CS4HS@Sydney
Teaching & Technology

Professor David Lowe
Associate Dean (Education) / Professor of Software Eng.
Faculty of Engineering and Information Technologies
The University of Sydney
Welcome!

The Importance of Tech Education in Our Schools

… So instead of teaching students how to be passive consumers of technology or how to use Microsoft Word or other proprietary software, our educators should be teaching students how to create, how to code. As Barack Obama recently observed to young students in America: ‘Don’t just download the latest app, help design it. Don’t just play on your phone, program it’.

… Callil determined that key ICT skills taught as part of the digital technologies syllabus, such as coding and computational thinking, should be taught from Foundation to Year 10. I agree with him and agree that machine languages and logic are and certainly will be in the future almost as important as basic literacy and numeracy.

… it is important that we move beyond outdated discussions that focus on tech literacy and instead expose primary school-aged children to tech creation through coding.

Malcolm Turnbull
Just as most students of mathematics will not become engineers or actuaries and most students of English will never write a novel, so most children who learn how to code at school will not become software developers.

But the training in logic and the understanding of how machines think will enable them better to engage in any and every course of life and career they pursue.

Our future, our prosperity depends on our being more innovative, more competitive and we simply cannot do that unless we are as technically literate as the other nations with which we compete.

Malcolm Turnbull

A Shorten Labor Government will ensure that computer coding is taught in every primary and secondary school in Australia so the next generation have the skills they need for the jobs of the new economy.

Coding is the literacy of the 21st Century, and every young Australian should be able to read and write the global language of the digital age.

Every part of our economy and every job will be touched, if not transformed, by the application of science, technology, engineering and mathematics in the future. Code powers our digital world, making coders the architects and builders of the digital age.

Bill Shorten
Why is CS / SE / IS / ICT Education Important?

› “Australia’s rapidly growing digital economy has been valued at $79 billion, and 5.1% of GDP – bigger than traditional industry sectors such as agriculture, retail and transport.”

- Deloitte:
  

› The “CS+X” movement

- Can you name a single profession which isn’t being reshaped by IT?

- See Careers with Code: [https://careerswithstem.com/code/](https://careerswithstem.com/code/)
Chart 1: Indexed employment growth, ICT professional and all occupations, 1986 to 2015

Source: ABS Labour Force Survey, November 2015, indexed (August 1986 = 100)

https://docs.employment.gov.au/node/36796
Chart 3: Number of students, by citizenship, graduating in the field of Information Technology 2001 to 2014

Source: Department of Education and Training - Higher Education Statistics Data Cube (uCube)

https://docs.employment.gov.au/node/36796
And there is a shift from the technology to the opportunities it creates…
What about education?

c1350 class
(Laurentius de Voltolina)

c2010 class
Technology can’t replace education! (yet?) …. 
So, how *will* technology affect education?

- Stage 1: Supplementation
  - enhancing what we already do

- Stage 2: Transformation
  - doing new things?
Technology and Education: Engage

3D Printing, Sensors, gamification, …

› Connectivity to support collaboration
› Gamification to provide challenge
› 3D printers to give interactivity!
› Sensors to interact with the world

› See
  - https://www.knewton.com/infographics/gamification-education/
Technology and Education: Understand

Learning Analytics

› No – this is not NAPLAN!

› How much do you really know about your students?

› What could you know?
  - Stress levels? Tiredness? Boredom?
  - Level of interaction?

› Read:
  - https://en.wikipedia.org/wiki/Learning_analytics
  - http://edutechwiki.unige.ch/en/Learning_analytics
  - http://www.dataversity.net/future-analytics-collaboration-deep-learning-telling-story/

http://dx.doi.org.ezproxy1.library.usyd.edu.au/10.1016/j.ijhcs.2015.05.001
Personalisation and Adaptation

› Allows for different approaches, styles, levels, …

› Adaptation of:
  - Content; presentation; sequencing; feedback; collaboration; …
  - Emergence of richer tools

› See:
  - https://www.smartsparrow.com/
  - http://www.dreambox.com/adaptive-learning
  - https://www.knewton.com/
Augmented Reality

› Enhance Understanding of Reality.
  - Supplementary information
  - Invisible things → visible
  - Hidden things → visible
  - Visible things → removed
  - Focusing of attention

› See
  - http://www.augment.com/blog/5-reasons-use-augmented-reality-education/
  - http://www.hongkiat.com/blog/augmented-reality-apps-for-education/
Technology and Education: Enhance

https://www.magicleap.com/#/home
Will it affect you?

› Can’t I just keep teaching the way I have been?

› How do I work on adoption?

http://www.edtechmagazine.com/k12/article/2012/12/7-habits-highly-effective-ed-tech-leaders-infographic

The 7 Habits of Highly Effective Teachers Who Use Technology

1. They always start with the why
   Technology for technology’s sake is dangerous. Highly effective teachers who use technology always have a reason for using new technology tools. Whether it saves them time, improves learning outcomes, or helps with lesson planning, highly effective teachers always start with the why.

2. They are malleable and can easily adapt
   Technology is constantly changing, and the classroom environment will be drastically different in 2 years. Understanding the big picture is key.

3. They embrace change
   The technology that they use today will be drastically different in 2 years. Many teachers are starting to embrace change as they see it coming.
Some sources of additional information…

› https://au.pinterest.com/classcharts/edtech/

› http://www.edutopia.org/adopt-and-adapt-shaping-tech-for-classroom


Questions? Discussion?