manpowergroup.com/talent-shortage-2016
# Skills in Demand

<table>
<thead>
<tr>
<th>Survey</th>
<th>No.</th>
<th>Skill 1</th>
<th>Skill 2</th>
<th>Skill 3</th>
<th>Skill 4</th>
<th>Skill 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>PayScale (2016)</td>
<td>63,924</td>
<td>Critical Thinking</td>
<td>Attention to detail</td>
<td>Communication</td>
<td>Leadership</td>
<td>Teamwork</td>
</tr>
<tr>
<td>NACE (2016)</td>
<td>260</td>
<td>Teamwork</td>
<td>Leadership/Problem-Solving</td>
<td>Communication</td>
<td>Organisation</td>
<td>Information Processing</td>
</tr>
<tr>
<td>EvolveScientific (2016)</td>
<td>142</td>
<td>Critical Thinking</td>
<td>Independence</td>
<td>Adaptability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LinkedIn (2016)</td>
<td>291</td>
<td>Communication</td>
<td>Organisation</td>
<td>Teamwork</td>
<td>Punctuality</td>
<td>Critical Thinking</td>
</tr>
</tbody>
</table>

Innovations in HE
Typical Classroom

Source: https://www.flickr.com/photos/velkr0/3472576304 (CC BY)
Innovations in Higher Education?

Slow pace of diffusion of innovation

- Augmented & Virtual Reality
- Micro-credentials
- Learning Analytics
- Bring Your Own Device
- Blockchain
- Massive Open Online Courses
- Games and Gamification
- Makerspaces
- Wearable Technology
- Open Educational Resources
- Mobile Learning
- The Internet of Things
- 3D Printing
- Flipped Classroom
- Robotics
- Next-Generation LMS
- Artificial Intelligence
- Tablet Computing
- Adaptive Learning Technologies
- Open University
Innovations Happen

- Demands of a learning society
- When new technologies emerge
- New providers emerge
Fourth Industrial Revolution

1st: Mechanization, water power, steam power
2nd: Mass production, assembly line, electricity
3rd: Computer and automation
4th: Cyber Physical Systems

CC BY-SA Source: https://commons.wikimedia.org/wiki/File:Industry_4.0.png (User:ChristophRoser)
Tertiary Education Over Four Stages

- From elite to mass
- Correspondence model
- Multi-media model
- Intelligent flexible learning model
NMC Report 2018

Important Developments in Technology for Higher Education

- **Time-to-Adoption Horizon: One Year or Less**
  - Analytic Technologies
  - Makerspaces

- **Time-to-Adoption Horizon: Two to Three Years**
  - Adaptive Learning Technologies
  - Artificial Intelligence

- **Time-to-Adoption Horizon: Four to Five Years**
  - Mixed Reality
  - Robotics

Rise of Messaging

Messaging Apps Have Surpassed Social Networks
Global monthly active users for the top 4 messaging apps and social networks, In millions

Note: Big 4 messaging apps are WhatsApp, Messenger, WeChat, Viber.
Big 4 social networks are Facebook, Instagram, Twitter, Snapchat
Source: Companies, BI Intelligence
Impact of Technology

The effect of today’s technology on tomorrow’s jobs will be immense

- The Economist

47% of today’s jobs could be automated in the next 20 years

- Oxford University Study
Re-educating Rita

• Technological progress, and artificial intelligence in particular, will require big changes in the way education is delivered....

• Automation could have a much bigger impact in developing economies ...because much of what they provide is ...embodied labour.
## Scenario for Automation Adoption 2016-2030


<table>
<thead>
<tr>
<th>Country</th>
<th>work that can be automated (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>9</td>
</tr>
<tr>
<td>China</td>
<td>16</td>
</tr>
<tr>
<td>United States</td>
<td>23</td>
</tr>
<tr>
<td>Germany</td>
<td>24</td>
</tr>
<tr>
<td><strong>Global</strong></td>
<td><strong>15</strong></td>
</tr>
<tr>
<td><strong>Workers that may be displaced</strong></td>
<td><strong>400 Million</strong></td>
</tr>
</tbody>
</table>
Gartner Hype Cycle

Each Hype Cycle drills down into the five key phases of a technology's life cycle. Roll over the phases in the graphic above for more information.

Source: https://www.gartner.com/technology/research/methodologies/hype-cycle.jsp
Decade of digital transformation
## Digital Innovations in TE

<table>
<thead>
<tr>
<th>Innovation</th>
<th>Dominant mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOOC/Blended learning</td>
<td>Classroom/Lecture</td>
</tr>
<tr>
<td>Blockchain</td>
<td>Accreditation authority/ Degree mills?</td>
</tr>
<tr>
<td>Micro-credentials/Badges</td>
<td>Degree?</td>
</tr>
<tr>
<td>Open Education/OER</td>
<td>For-profit colleges/ copyrighted course materials?</td>
</tr>
</tbody>
</table>
“MOOCs are online courses designed for large numbers of participants, that can be accessed by anyone, anywhere as long as they have an Internet connection, are open to everyone without entry qualifications and offer a full/complete course experience online for free”

- Mulder & Jansen, 2015
Implications for HE

**Present**
- National or provincial jurisdiction
- Interaction at the campus
- Print+ (audio, video, online)

**Future**
- Global classroom
- Increased use of Peer2Peer learning and social media
- Online+ (increased use of adaptive learning)
Blockchain: Quality & Mobility
Implications of Blockchain for HE

**Present**
- Paper certificates
- Verification challenge
- Manual authentication of work (such as portfolios)

**Future**
- Digital permanent certificates
- Complete online verification
- E-Authentication of work (ePortfolios)
Micro-credentials: skilling and reskilling

- Short duration
- Modular approach
- Skills based

- Community learning
- Self-paced
- Mentoring support

- Verifiable credential
- Project-based

- Job-ready
- Reduced cost
- Blended with F2F for formal degree
Implications of Micro-credentials for HE

**Present**
- Semester courses
- Less flexibility
- Limited mobility

**Future**
- Shorter courses
- Bundling/accumulation of credits
- Transferability of credentials
Open Educational Resources (OER): Costs

Materials that are:

• Free and freely available
• Suitable for all levels
• Reusable
• Digital
Implications of OER for HE

**Present**
- High costs of textbooks
- Institutional Teams
- Student as consumer

**Future**
- Free quality content
- Global Teams of course developers
- Student as producer
The Career Benefits of MOOCs

As reported by those who stated career benefits as their primary reason for completing a MOOC.

**TANGIBLE**
- Any: 33%
- Found a new job: 26%
- Started my own business: 9%
- Received a pay increase: 3%
- Received a promotion: 3%

**INTANGIBLE**
- Any: 85%
- Enhanced skills for current job: 62%
- Improved candidacy for a new job: 43%
- Changed to a new career: 19%
- Other: 9%

Source: COURSERA SURVEY DATA

Emerging Trends
Rise of Big Data in Learning

AI in Daily Life
AI in Education

- Can provide an intelligent, personal tutor for every learner
- Encourage intelligent support for collaborative learning
- Adaptive group formation
- Expert facilitation

Jill Watson: World Famous Teaching Assistant

- Deployed in four offerings of an online course in Computer Science in Georgia Tech (Instructor: Ashok Goyal)
- A conversational chatbot built on AI
- Three versions built and deployed:
  - Jill Watson
  - Stacy Sisko
  - Liz Duncan

Source: http://hdl.handle.net/1853/59104
Inferences for Education

“...for highly focused technical domains... it is difficult for humans to distinguish between the responses of AI and human experts.”

-Georgia Tech
Robots: From Teaching to Oversight

Robots will replace teachers in the next ten years.....robots will enable pupils to learn new material at their own pace, rather than as part of a class...teachers would adopt the role of “overseers”, monitoring the progress of individual pupils, leading non-academic activities and providing pastoral support.

--Anthony Seldon, VC, Buckingham U (Sep 2017)
Example of AI in Education

**Inquire: an intelligent textbook**

Tap any biology term to see a quick **popup definition** and get a link to Inquire’s detailed glossary.

**Highlighting** is quick and easy, and each highlight serves as the anchor for a notecard and a list of related questions.

Each highlight has a blue card with **suggested questions**, encouraging students to dig deeper into the material.

Write notes in the margin, making them easy to reference later.

Source: http://inquireproject.com
Example of AI in Education

Open Learner Model in Assessment

Source: http://dx.doi.org/10.1038/s41562-016-0028
The Future of Work

• Digitalisation can make professions disappear
• Rise of AI can lead to elimination of many high-skilled jobs leaving just the highest skilled ones for operations by humans
Implications for Higher Education

• Rise of the Multi-Versity network
  ...learners can move from education to society and back

• Micro-qualifications: rapid acquisition of highly specific knowledge and skills rather than a degree

• The Faculty to become Lifelong Learners -- focus on new modes of delivery and pedagogy

Multi-versity: term introduced by Clark Kerr (1963) http://openvault.wgbh.org/catalog/A_0DF915F352B044EFB1A31CCC71E8F9BF
Three Key Literacies in the Age of AI

Human

Data

Technological

Literacies

Re-imagining Learning
The New Learner: 1980’s

• adult learner who looked for new education, training and/or skills for personal development, promotion, change in career, and/or enhanced job requirements
Digital Native: C21

Technology-savvy learners, usually young school-leavers

The Emerging Ultimate Learner
The Learner in 2035

Division of Learning: “Maker, Doer, Thinker”

Artificial Intelligence: Holographic Advisor Bot

Advanced Communication: Language translation implants

Micro-courses

Learning at home: Immers-A-Casts

Broadened classrooms & Blended courses: linking of multiple f-f classes via technology (mega-pixel walls)

Reference: BIG SHIFTS ARE COMING! LOOKING BACK FROM 2035.
www.contactnorth.ca
GOAL 4

ENSURE INCLUSIVE AND EQUITABLE QUALITY EDUCATION AND PROMOTE LIFELONG LEARNING OPPORTUNITIES FOR ALL

SUSTAINABLE DEVELOPMENT GOALS
More at sustainabledevelopment.un.org/sdgsproposal
Lifelong learning

• Simply reforming current education systems ...to meet future skills requirements is not going to be enough....

• Ageing countries ...will need wholesale reskilling of existing workforces throughout their life
Integrating Employability

- Balance between theory and practice; hard and soft skills
- Engage industry: internships; apprenticeships
- Link QA to employability
- Career support
- Measure capability rather than number of hours

Credit Hour → Range of skills
Employability pathway in TE

- Sensitisation
  - Before Admission
- Career Counselling
  - After Induction
- Evaluation Drills
  - Penultimate Year
- Career Support
  - Upon Graduation
Skills for Innovation

• Questioning
• Observing
• Networking
• Experimenting
Learning in an Era of Digital Transformation

Empathy

Equity

Ethics
Thank you

www.col.org