

Response to Australian Government's Regional, Rural and Remote Education Review

In collaboration with

OPTUS

Executive Summary

IMPORTANCE OF THIS REVIEW

The Australian Government needs to be commended and recognised for its interest in using innovation and technology – along with other levers – to deliver improved educational outcomes to regional, rural and remote students. The outcomes of this review are important to Cisco and Optus for a number of reasons:

- ▶ Strong regional participation and student outcomes are critical to a thriving Australian economy, and a thriving economy benefits industry and the community.
- ▶ As global digital companies, we believe technology has a major role to play in meeting some of the challenges identified in the discussion paper.
- ▶ Cisco and Optus have significant and evolving talent needs that must be met for a digital economy.

The transition to a knowledge-based economy is demanding changes in our education system and skills mix, including ensuring that traditionally disadvantaged groups are able to participate fully in a digital world. Focusing on regional and rural education is critical to ensuring that remoteness does not equal disadvantage.

BACKGROUND TO THIS REVIEW

We are witnessing astonishing industry disruption and shifts in global economic power. These are resulting in a rebalancing in terms of both consumption patterns and infrastructure spending, resulting in an entirely new global economic landscape.¹ A premium is now placed on innovation as the ability of some countries to simply manufacture more products or mine more resources rapidly diminishes.

The review of regional, rural and remote education is occurring against a backdrop of global volatility and accelerating change. These changes have significant implications for the Australian economy, and the ability of our education system to respond to the demand for future skills and new education requirements for a digital world. Three major factors are relevant to this review:

1. Rapid globalisation, urbanisation and digitisation, which is eroding traditional areas of competitive advantage and increasing pressure on Australia to find new ones.
2. Labour market changes, including the fact that up to 44% of jobs – or 5.1 million – are at risk from digital disruption in the next decade or two.² Poor digital literacy is no longer a social problem; it is a workforce participation problem.
3. The growing importance of horizontal skills and generalist knowledge / capability.

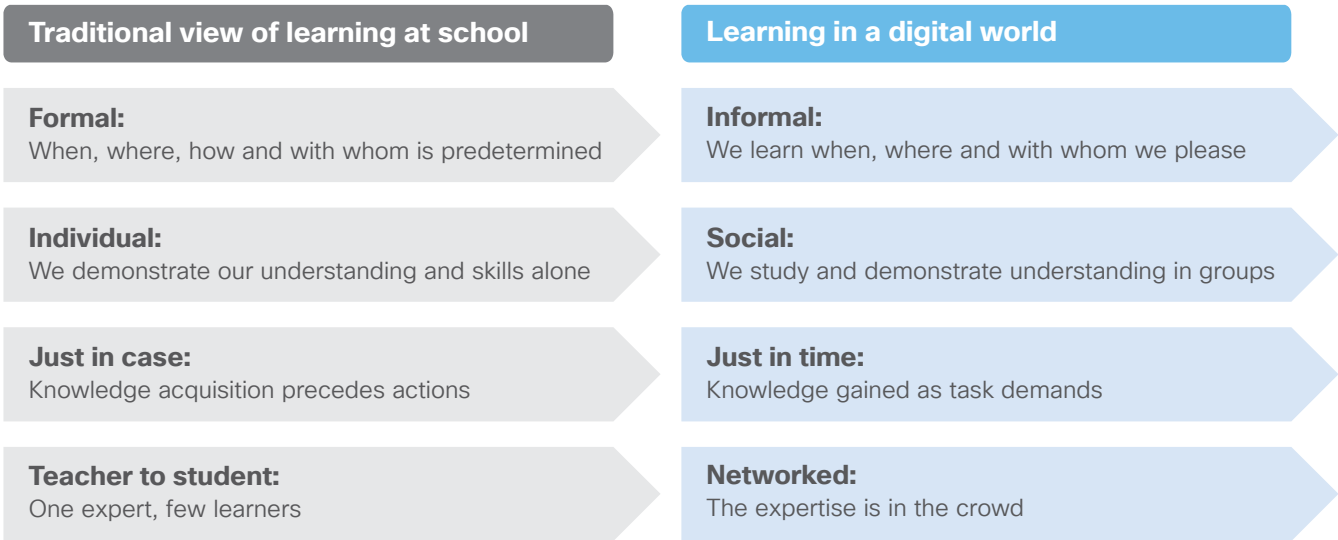
¹ Yang S, *PwC Global Annual Review* (2014), p. 7.

² PwC, *A smart move* (2015), p. 1.

Major opportunities related to digitisation and technology for regional, rural and remote students

Opportunity 1: Providing students with access to tools and technology that will drive engagement and reduce the achievement gap

Technology is no longer just a teaching augmentation tool. There is recognition that traditional, non technology-enabled training and teaching pedagogies are less effective than they once were. Latest research suggests that traditional lecturing techniques (such as the ‘stand and deliver’ technique) are less effective with the current generation of students and particularly in STEM subjects. One study found that traditional lecture techniques were likely to increase the failure rate by a factor of 1.5, compared with more active learning techniques.³



³ Freeman S et al., *Active learning increases student performance in science, engineering, and mathematics* (2014), available at: <http://www.pnas.org/content/111/23/8410>

Examples of what works/is currently working

Creating digital learning networks in the Pilbara region

One of the best examples of using technology to address regional, rural and remote advantage is in the Pilbara, Western Australia. The region presents unique challenges, including a high proportion of schools in rural locations and some of the most remote in the world. The WA Government has made a commitment to ensure all young people in the state have access to a high-quality public school education. The Department has invested in a range of proactive initiatives to mitigate the effects of isolation for rural and regional students. This includes installation of new technology into 30 Pilbara schools to support delivery of 'live' video – augmented by investment in network optimisation technology to ensure schools can make the most of available bandwidth.

Smart Classrooms at South West TAFE in Victoria and the vision for a 'skills city'

Investment in Smart Classrooms is exploding across the region as institutes realise they need to provide more immersive and interactive learning experiences, and provide more opportunities for students, trainers and industry to overcome geographic boundaries. By equipping classrooms with high-definition video and collaboration tools, institutes are able to more effectively and efficiently serve remote learners, including those in a workplace setting. In some cases new enrolments enabled by Smart Classrooms are the difference between being able to offer a course in a particular institute or region, and not. In the case of SW TAFE the technology has resulted in the institute being able to retain courses if would previously have not been able to sustain – resulting in students being able to stay in the region to complete their training.

"The results have been dramatic and I am bullish about the future for our Smart Classroom investment. It's changed attitudes, it's provided opportunities and, most importantly, it is providing SW TAFE with a sustainable model on which it can build." – SW TAFE CEO Mark Fidge

Cyber Security Experience with LifeJourney

The Optus Cyber Security Experience is an online cyber education program for secondary schools, TAFEs and universities. It enables educators to introduce students to one of the fastest-growing STEM career pathways, with the aim of addressing the critical cyber skills shortage in Australia and worldwide. The program delivers one of Australia's first free online national cyber security education courses for students to experience a day in the life of Optus's cyber experts to understand the skills and activities involved in a cyber attack, and the critical importance in helping Australian organisations combat the growing volume of cyber threats. The program also provides a Cyber Teacher Certification program so the nation's ICT, maths and science teachers can deliver cyber security learnings to their students.

WHAT AUSTRALIA NEEDS TO DO TO CAPTURE OPPORTUNITIES: IDEAS FOR THE FUTURE



Expand the regional study hub model and consider augmenting with co-working spaces

Cisco and Optus applaud the Australian Government's recent decision to expand the Regional Study Hub concept into the Pilbara. \$15 million has been set aside to establish and maintain eight regional study hubs. These hubs would target regional students who want courses delivered locally from any university, and who want to remain in their local area. The hubs will be modelled on the two current regional hubs (Geraldton, WA and Cooma, NSW) and one new hub located in the Pilbara.

The study hub model recognises that high-quality education can be provided remotely as long as students have access to the right technology, tools and teaching. An opportunity exists to leverage infrastructure that is already in place – e.g. regional TAFE campuses – to ensure that scarce funds are geared towards providing students with access to cutting-edge tools to facilitate immersive remote learning and collaboration. We believe there is also an opportunity to broaden the scope of the centres to include co-working spaces. One of the most critical decisions that needs to be made is in relation to the technology foundation they will be built on.



Encourage use of schools as adult learning centres

Schools – particularly those equipped with Smart Classrooms – should be thriving community assets. There is a significant opportunity to use technology infrastructure to promote lifelong learning and re-skilling, ensuring all regional schools potentially become 'regional study hubs'.



Opportunity 2: Teaching young people to be more collaborative and entrepreneurial to thrive in a digital economy

One of the most important contemporary skills required by students is the ability to *collaborate*. Effective collaborators tend to possess a number of the following: communication, capacity to work in teams, accountability and critical thinking. Technology is an enabler of collaboration. A range of tools is available to enable students and teachers to share, co-author, network and analyse information in a variety of forms. True collaboration happens in real time and is immersive, and the following use cases are currently delivered in Australian schools using Cisco and Optus technology:

- ▶ Connecting students with subject matter experts (e.g. remote experts)
- ▶ Connecting students with teachers in short supply (e.g. STEM)
- ▶ Providing specialist support to students (e.g. physical and mental health services)
- ▶ Delivering immersive virtual excursions (e.g. for cultural experiences)
- ▶ Facilitating global student collaboration
- ▶ Extending learning and creating pathways into K12, VET and higher education.

It is important to recognise that the usefulness of these tools is not restricted to students. These tools run on the same platform, whether used by students or teachers. In fact, uptake is probably strongest for teacher professional development and sustaining communities of practice/interest.

The importance of *entrepreneurial skills* also cannot be underestimated. If regions are to create new jobs to replace those that are being automated, they will almost certainly need to tap into the start-up economy and ecosystem. Entrepreneurship needs to be taught in all three sectors (K12, TAFE and higher education) to create the next generation of start-ups, but also to help young people navigate an increasingly freelance economy and volatile job market.

Examples of what works/is currently working

Cisco's Digital Schools Network to drive collaboration between schools

Getting students to collaborate is critical, but so is having education institutions from all three sectors do the same. Cisco recently announced the establishment of a Digital Schools Network program to help schools showcase and make more informed decisions about the use of technology in their schools. The network is based on Cisco's Spark platform and has a number of important elements:

- The network's focus is on improving education and showcasing/sharing best practice.
- Schools will have access to global education/technology experts who can counsel them on design and implementation considerations.
- University partners have joined to provide virtual excursions to rural and remote locations.
- Expansion into Asia so Australian schools can expand networks and communities of interest.

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Investment in collaboration technology at scale to take advantage of network effects

Most of the focus in terms of educational technology has tended to focus on the end device – the laptop or desktop computer. In contemporary education, technology’s greatest potential is to create and sustain communities (of teachers, students and parents). Collaboration platforms are now vital pieces of education infrastructure for regional schools and institutions, but may be financially out of reach. Cisco’s work through the Digital Schools Network has demonstrated a thriving community of schools that want to collaborate and it is important that education systems and individual schools make strategic investments in these underpinning platforms rather than treating them as a ‘bolt-on,’ consumer-grade piece of software.



Formally recognise ‘horizontal skills’ in TAFE training packages

Training packages today are too heavily biased towards technical skills and overlook the fact that ‘horizontal’ or soft skills are increasingly important to industry. While the existence of training frameworks and packages is a competitive advantage for Australia, they do not fully reflect what it means to be job-ready. The relationship between the changing workplace, technical skills and soft (horizontal) skills is depicted below.

IMPLICATIONS

The Workplace	The Workforce	
<ul style="list-style-type: none"> ▪ Rapid pace of technological change ▪ Critical need to respond or lose out ▪ Enterprise thinking & collaboration is key ▪ Sunrise & Sunsetting of roles ▪ War for business and talent 	<p>Technical skills</p> <ul style="list-style-type: none"> ▪ Programming & Web Development (Bootstrap, jQuery, C++ Angular, Code Igniter, PHP/JavaScript and MySQL, Python) ▪ App Development ▪ Digital Design ▪ Project Management ▪ Process Management ▪ Software Engineering, Development & Architecture ▪ Cyber Security ▪ Embedded Engineering ▪ AI (& NLP) ▪ Robotics ▪ Agile Development ▪ Analytics (Mobile, Wifi, Video, Social, IoT) 	<p>Soft skills</p> <ul style="list-style-type: none"> ▪ High Learning Agility & Cognitive Flexibility ▪ Global Cultural Agility: Able to work well with others from diverse backgrounds ▪ Complex Problem Solving ▪ Critical Thinking ▪ Creativity: creating something new



Continually promote innovation in learning design

Schools have already gone from teaching the ‘three Rs’ to having a broader remit related to helping students manage transitions, health and well-being, and digital economy skills. One of the challenges associated with these new skills is the need for learning scaffolds to teach future work skills. While education systems have made significant investment in learning scaffolds for specific domains (e.g. literacy and numeracy), the same is not necessarily true of problem-solving, collaboration and critical thinking competencies.



Scholarships for regional entrepreneurs

Entrepreneurship needs to be a foundation on which sustainable regional communities are built. While regional areas have done a good job of building their start-up base organically, there is a role for government to a) demonstrate to young people that it is a viable future path, and b) provide support for them to realise their aspirations. Given the additional challenges faced by regional students (including limited access to accelerator and incubator infrastructure), there is merit in considering scholarships and internship programs for young entrepreneurs. La Trobe University is an example of a university trying to ensure that its innovation programs deliver benefits to regional as well as metropolitan areas. The La Trobe Accelerator Program is specifically focused on increasing opportunities for entrepreneurs in regional areas, but also tapping into and building on areas of specialisation in different regions (e.g. agribusiness in Shepparton or Mildura in Victoria) by creating hotbeds for research, innovation and learning.

Opportunity 3: Building STEM skills and opportunities to apply them

It is estimated that 47% of today’s jobs will be able to be automated over the next decade or two.⁴ What is less understood, as the economy transforms, is the specific nature of ‘reconfigured jobs’ that will be required as replacements, and the foundational skills required to do them. While the answer is not straightforward, there is overwhelming evidence to suggest that STEM competencies will continue to be in high demand in the future. It is estimated that 75% of the fastest-growing occupations require STEM-related skills and experience and 90% will require digital skills.

At the same time Australia has experienced a decline in Year 12 participation rates for STEM subjects across the board. Between 1992 and 2010, participation in Year 12 biology dropped from 35-24%, physics 21-14%, chemistry 23-17% and maths 77-72%. The statistics for maths are actually less positive than they appear given that of the 72%, only 10% of students were studying at an advanced maths level in 2010.⁵ The situation for women’s participation is even worse than the average, with just 6.6% of girls sitting advanced maths in 2013 – just half the rate for boys and a 23% decline since 2004.⁶



⁴ Frey, Carl B. and Osborne, Michael A., *The future of employment: how susceptible are jobs to computerisation?* (2013).

⁵ Finkel, Alan, *Attracting and Retaining STEM Talent*, The STEM Pipeline for the Digital Economy Round Table (2014), www.bhert.com

⁶ Financial Review, *Australia’s maths crisis*, http://www.afr.com/p/national/education/australia_maths_crisis_I3P1MZ7bcKJKqiyOSnGDVM

Examples of what works/is currently working

Cisco Networking Academy program

The Cisco Networking Academy has trained 7.8M people globally since 1997, including a recent expansion into cyber security, Internet of Things and entrepreneurship. The networking academy's cyber program is no longer just a stand-alone credential; it is being integrated into degrees with universities and will be broadened to encapsulate future digital skills, with potential to add simulation and serious games into the pedagogy. It has also helped to bring about an exchange of lecturers between university and vocational education. At Curtin University, the academy program also had a virtual lab component, which was demonstrated on the tour to promote access to the program.

Cyber Games at La Trobe University

Melbourne's secondary school students will be given a rare glimpse inside the dark world of cyber attacks by being invited to take part in an immersive competition designed to nurture the next generation of cyber defenders.

La Trobe Vice-Chancellor Professor John Dewar announced a new Cyber Games initiative in early 2017 in partnership with Optus and Cisco. The initiative is intended to provide students with the opportunities and skills they will need to work in cyber – one of the world's fastest-growing employment fields. Students will defend a range of cyber attacks – including phishing, denial-of-service attacks, an email hack or all-out cyber warfare. New vulnerabilities and tougher challenges are added as the situation develops, allowing students to defend real-world scenarios.

"There's a huge need for a new workforce of cyber defenders. This initiative will not only educate a new generation of cyber-literate students, it will also help close the gap of what looks set to be a looming skills shortage." – La Trobe Vice-Chancellor Professor John Dewar

Cisco's industry standard Cyber Range Platform – a cyber attack simulator using real-life scenarios that can progressively increase in complexity and difficulty – will be adapted for use in the Cyber Games competition to ensure a safe and controlled environment. Cyber Games will now be introduced to the Cisco Digital Schools Network program to provide a virtual experience to students promoting awareness and pathways in Cyber Security.

John Monash Science School: driving STEM excellence

Cisco has worked closely with the John Monash Science School in Melbourne, recognising it is a model for how STEM can be taught and learned. Students at the school can study emerging science electives in fields such as nanotechnology, astrophysics, pharmaceutical science and bioinformatics. All Year 10 students are able to undertake an extended science research project with guidance from expert mentors. The school relies heavily on technology in delivering subjects. The physical environment at JMSS is very different from traditional schools. Flexible learning spaces enable students to learn individually and in teams. All students develop individual learning portfolios informed by their own interests and abilities. Students use tablets or laptops to research, problem-solve, organise, document, analyse, present and create digital objects, as well as access references and resources from Monash University and beyond.

WHAT AUSTRALIA NEEDS TO DO TO CAPTURE OPPORTUNITIES: IDEAS FOR THE FUTURE



Expand use of the Cyber Range platform in schools to keep STEM learning engaging

Cisco and Optus recently entered into a partnership with La Trobe University to roll out its Cyber Range platform in schools. Cyber Range simulates real-world threat scenarios in an immersive 'cyber gaming' environment and helps students learn how to defend a range of cyber attacks – including phishing, denial-of-service attacks, an email hack or all-out cyber warfare. New vulnerabilities and tougher challenges are added as the situation develops, allowing students to defend real-world scenarios.



Package-up Cisco Networking Academy units as micro-credentials

Cisco currently offers its course materials to partners on a royalty-free basis. Given the move towards flexible learning and micro-credentials, Cisco believes that some of its courses could be converted into stand-alone credentials with minimal effort. While some providers are already doing this (e.g. by integration into their degree programs), government investment could stimulate the pace at which these credentials could be made available to providers across all three sectors in regional areas.



Establishment of a Digital Industries Advisory Group

The pace of disruption in the information and communication technology industry is symptomatic of what is to come across the economy. There is an opportunity for government to leverage the perspectives of global technology companies – including Cisco and Optus – to inform decisions and discussion about education, innovation, digitisation, the jobs of the future and collaboration.

Conclusion

Cisco and Optus are encouraged that the Australian Government is looking at the issue of regional, rural and remote education holistically. The decision to review potential responses in all sectors of education simultaneously recognises that education, training and learning is increasingly integrated. It also recognises that in regional, rural and remote areas, educational infrastructure is a shared community asset and increasingly becoming a more critical asset.

Government has an important role in not only supporting the education system to innovate and improve practice, but also in accelerating the pace of change that occurs. Cisco and Optus look forward to discussing their views further with the Government and demonstrating that corporations are prepared to step up when it comes to contributing course content, curriculum, digital infrastructure and ideas to what is a critical challenge for our nation.