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#### Digital learning in an era of change Challenges and opportunities for STEM teaching and the OU

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#### Overview

- 1. Key forces of change
- 2. Current trends in online learning
- Implications for teaching and learning
- 4. Whither the OU?





# Key forces of change: 21st century skills?

**Conference Board of Canada:** communication skills independent learning ethics/responsibility teamwork and flexibility thinking skills (critical thinking, problem-solving, creativity) IT skills embedded in subject area knowledge management



A small start-up in automative design

#### 1. Key forces of change Skills in demand

#### Royal Bank of Canada study ('Humans Needed'):

#### **PROJECTED SKILLS DEMAND FOR ALL OCCUPATIONS IN ORDER OF DESCENDING IMPORTANCE**



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#### 1. Key forces of change Skills in demand







#### Trends: a. new modes of delivery



#### 2. Trends: b. for-credit online learning: Canada

First national survey, 2017 All 203 public universities and colleges in Canada

**Response rate:** 

- 69% of institutions covering
- 78% of all student enrolments

Voluntary



#### 2. Trends: b. for-credit online learning: Canada

- 98% of Canadian universities and 94% of colleges outside Québec offer fully online courses
- Growth between 2011-2015:
  - Universities: 10% per year;
  - Colleges: 15% per year
- Estimate of all credit course enrolments fully online in 2015:
  - Universities: 16%
  - Colleges: 12%

Course completion rates (80-85%)





#### 2. Trends: b. for-credit online learning: Canada

- Over two-thirds rated online learning very important for future
- Most (72%) have or are developing a strategy or plan for online learning







#### 2. Trends c. hybrid learning

- Definition: some reduction in face-to-face teaching
- Many (75%) institutions in Canada offer some hybrid
- BUT few courses (60% with less than 10% hybrid)
- Hybrid = innovative teaching;
  better use of limited space



#### 2.Trends: d. MOOCs

- Driven by Stanford, Harvard, MIT
- Attempts at accreditation but assessment a massive challenge
- BUT: useful for non-credit continuing education
- No MOOC mania in Canada: less than 20% of institutions







#### 2.Trends: e. Open education

- open textbooks
- open research
- open educational resources (OER)
- content will be free, abundant and all online
- teaching + learner support key quality differentiator
- the real game-changer



## 3. Implications for teaching and learning



#### content and skills

- Content = facts, ideas, principles: 'knowing'
- Skills = understanding, analysing, evaluating, applying: 'doing'
- Both necessary in today's society
- BUT: content has been the traditional priority in HE





#### content and skills

We know a lot about how to teach skills:

- Context-specific
- Learners need lots of practice
- Small steps
- Regular feedback from expert
- Develop over a program rather than one course





### Examples in STEM teaching: 1

- Teaching scientific argumentation
- Simon Fraser University biological sciences
- Students expect a 'right' answer for every scientific question
- Poor skills at scientific argumentation
- Simple web-based tool



#### Scientific argumentation



#### Scientific argumentation

https instudy.educ.sfu.ca/dialecticalmap/map/ilpVvjUMx67XtsyALiCmM_snQ_/	Wolves%20should%20be%20killed%20to%20protect%20endangered%20woodland%20caribou%2 C Reader
IIII Under The Influence SALG Kalpna Protect What You Love How Wolves nge Rivers Bird  Dialetic Map	Yahoo Nick Lane C-51 Doug Homer HHMI Miss Manners 2014 All Maps Ting >>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
+	+
	3 There is no guarantee that wolf culling will have the same impact in every environment in Canada, it will be meaningless if the population of caribou don't rise after the culling of wolves.
	Supports  In a study conducted by Hervieux he observed the caribou  population in two different environments and how wolf culling had  an impact in the two environments.  He looked at the data from Little smoky wolf population and  Redrock prairie creek to see what effect the culling had on the  caribou. He found that although in the little smoky wolf population,  the caribou numbers increased, in redneck prairie the numbers of
	+
Add Pro Reason	Add Con Reason

The extinction of the caribou is a major problem today. On the one hand, it can be argued that we should act immediately and it may seem as though wolf culling is the only option. On the other hand, you have to wonder why we have any right to interfere with nature.

In the process of killing the wolves we may protect the caribout but endanger

### Examples in STEM teaching: 2

- Use of rare specimens in gross anatomy
- University of Prince Edward Island veterinary school
- Only one plastinated model of dog's heart
- Use of mobile phone and QR tags for simple video explanation



#### New teaching approaches

- from information transmission to knowledge management
- skills development + content
- lecture-based courses replaced by student projects, problem-based learning, collaborative learning
- goodbye written exams: replaced by e-portfolios demonstrating student's knowledge/skills



te University		
XPERIENCES	ASPIRATIONS	CONTACT ME
curricular Activities	Short-Term Goals	Standard Methods
ious Employment	Long-Term Goals	Electronic Methods
	curricular Activities vious Employment e Coursewor	xurricular Activities Short-Term Goals vious Employment Long-Term Goals e Coursework

\*All files in Adobe PDF format\*



XPERENCING A CROSS-FUNCTIONAL BUSINESS SCENARIO Apple Inc. Corporate Report: adaptivy Mega Trends (BA 411: Analyzing Business and Industry, Fall 2007): With the main purpose of pooing students to a cross-functional business scenario, this report combines the knowledge of marketing, ccounting, finance, supply chain, and economics from each of my four group members enrolled in different majors rooss the Smeal College of Business. As the sole marketing representative of my group, I helped in both the ablocation of the written section of the report and by taking the initiative in creating a unique aesthetic report yout in regards to Apple's brand associations of sophistication, prestige, and simplicity.

Apple Inc Corporate Report

COLLABORATING WITHIN A SMALL GROUP Marketing Research Project for the Pean State Leves Hockey Team (MKTG 142; Marketing Research, Spring 2007; While working with our other group members to achieve the highest graded project in our class, this project involved



### 'advanced' online course design

- core skill: knowledge management
  - how to find, analyze, evaluate and apply information
- open content within a learning design
- student-generated multimedia content: online project work
- assessment by e-portfolios
- just one example: new designs needed



# Whither the OU?



#### Whither the OU?

- Technology and learning needs constantly changing; lifelong learning essential: OU advantage
- Agile course development and delivery designed for part-time study
- Learning design remains critical for hybrid/fully online/part-time study
- All unis will be doing digital learning
- OU needs to stress its expertise in these areas: consultancies/partnerships?





• 'Humans Wanted':

https://www.rbc.com/dms/enterprise/ futurelaunch/\_assets-custom/pdf/RBC-Future-Skills-Report-FINAL-Singles.pdf

- Teaching in a Digital Age: <u>https://opentextbc.ca/teachinginadigitalage/</u>
- Online Learning and DE Resources: <u>http://www.tonybates.ca/</u>
- E-mail: tony.bates@ubc.ca

