CS4HS@Sydney

Professor David Lowe

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Welcome!

› “Curiosity should be encouraged

› “While an introduction to CS concepts at earlier ages encourages more diversity among scholars and practitioners in the field, there are not enough instructors prepared to guide our next generation of innovators.

› “Through annual grants, CS4HS supports colleges and universities dedicated to CS education in their efforts to provide professional development training for local high school and middle school teachers. These teachers develop their own CS curriculum using real-world applications to engage young adults and spark curiosity for what is possible.”

- http://www.cs4hs.com/
Why is CS / SE / IS / ICT Education Important?

› We have:
  - Australia’s digital economy is valued at over $100 billion
  - The ICT industry and profession contributes almost 8 per cent of GDP.

› And yet:
  - Australian UG students enrolled in ICT degrees – declined by 50% over the last decade (but now starting to pick back up! Slowly.
  - ICT is one of the bottom two general discipline areas with respect to attracting high achieving school leavers (ATAR > 90) into tertiary study.

› Cause for concern? Or Hope?
And there is a shift from the technology to the opportunities it creates…
Wednesday 1st October
  Welcome and Introduction
  Obsessively IT: Minecraft
  Introducing Python & PyGame
  PyGame Session 1
  PyGame Session 2

Thursday 2nd October
  Problem solving: load balancing and bin packing
  Distributed Computing
  Lab Tours
  ICT for Collaboration and Teaching
  Careers Session

Friday 3rd October
  Australian Curriculum: Digital Technologies
  Databases
  Short talks
  Introducing the Arduino
  Build-your-own Robot part 1
  Build-your-own Robot part 2
Thank You
Online Education

Threat or Opportunity

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President, Global Online Laboratory Consortium
General Chair, REV2013 Conference
Are we using technology effectively?

c1350 class

(Laurentius de Voltolina)

c2010 class
WHAT IS THE DIFFERENCE BETWEEN E-LEARNING AND ONLINE EDUCATION?

*From OED Online…*

› **Education:**
  - culture or development of personal knowledge or understanding, growth of character, moral and social qualities, etc., as contrasted with the imparting of knowledge or skill.
  - The systematic instruction, teaching, or training in various academic and non-academic subjects given to or received by a child, typically at a school; the course of scholastic instruction a person receives in his or her lifetime. Also: instruction or training given to or received by an adult

› **Learning**
  - The action of receiving instruction or acquiring knowledge; spec. in Psychol., a process which leads to the modification of behaviour or the acquisition of new abilities or responses, and which is additional to natural development by growth or maturation;
  - Knowledge, esp. of language or literary or historical science, acquired by systematic study;
Is education changing? Is learning changing?

› Significant area of research
  - Loss of analytical skills?
  - Loss of synthesis skills?
  - Gain in knowledge integration skills?
  - Enhancement in broad knowledge frameworks?
  - …

› But where to from here?
Online learning

› Will it affect us?

› How will it affect us?
Technology Outlook for STEM+ Education 2012-2017

› Time-to-Adoption: One Year or Less
  - Cloud Computing
  - Collaborative Environments
  - Mobile Apps
  - Social Networking

› Time-to-Adoption: Two to Three Years
  - Augmented Reality
  - Learning Analytics
  - Massively Open Online Courses
  - Personal Learning Environments

› Time-to-Adoption: Four to Five Years
  - Collective Intelligence
  - Internet of Things
  - Natural User Interfaces
  - Wearable Technology

- http://www.nmc.org/publications
For the things we have to learn before we can do them, we learn by doing them: Aristotle

Tell me and I'll forget; Show me and I may remember; Involve me and I'll understand: Chinese Proverb

Secondary school science labs:
Constrained access; limited relevance; lack of integration with learning technologies (Goodrum, Hackling, Rennie. 2001)

Lost Learning Opportunities!
But why Labs (rather than, say, simulations)?
They are expensive, cumbersome, inflexible, difficult to evolve, disconnected from reality, time-consuming, …
Is our lab pedagogy evolving?

c1900 Laboratory
Cavendish laboratory
http://www-outreach.phy.cam.ac.uk/camphy/museum/area8/display1.htm

c2010 Laboratory
Typical undergraduate facilities
Example labs
Remote Labs + New opportunities