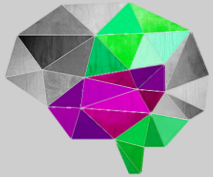


THE MIND LAB by Unitec®

Tomorrow's Tertiary Student - Agile, Digitally Fluent, Expecting More

Dr David Parsons
The Mind Lab by Unitec
@dave_parsons #CITRENZ

CITRENZ
COMPUTING AND INFORMATION TECHNOLOGY RESEARCH AND EDUCATION NEW ZEALAND

The Mind Lab by Unitec

Share on a Padlet

What skills are value-added by tertiary education in CS between school and graduation?

tinyurl.com/CITRENZPadlet

Before the Web

What has changed in computer science education since the 1980s?

Twitter Check

Are you tweeting?

Hashtag check?
#CITRENZ

@dave_parsons

What Forces Are At Play?

Changes in generation (Millenials -> Gen-Z)
Changes in society (technology, employment, politics)
Changes in physical teaching spaces and infrastructure
Changes in pedagogy
Changes in curriculum

Millennials

While simplistic notions of the Net generation of Digital Natives may be discredited, there is **significant demographic change in the Millennial student cohort**, including extensive technology use.

Jones, C., Ramanau, R., Cross, S. & Healing. G. (2010). Net generation or Digital Natives: Is there a distinct new generation entering university? *Computers & Education, 54*(3), 722–732.

Generation Z

An individual born in 2005 (Gen-Z) is growing up in a vastly different era than someone born in 1985 (Millennial). To label's today's youth as merely "Young Millennials" is not only clumsy but could also prove to be a source of misunderstanding… Never before has there been a generation incapable of remembering a world without the internet.

Boroujerdi, R. & Wolf, C. (2015). What if I told you… *Goldman Sachs Equity Research*. Retrieved from http://www.goldmansachs.com/our-thinking/pages/macroeconomic-insights-folder/what-if-i-told-you/report.pdf

The Challenge

- A generation of children is making it's way into tertiary education which with some notable exceptions has made few concessions to education in the 21st century
- Upcoming generations of students will be even more digitally digitally fluent and perhaps thinking computationally

10 Years Ago

Kindergartens using tools such as digital cameras and laptops with pre-school students

Manaiakalani Cluster set up to lead future focused learning in connected communities

Will.i.am at Point England School

5 Years Ago

Orewa College introduced their 1 to 1 iPads initiative to a storm of media controversy

Orewa College students use iPads to record and analyse activities in physical education classes

2017

Bill in a Hololens with Frances and a scared looking child

Mind Lab Teachers

- More than 3,000 in-service teachers have already been through the Mind Lab's Postgraduate Certificate programme in Digital and Collaborative Learning
- This has already impacted on tens of thousands of students in primary (~60%) and secondary (~40%) schools

UFB in Schools

The MoE has now completed the School Connection Project (SCP) and 97.7% of all state and state-integrated schools built before 2011 are now connected

MoE. (2017). *Getting ready for broadband*. Retrieved from https://education.govt.nz/school/running-a-school/technology-in-schools/getting-ready-for-broadband/

SNUPgrades

- 1,300 schools received School Network Upgrade Project (SNUP) funding from June 2013 onwards (there are about 2,500 schools in New Zealand)
- 825 of these schools have been funded to retrofit/upgrade their wireless infrastructure (WSNUP)

Kaye, N. (2016). *$8.5m boost for school wireless connections*. Retrieved from https://www.beehive.govt.nz/release/85m-boost-school-wireless-connections

Education Counts (2016). *Number of Schools*. Retrieved from https://www.educationcounts.govt.nz/statistics/schooling/number-of-schools

Are You Assessing Digitally?

Is the tertiary sector ready for fully online, on-demand exams?

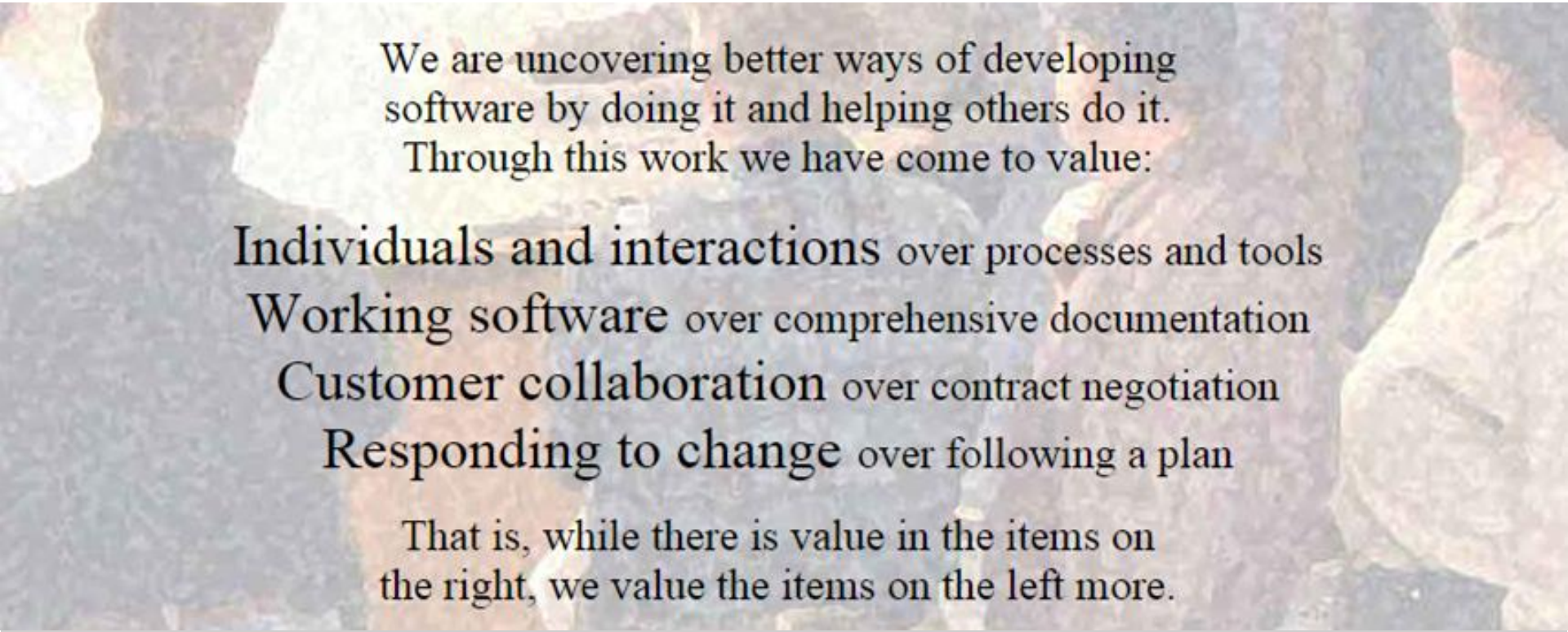
- ✓ **Move to digital assessments of NCEA**
- By 2018 at least 3 digital examination subjects online; by 2019 NZQA external moderation service fully online; by 2020 NCEA external examinations online (where appropriate); after 2020 move progressively to online exams on demand, anytime, anywhere

MoE. (n.d.). *Towards Digital Fluency*. Retrieved from https://education.govt.nz/assets/Uploads/Towards-Digital-Fluency.pdf

Agile

In what ways might tomorrow's tertiary student be 'agile'?

Agile Manifesto



The Agile Schools Manifesto

Individuals and interactions **over** processes and tools

Meaningful learning over measurement of learning

Stakeholder collaboration **over constant** negotiation

Responding to change **over** following a plan

Peha, S. (2011). Agile Schools: How Technology Saves Education (Just Not the Way We Thought it Would). *InfoQ*. Retrieved from http://www.infoq.com/articles/agile-schools-education

Shameless Plug

Call for Chapters:

'Agile and Lean Concepts for Teaching and Learning: Bringing Methodologies from Industry to the Classroom'

(Previous working title was 'Agile Education, Lean Learning')

Edited by David Parsons and Kathryn MacCallum

We are inviting full chapter submissions for the forthcoming edited book, "Agile and Lean Concepts for Teaching and Learning: Bringing Methodologies from Industry to the Classroom", to be published by Springer. The initial set of chapter proposals has been formally reviewed and accepted for further development. However, we are still able to consider full chapter submissions from potential authors who may wish to contribute chapters to this publication up until the October 31st 2017 deadline.

The subject of the book is the application of agile and lean techniques into various aspects of education. This is a topic which has become increasingly popular in recent years, but so far there has been no single publication to draw together these ideas, particularly one that covers both agile and lean, which although in software are closely related together, are less commonly linked in the educational context.

The major contribution of this book will be to provide a single point of reference for global expertise in how agile and lean ideas can be applied in teaching and learning at all levels of education. Aspects that would be of most interest to readers would be analysis, experiences and ideas that can be reused and adapted in other contexts. Possible chapter topics might include applying agile techniques inside the classroom (such as XP/Scrum based processes, story cards, Kanban boards etc.), applying lean value chain analysis to educational workflows and using team-based servant leadership approaches to student centred activities based on agile principles. We are most interested in using agile and lean techniques for teaching and learning. We are less interested in lean management applied to educational administration, a topic that has been extensively covered elsewhere, and is not a core focus of this book.

Digital Fluency

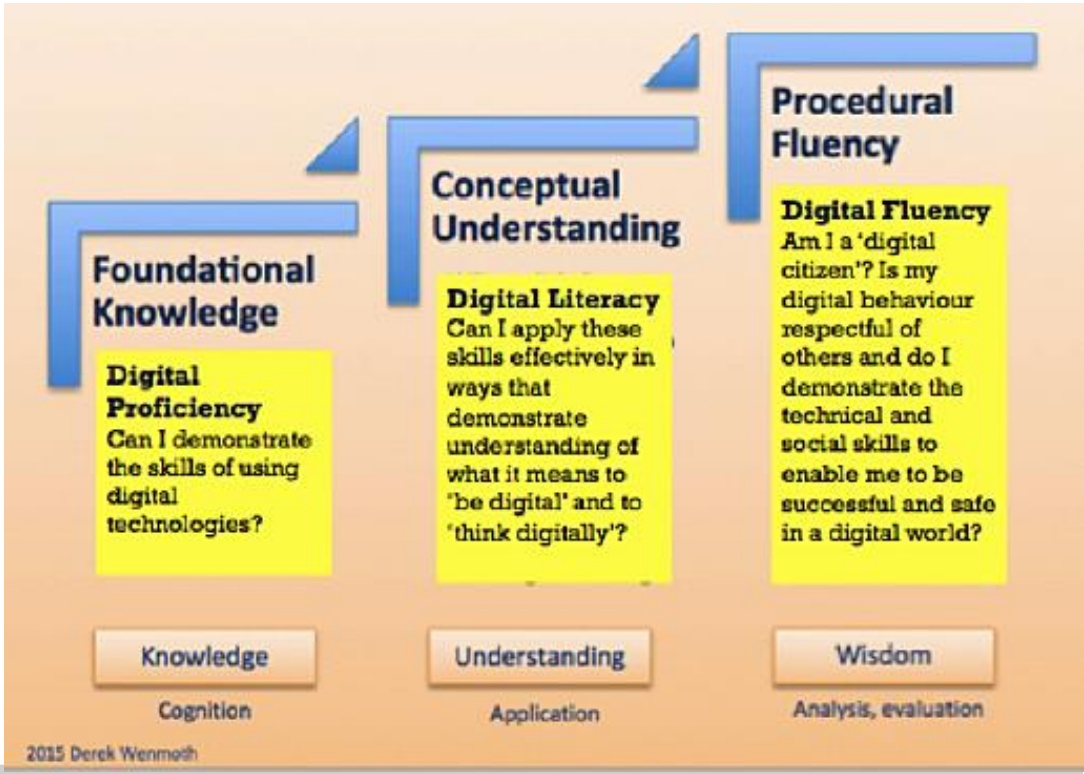
In what ways might tomorrow's tertiary student be 'digitally fluent'?

Digital Fluency

This is CORE Education's version

- Proficiency
- Literacy
- Fluency

Spencer, K. (2015). *What is Digital Fluency?* Retrieved From http://blog.core-ed.org/blog/2015/10/what-is-digital-fluency.html



Digital Transformation

The DigEuLit view

- Competence
- Usage
- Transformation

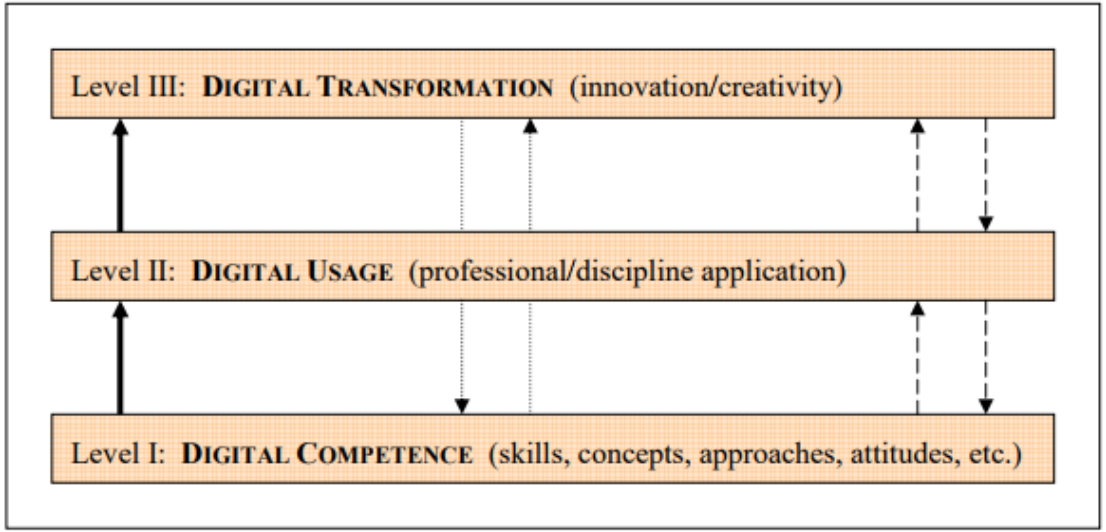
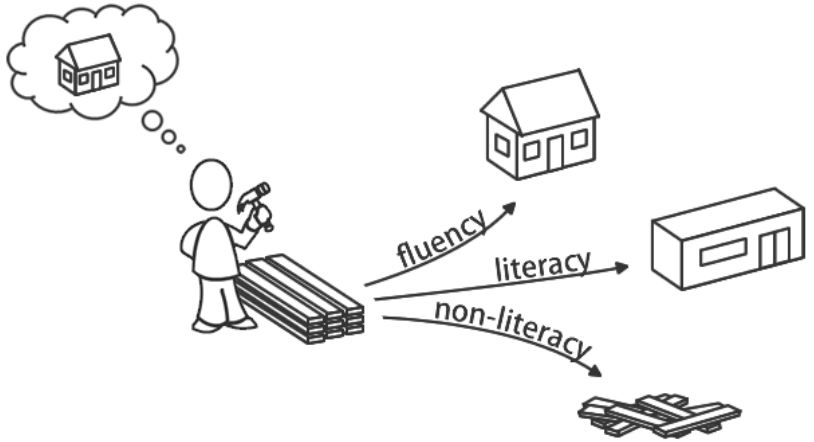


Figure 1. Levels of Digital Literacy

Martin, A. & Grudziecki, J. (2006). DigEuLit: Concept and Tools for Digital Literacy Development. *Innovation in Teaching and Learning in Information and Computer Sciences, 5*(4), 1-19.

Fluency = Transformation

Transactional (literacy) vs transformational (fluency) fluency is knowing when to use the tools to achieve the desired outcome, and why those tools are likely to have that outcome



Briggs, C. (2011). *The Difference Between Digital Literacy and Digital Fluency*. Retrieved from http://www.socialens.com/blog/2011/02/05/the-difference-between-digital-literacy-and-digital-fluency/

The Digital Curriculum

"The new curriculum has the potential to be the ultrafast broadband of learning." - Nikki Kaye (Minister of Education)

MoE. (2017). *Digital Technologies* | *Hangarau Matihiko*. Retrieved from https://education.govt.nz/assets/Documents/Ministry/consultations/DT-consultation/DTCP1701-Digital-Technologies-Hangarau-Matihiko-ENG.pdf

Core Skills and Specialisation

- By the end of **Year 10**, **all learners should be digitally capable**… to apply their understanding of digital technologies to all aspects of their lives and careers
- Learners who study Digital Technologies through to **Year 13** will be on the **pathway to specialising** – they… can lead our next generation of innovators and trailblazers in the digital world.

MoE. (2017). *Digital Technologies | Hangarau Matihiko*. Retrieved from https://education.govt.nz/assets/Documents/Ministry/consultations/DT-consultation/DTCP1701-Digital-Technologies-Hangarau-Matihiko-ENG.pdf

New Technology Areas

Computational Thinking for Digital Technologies

- Understanding computer science principles
- Learning how to develop instructions to control digital technologies

Designing and Developing Digital Outcomes

- Understanding the human aspect of digital systems
- Creating digital content across a range of digital media
- Learning about the components and techniques for designing digital devices

Year 10 Outcomes (CT)

- Independently **decompose problems** into an algorithm that a computing device can understand.
- **Implement the algorithm** by creating a program
- Determine when to use different types of **control structures**
- Explain and document programs and use an organised approach for **testing and debugging**
- Understand how computers store more complex types of data using **binary digits**

Year 13 Outcomes (CT)

- Analyse a selection of **areas of computer science** (e.g. formal languages, network protocols, complexity and tractability, AI, graphics and visual computing, big data)
- Evaluate how the synthesis of **key ideas** of algorithms, data representation and programming is applied effectively when developing real world applications
- Use an accepted **software engineering methodology** to design, develop, document and test a complex computer program.

Year 10 Outcomes (DO)

- Make decisions about the **best tools/techniques** to solve a problem.
- Work through an **iterative process** to design, develop, create, store, test and evaluate digital content
- **Select software** and file types for particular purposes
- Use selected software **create an outcome**
- Understand the role of **operating systems**
- Explain the conventions of **storage**

Year 13 Outcomes (DO)

- Integrate knowledge of digital systems to **create digital outcomes** that meet design specifications
- assemble, configure, and manage a **LAN**
- Discuss, design, construct and debug **complex electronic environments** and embedded systems
- Understand how an information system **adds value** to an organisation
- Effectively apply an **iterative software engineering process** to develop digital outcomes

2020 Digital Curriculum

MoE. (2017). *Digital Technologies and the national curriculum – what's it all about?* Retrieved from http://elearning.tki.org.nz/Teaching/Curriculum-areas/Digital-Technologies-in-the-curriculum

Expecting More

In what ways might tomorrow's tertiary student be 'expecting more'?

Job Ready or Job Capable?

The focus is shifting in higher education from learning for the sake of learning toward learning to become my future self that earns money to live.

Matthews, K. (2016). Being 'job ready' is not the purpose of university science degrees. *The Conversation*. Retrieved from https://theconversation.com/being-job-ready-is-not-the-purpose-of-university-science-degrees-63711

Student Debt

- Average NZ student loan is $21,000.
- Almost 731,800 people have a student loan, totalling $15.3 billion of debt (GDP is $270 billion)
- Median starting salary for software developer jobs is around $55,000

Dougan, P. (2017). Student loan debt 'balloons' by 37 per cent, with average student owing $21,000. New Zealand herald. Retrieved from http://www.nzherald.co.nz/personal-finance/news/article.cfm?c_id=12&objectid=11787574

Pay Scale (2017). *Entry-Level Software Developer Salary (New Zealand)*.
Retrieved from https://www.payscale.com/research/NZ/Job=Software_Developer/Salary/89c3dc87/Entry-Level

Mismatched Skills?

78% of UK business leaders and IT execs said a shortage of digital skills was holding their firm back, yet a relatively high proportion of computer science graduates are struggling to find work, with 11.7 percent unemployed six months after leaving university, 40% worse than other STEM subjects

Heath, N. (2016). If there's a tech skills shortage, why are so many computer graduates unemployed? *Tech Republic*. Retrieved from http://www.techrepublic.com/article/if-theres-a-tech-skills-shortage-why-are-so-many-computer-graduates-unemployed/

You've Heard This Before...

We do know there is a constant demand for soft skills and communication skills. There is an apparent belief [that institutions] are just not doing enough to equip students with those skills.

Hall. K. (2016). Computer Science grads still finding it hard to get a job. *The Register*. Retrieved from http://www.theregister.co.uk/2016/02/12/computer_grads_still_finding_it_hard_to_get_a_job_despite_skills_gap

No Easy Answer

Despite the best intentions of academics to enhance graduates' employability, the limitations inherent within the agenda will consistently produce mixed outcomes. Furthermore, it is argued that resources would be better utilised to increase employment-based training and experience, and/or employer involvement in courses

Cranmer, S. (2006) Enhancing graduate employability: best intentions and mixed outcomes, *Studies in Higher Education, 31*(2), 169-184. Retrieved from https://www.researchgate.net/profile/Sue_Cranmer/publication/225083774_Enhancing_Graduate_Employability_Best_Intentions_and_Mixed_Outcomes/links/585ba3eb08ae6eb8719c0832.pdf

But Actually It's Good News

- Students arrive with a better skill set
- Little need to transfer information 'live' (flip that lecture)
- Students better able to collaborate and apply their own agency
- More fun teaching project based learning and inquiry
- Let the students take the weight of writing assessments and providing feedback to peers
- Students can teach each other (and you)

NZ Education Top in Future Skills

6 key skills

- Interdisciplinary skills
- Creative and analytical skills
- Entrepreneurial skills
- Leadership skills
- Digital and technical skills
- Global awareness and civic education

+ holistic educational techniques such as project-based learning, where students learn in depth and with reference to several academic disciplines

Collins, S. (2017, Sept 26). NZ education 'top in world' for future skills, says British report. *New Zealand Herald*. Retrieved from http://www.nzherald.co.nz/business/news/article.cfm?c_id=3&objectid=11926730

Engaging Gen Z

- Craves regular and technology-enhanced learning opportunities
- Looks for educational opportunities that use visually enhanced methods of teaching
- Thrives on opportunity. Guide them in how to achieve their goals. They want to participate in the journey!
- Students want to shape their own journey with you as a guide

Cook, V. (2015). Engaging Generation Z Students. *University of Illinois*. Retrieved from https://sites.google.com/a/uis.edu/colrs_cook/home/engaging-generation-z-students

Changing Tertiary Practice

- Let students choose their assignment medium
- Let students pick an assignment focus within a broad topic
- Give them a voice to present their work however they want
- Set problems rather than giving information
- Capture learning requirements collaboratively and iteratively
- Be agile and integrate digital fluency

Let's Kahoot!

Go to kahoot.it and wait for the PIN