ICT as a Utility for Education

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Agenda

- Education Landscape
- Change Agenda … and The Role of ICT
- Working Together
Education Landscape

Education Landscape in Australia

- Higher Education
  - Universities

- Vocational Education and Training (VET)
  - Colleges of Technical and Further Education (TAFE)

- Kindergarten to year 12 (K12)
  - Kindergarten
  - Primary School
  - High School

- Have been three largely independent sectors and largely unchanged for some time
Education Funding

DIISR  DEEWR

Grant Authorities  Departments of Education  Departments of Skills/VET

Universities  Independent K-12 Schools  Government K-12 Schools  TAFE’s

x 39  x 2,729  x 6,833  x 65

Universities

- Varying mix of research and teaching business objectives
  - Compete regionally, nationally, internationally
- Notionally a single system, but actually quite diverse
  - Group of 8 Innovative Research Universities
  - Regional Universities Australian Technology Network
- Key constituents
  - General Staff, Academic Staff, Students (under and post graduate)
- Typically large multi-building facilities; many multi-campus
- Extremely broad and demanding range of ICT needs
  - From classic administration …
  - … to computational and visualisation research
Vocational Education and Training

- Very tight coupling to industries that consume students
- Nationally endorsed standards and qualifications
- Largely regionally focused, with little direct competition
- Key constituents
  - Administration, Educators, Students
- Typically large multi-building facilities; many multi-campus
- ICT needs
  - Alignment with industry requirements
  - Administration at both an individual TAFE and state level

K12

- Obvious split between state government and private (including Catholic) schooling options
  - Compete at a regional, almost suburb, level
- Key constituents
  - Teachers, Students, Parents
  - Very high focus on duty of care
- Multi-building facilities
  - State Departments of Education are very large organisations
- ICT needs are potentially quite demanding
  - Somewhat constrained by the lack of real broadband (coverage/cost)
  - Often variable and fragmented use of ICT – spread between Department (system) and individual schools
Demographic Change – The Net Generations

- Successive generations growing up immersed in an ever increasing array of digital technologies
- Multi-modal experiences are commonplace
- These generations are the *input* to the education system
Teaching and Learning are Changing

- 21st Century Teaching and Learning
- 21st Century Skills

21st Century Schools

Creativity

Policy Change

- Bradley review
  Student demand-driven model for tertiary education

- Digital Education Revolution
  Computers+On Costs, Fibre Connection to Schools
  Professional Development, National Curriculum

- Vocational Education Broadband Network
  1Gb Links for main campus of every TAFE

- National Broadband Network
  FTTH/FTTP for 90% of Australia

- TAFE Training Centres
  Collaboration/integration between K12 and VET

- Building the Education Revolution
  More Building than Education …
Very High Expectations of ICT in Education

**Effectiveness** $\rightarrow$ **Efficiency**

- Educational Solutions/Applications
- Administration
- End Points/Network
- Physical Needs/Access

- ICT provides a better, new, and/or converged way of doing things
- By being more **efficient**, ICT becomes a platform to support innovation and creativity, to deliver more **effective** teaching and learning outcomes

Implementation and Support of ICT

- The processes for reducing ICT complexity and improving ICT effectiveness are well understood*
  - **Standardised** architecture (templates, blueprints)
  - **Centralised*/coordinated procurement (leverage volume)
  - End-to-end management (outsourced or in-house)
  - Shared services (consistent, uniform)

*Within the bounds of governance and funding
THE BUSINESS CASE FOR ICT TRANSFORMATION

The last 10 years

- Short-term / ad-hoc / poorly distributed investment
- Small Number of “Boutique Projects”
- Focus on end-user devices
- Old pedagogy / New Technology
- Short-term / “Cliff Edge” Investment
- De-alignment of public / private sector

Where we want to get to

- long-term / system-wide transformation
- “a transformation in teaching and learning”
- Area-wide, scalable, holistic ICT service
- Even distribution of investment (£1450 + £220 per pupil)
- Better alignment of public & private sector strengths

Transformation is sporadic, short-lived and un-evenly distributed

Applies Not Just to “Network” ... or “ICT” ... Think – Networked Infrastructure

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<th>Facilities</th>
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IP Provides a Convergence Platform

- Data
- Voice
- Video Streaming
- Videoconferencing
- PA (Intercom)
- Video Monitoring
- Building Controls
- Clocks and Bells

Spaces for Effective Learning

**Wireless LAN**
Mobility and Flexibility, secure for **STAFF** and **STUDENTS**

**Wired LAN**
Ultra High throughput, inline **power** for phones, cameras, clocks, secure for **STAFF** and **STUDENTS**

**Electronic Peripherals**
End user digital devices, Whiteboards

**CCTV / PA / Bell System**
Logically separated but on single infrastructure

**Collaboration**
Peer to peer and group voice/video/web applications for **STUDENTS** and **STAFF** (eg. PD)
Teaching and Learning ICT Experience

- Consistent, reliable, dependable, affordable
  - Reusable skills, training
  - Builds confidence in ICT
  - Leverage economies of scale for support and operation over a common network

- Concept of common platforms
  - Support local innovation at all levels
  - Allows incremental deployment, development

Working Together
Many Dimensions of Together … … in the context of ICT for better outcomes

- Multiple “silos” within an institution (school, TAFE, uni)
  Teaching ICT, Learning ICT, Administration ICT
  Telephony, Video, Security, PA, building controls

- All institutions within a “system”
  Centralised and standardised ICT, eg. for all schools within a school system, or for all departments within a university
  Shared WAN network, eg. AARNet,

- Between Higher Education, VET, K12
  TTC’s, TAFE’s as “hubs” for schools, VIC Regeneration

- Education and Other adjacent sectors
  Research, Health

- Federal and State governments

The Network is All About Access and Experiences

- Access to Content and Resources
  Content
  Digital stored documents, videos, learning elements (static)
  Digital learning services (dynamic)
  Resources (or connectivity)
  People – collaborators, students, experts, specialists
  Places – museums, galleries

- Experiences
  Multi-modal – face to face, live video (HD, SD, Web), recorded video, live audio, recorded audio, IM …
  1:machine, 1:1, 1:many, few:few, many:many, meshed …

- It’s all on the ‘Net!! Or is it?
  It’s a simple as plugging in … it’s cheap and you get all of this …
The Internet is Actually ... 

... Complicated

Higher Education Network Architecture

Uni-1  Uni-2  Uni-3  Pacific Ocean  Global

AARNet  NRENs

ISP  ISP  ISP
ISP  ISP  ISP

Internet

Content Provider-2

Content Provider-1
K12 Schools and Community Colleges
NREN Connected – US

50%

K12

Community Colleges

http://k20.internet2.edu/connectivity/data

K12 Schools NREN Connected – Europe
TERENA Compendium 2008

- Note that aside from the connection itself, the connection method and the type of services offered are also important.

- Thus, in the UK, schools are not connected directly to the NREN but via the regional broadband consortia or local authorities who use the NREN as their backbone. Schools receive a reduced set of services.

- In other countries, schools may be connected directly to the NREN backbone and may receive an extended set of services, tailored to the needs of schools.

Networking is NOT just The Internet

- Internal or Private Network
  - Interconnects all locations, campuses of a single organisation
  - Resources and services tailored to internal requirements
  - Particularly administration

- Typically more capable than commodity Internet – certainly provides MUCH greater control (security, content, QoS) and tighter integration with corporate IT systems
  - Not always true for a large WAN (eg. State DoEducation)

In a technology-rich learning environment for the next 5-7 years, SETDA recommends:

- **An external** Internet connection to the Internet Service Provider of at least 100 Mbps per 1,000 students/staff

- **Internal** wide area network connections from the district to each school and between schools of at least 1 Gbps per 1,000 students/staff
Education: Adjacent Public Sectors

- Conflicting goals
  Education (vertical) Outcomes vs. State/Department wide needs
In Closing (1/2)

- Although Education is not a single entity, all the entities that make up Education have some common challenges
  - 21st Century Teaching and Learning
  - An ICT-heavy policy agenda
  - The administration challenges of large, distributed, organisations

- An architectural approach to ICT across each education system can significantly improve ICT effectiveness and efficiency
  - Centralisation and standardisation
  - Integration of functions that are not “obviously” ICT
  - ICT should be a utility and not a organisational differentiator

- The dispersed nature of Education means that networks, both human and ICT, are critical enablers
  - Building and maintaining organisations, PD environments, community
  - Access to content and resources, Experiences
In Closing (2/2)

- Telecommunications (networking) in Australia is going through a period of profound change
  
  Very little about the future is clear

- At the same time, there are many networking/ICT initiatives “in play” across the Education sector
  
  The good news is that the technology is (relatively) trivial 😊
  
  Working through the politics, and aligning the potentially conflicting objectives of the many stakeholders is harder

- So …
  
  Seek clarity regarding the “business problem we are trying to solve”
  
  Align technology to stakeholder objectives

Maximise the Potential of the funding available

Do No Damage