LEARNING FAST
BROADBAND AND THE FUTURE OF EDUCATION

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INTRODUCTION

Educational institutions have always had a central place in the online age. Before the advent of high-speed broadband, other communications technologies and services also played a big role in education.

University researchers were among the first Australian users of what became known as the Internet. When the domain name system was deployed in the mid-1980s, the .au domain was delegated to Robert Elz at the University of Melbourne. When the Australian Vice-Chancellor's Committee decided to set up a national communications network to support research, Geoff Huston transferred to its payroll from ANU to work as technical manager for AARNet, whose current chief executive, Chris Hancock, is interviewed by Liz Fell in this issue. When a 56 kbps ARPANET link with Australia was made by NASA and the University of Hawaii via Intelsat in June 1989, the connection was established in Elz's University of Melbourne laboratory. (Clarke 2004: 31)

In earlier times, the postal service made learning-at-a-distance possible by 'correspondence', particularly in remote areas of Australia. Advances in radio communications made it easier and the interactivity more immediate. Television sets and later video cassette and DVD players and recorders made it more visual. The telephone provided a tool of communication for teachers and learners; the best of them understood that most people were both at different times. Then simple low bandwidth tools like email and web browsing provided new ways for students, teachers and their institutions to communicate and distribute and share information. Learning management systems like Blackboard have been widely deployed through the education sector. Information that was once housed in libraries is now available online and social media platforms are providing new ways for students to collaborate. Ubiquitous, faster broadband and mobile access via smartphones and tablets promise further transformations.

At the Institute for the Broadband Society's annual symposium in late October 2012, the University of Melbourne's director of eLearning, Gregor Kennedy, identified three features of the contemporary university environment that make communications especially important: students spend less time on campus but more time online; the student population is bigger and more diverse; and educational researchers are encouraging teachers to move away from lectures as a primary teaching tool. Within this environment, the last year or so has seen what Kennedy calls the 'small explosion' of 'MOOCs', 'massive open online courses' run by organisations like Coursera and edX. Coursera was formed a few months ago with original partners including Princeton, Stanford and the University of Pennsylvania, and recently added others, including Brown and Columbia Universities, the Hebrew University of Jerusalem and

Hong Kong University of Science and Technology and the University of Melbourne. Broadband, Communications and the Digital Economy Minister Stephen Conroy recently warned: "universities know if they don't act now they will become irrelevant".

So what should educational institutions do? Kennedy argues they should try to make smarter use of technology to promote faster, more convenient and widespread access to education, to promote genuine engagement and to do things they couldn't otherwise do.

There are many possibilities. To promote faster, more convenient and widespread access to education, experts can teach classes from a distance. An expert scientist can teach a high school class, or an eminent professor can take a guest lecture. Regional and remote communities can be helped to overcome specialist teacher shortages and be given access to specialist facilities such as ScienceWorks in Victoria that are typically located in or near major cities. 'Anywhere, anytime learning' can help people fit study around their jobs, family responsibilities and other interests, rather than being locked into scheduled classes and appointments with teachers and other students. School students can have access to information for homework exercises that is not available in the classroom or the school library.

To promote genuine engagement, ubiquitous high-speed broadband and virtual collaboration spaces can be used for exchanges between students and experts and among students themselves - perhaps between classes that are located in different places or among students working on the same homework, tutorial exercises or assignments. Tele-presence and video-conferencing enable classrooms and lectures to extend across geographic boundaries.

Many applications, supported by ubiquitous fast broadband, enable us to do things we couldn't otherwise do. Visualization tools, such as 3D video, can help students to grasp difficult concepts or view realistic environments. Fully immersive 3D virtual reality environments with haptic or force-feedback capabilities can allow students to practise skills such as surgery or the operation of complex machinery. Smart information systems that sense, collect and integrate data provide new ways to gather information for analysis. Augmented reality applications and interactive 'serious' gaming can supplement and complement face-to-face contact. MOOCs allow distant students to take a course offered by an institution they might not have contemplated attending, or in a subject area where they might not meet entry requirements set to maintain enrolment ceilings. Universities that have worked hard to attract fee-paying students to live and study a long way from home are now asking a related question that might seem more familiar to media companies: what needs to be done to attract an 'audience'? A recent MOOC for artificial intelligence hosted by computer science professor Sebastian Thrun and his colleague Peter Morvig from Stanford University attracted over 160,000 students in a single semester. (Leckhart and Cheshire 2012)

This issue of the TJA focuses on what educational institutions, especially universities, are and might be doing with broadband. The first three articles report on research about particular educational applications. Vetere and others describe a trial of 'ambient technology' designed to help school-aged children deal with protracted periods of hospitalization or repeated admissions that can severely disrupt their education. Technologies such as email, blogs and teleconferencing are already widely used and larger hospitals employ teachers to ensure patients' learning continues. Information and communication, however, is only part of what is needed. This trial used an ambient 'orb' to try to create a sense of belonging and a feeling of connection between the hospitalised child and the classroom. Ambient technologies are 'peripheral, lightweight and aesthetically pleasing': peripheral because they operate in the background; lightweight in that they are not used for data analysis or decision-making; aesthetically pleasing because they are designed for their setting. The researchers found the ambient orb did help to establish a 'genuine sense of connection' and propose further research into the ways ambient presence might support other relationships and longer periods of hospitalisation.

Doube and Salomon report on a science teaching trial conducted using the *Adobe Connect* web conferencing and collaboration software. 'Zoo Connect' was a science lesson developed by educators at Sydney's Taronga Zoo, delivered to more than a hundred 12-14 year-old

students at two early secondary high schools. Three classroom teachers and three educational officers from the Zoo participated. The research found existing online collaborative tools and learning programs could 'enhance and extend learning by harnessing communication techniques that are in contemporary use by school children in their everyday lives', providing strong support for a widespread roll-out of online collaboration tools to classrooms. The main impediments were insufficient bandwidth and teacher resistance, suggesting that teaching and classroom management techniques needed to be revised to accommodate differences in learning paradigms driven by tech-savvy students.

Clarke describes IPTV and some of the possibilities for deploying it more widely in tertiary and school education, continuing professional development and public education, including the 'Uni TV' project based at the University of Melbourne. This platform will go live for staff and students in the Melbourne Dental School in 2013, making IPTV accessible at campuses in Melbourne and Shepparton and for home users in the first wave NBN build suburb of Brunswick. The School uses specialist cameras and simulation tools for teaching and patient treatment activities, including microscope cameras; podium cameras which look down on the clinical-tutors' hands as they demonstrate complex procedures; wide angle cameras that capture dentist-patient interactions; 3D haptics simulation work-stations; and intra-oral dental cameras for tele-dentistry with confined elderly and remote patients. For school-age children, IPTV can help make available a wider range of subjects in outer metro, rural, and remote areas where there are serious teacher shortages. For professionals such as dental practitioners, IPTV can save lengthy and costly travel to city locations for continuing professional development.

Two other papers describe projects that are just beginning. The NBN Virtual School of Emerging Sciences (NVSES) is an initiative of Monash University, Pearson Australia and the John Monash Science School - a select entry school established by Victoria's Education Department to raise the profile of science education and demonstrate new approaches to science in secondary schools. At a time when interest in high school science continues to decline, leading to a corresponding decline in university science enrolments, these organisations are launching a program for Year 10 students who are passionate about science. Aiming to ensure science is 'an active exploration of modern insights to modern problems' rather than 'just a history lesson', the program will run from January 2013 to December 2014, providing a variety of social, collaborative and self-directed learning tools to ensure students are challenged and supported by peers and teachers. With access to experts in fields such as nanotechnology and astrophysics, students will have the opportunity to be knowledge creators as well as problem solvers.

Building on more than twenty years' experience licensing the use of audiovisual programming by Australian and New Zealand educational institutions and the EnhanceTV service it commenced in 2001, Screenrights – the Audiovisual Copyright Society – trialled an expanded service, EnhanceTV Direct, with 21 schools across Australia in 2011. Now being rolled out across the country, the new service provides streamed access to a searchable archive of more than 11,000 education programs that can be viewed at home or at school by teachers and students. The archive is growing by about 100 programs each week. Teachers can create video lessons using all of a program or short extracts and share them with other educators. EnhanceTV Direct is designed to provide content specifically curated for the education market without the need for expensive storage onsite, while ensuring Screenrights' members - those who make the programs used in teaching - receive a royalty for the use of their work and are therefore encouraged to produce more.

The final two papers explain online teaching and publishing initiatives at universities. Grimley and O'Hare describe Swinburne Online, a partnership between Swinburne University and SEEK Limited that began offering Swinburne University accredited courses in 2012, via learning modules specifically designed for 100 per cent online delivery. These courses are intended to meet the needs of working Australian adults. In the last article, Jock Given discusses two online enterprises based at the University of Melbourne, *The Conversation* (started in 2011) and *The Citizen* (which will launch in 2013) with Misha Ketchell, managing

editor of *The Conversation*, and Margaret Simons, director of the Centre for Advanced Journalism, which will produce *The Citizen*.

These articles and interviews are just a small cross-section of the many topics that could be covered under the topic of broadband and education but they highlight the range of challenges and the diversity of responses for learners and teachers everywhere.

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