



Foresight in ICT in Higher Education

Professor Jill Downie PhD
Curtin University, Perth, Australia

Curtin University's vision is to be a recognised international leader in research and education. We will lead in innovative education globally, providing a richly interactive and personalised learning experience with opportunity for graduates, which will equip them with skills for the future.

Learning for Tomorrow is our promise to our students and future learners. By 2017 we will engage one million learners globally, sharing the expertise of our teaching academics with the world's learners. Curtin will use ICT and advancing technologies in higher education to raise the quality, efficiency and accessibility of teaching and learning to students, anywhere in the world.

Background

During 2012, as the first glimpses of the transformative and disruptive changes taking place in higher education were appearing, Curtin University began a critical process of review and reflection to ensure it thrived in a new world.

Student demand for more flexibility and multiple modes of accessing and participating in teaching and learning experiences was challenging the traditional models of lecture-intensive, tutorial heavy, campus-based education. Technology was making knowledge accessible anywhere, anytime at low or no cost. Universities were having to rethink their teaching and learning role and their value proposition to their customers in an environment of increasing competition with fewer and fewer geographical demarcations.

In support of Curtin's new Vision and Strategic Plan, the Transforming Learning at Curtin – Learning for Tomorrow initiative was launched in early 2013. Learning for Tomorrow is a university-wide strategy spanning all phases of the student lifecycle and transforming the design and delivery of education and the Student Experience at Curtin.

Changing Curriculum Imperatives: Curtin Converged

The vision for Curtin sees ICT as both a facilitator and an accelerator of the increasing globalization of education. Pedagogy drives the use of technology but its use has the potential to increase accessibility, efficiency and the depth of learning.

The new Curtin model for Learning and Teaching is *Curtin Converged*, a mix of four main elements.

- 1) Face to face; traditional lectures, flipped-classes,
- 2) On-line interaction; technology enriched environments, interactions, gaming, scale and visualizations
- 3) Massive Online Open Courses (MOOCs) and the use of OERs either as stand-alone courses or incorporated in on-line or f2f offerings
- 4) Distributed learning techniques using high-end video and 3-D technologies that actively engage students whether they attend classes on campus or from another location via Bb collaborate, Jabber Client or CISCO global classroom.



See 'Curtin Converged' <http://blogs.curtin.edu.au/odvce/2013/01/curtin-converged-a-new-model-of-teaching-and-learning/>

Personalizing, Adaptive Learning, Curriculum and Assessment

The initiatives in place to achieve Learning for Tomorrow are organised around the three key Teaching and Learning objectives of the Curtin Strategic Plan:

- **To be a leader in innovative education globally:** *course transformation into the Curtin Converged model; MOOCs development; the Curtin Learning Institute and Curtin Academy; and new collaborative learning spaces.*
- **Provide a richly interactive and personalised learning experience:** *learning analytics; student engagement & retention strategy; learning technologies; and global game-based challenges.*
- **Provide opportunity for graduates, to equip them with skills for the future:** *Work Integrated Learning; Curtin Leadership Centre; Student Mobility.*

A leader in innovative education globally

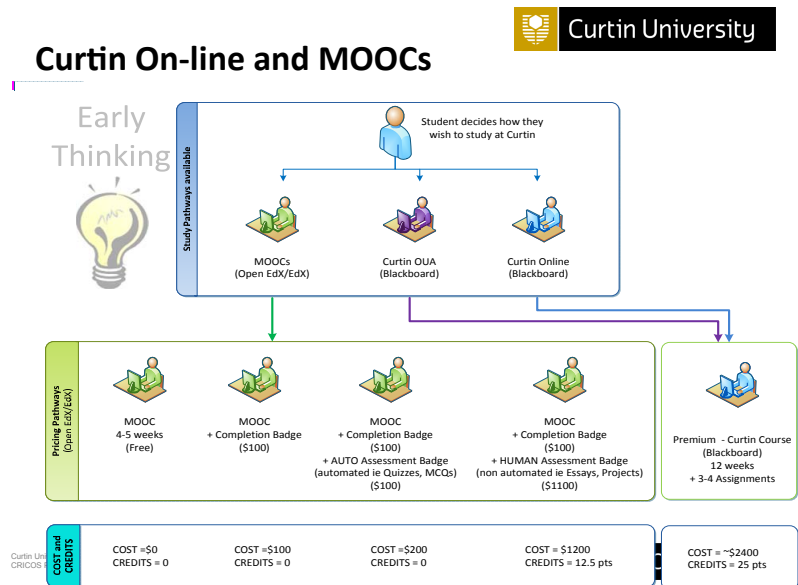
Our target of one million engaged learners is indicative of Curtin's potential reach on a global stage. Students already engage with Curtin in a variety of ways through our accredited degree courses, postgraduate programs, 'pick and mix' degrees, flexible 'unbundled' offerings, open access, distributed learning, MOOCs and game-based challenges.

ART 2015 is transforming learning within the curriculum. The elements of ART are **A**ssessment transformation, **R**evision of design and new markets, and **T**ransformed engagement. Curtin top 200 courses are being transformed with 20 signalled as Flagship courses for study anywhere in the world, at any time on any device. In terms of *on-line strategy*, Curtin already offers close to 90 courses (programs) in fully online mode through Curtin OUA and Curtin Online.

MOOCs

Implementation of Curtin's multi-platform *MOOCs* strategy developed in late 2012 continues with 3 MOOCs already launched and 2 for release this year on the Open edX platform. MOOCs are seen as gateways to the wide range of emerging offerings of the

higher education institution of the future. Curtin has created three MOOCs on different platforms in order to experiment with alternative techniques and to explore platform capabilities; the goals being scale, analytics, brand and lead generation. Curtin has decided to develop our future MOOCs on the Open edX platform and to work with global partners EdCast to make our contribution to the OER and open platform movement in that network. Our primary aims are to 1) Develop informal to formal pathways, 2) Develop new highly interactive learning experiences with effective embedded analytics, and 3) Promote Curtin's unique offerings to as wide an audience as possible.



Open Educational Resources – OER

Curtin Library is taking the leadership for a cross-university team in OER. Curtin is also a sustaining partner in OERu and are now proposing an Open Assessment Resource (OAR) project to the Hewlett Foundation. In the OAR project, Curtin will take a lead in OER approaches for assessment and analytics and will aim to engage large MOOC providers in offering open assessment resources to the world. The Curtin Library role is helping others to view OER resources as part of the institution's commitment to quality, curation, sharing and reuse of curriculum resources.

Central Role of Educators

Curtin is collaborating with Stanford Research Institute (SRI) on a skills framework that integrates ICT in teaching in higher education. This brings that framework into contact with other world frameworks such as ISTE standards, emerging pedagogical models and the UNESCO framework. Curtin has embedded core ideas from this work into a commissioned paper for the UNESCO Institute of Statistics for an updated global survey of the use of ICT in education.

Another key concept in our research and development of the adaptive curriculum and assessment systems, is the idea of 'semi-supervised automation'. This concept places humans into a close and continuous working relationship with the artificial intelligence of the strategies and tools of going to scale with high quality learning

experiences. Humans continually train and shape the responses of the automated system and make it smarter over time.

Finally, Curtin has also established a strong program of embedded continuous improvement of instructors through the *Curtin Learning Institute* and a set of related policy and practice tools, such as peer review of teaching, peer-to-peer feedback (Open Door), ongoing focused training, elevating champions in the *Curtin Academy* so other see examples of best practice, and engaging people in the scholarship of teaching and learning.

Curtin's *learning spaces* are also being transformed to support Learning for Tomorrow with 61 new technology (Bentley, Kalgoorlie and Miri) rich collaborative learning spaces already available and a new teaching and learning building planned. Many of these new spaces are equipped with high quality video-conference technology to enable classroom to classroom connection spanning national and international sites and the remainder are technology enabled for Cisco Jabber or Bb Collaborate type technologies.

Provide a richly interactive and personalised learning experience

All our students will enjoy a *personalised experience* at Curtin and know they are a highly valued member of the Curtin community, regardless of where they are located, or their mode of study. Personalization enables educators to match what is taught and how it is taught with the needs of each individual student. ICT improves educational benefits by supporting independent active learning.

Personalization in education at Curtin is underway and will be achieved through the Challenge Platform, the Curtin Student Study Assistant and co-curricular as well as curricular offerings that embed:

- Frequent assessment points that seek to diagnose every student's learning needs and abilities;
- Non linear learning and teaching strategies that build on individual aptitudes and demands;
- Engaging learning pathways customized for each learner; and
- A flexible approach to institutional organization – timetables, assessments, student systems.

ICT is also being implemented at Curtin to facilitate adaptive curriculum (finding and delivering the next best educative experience) and adaptive assessment (finding and delivering the next best challenge, quiz or test item). Our Transforming Curtin IT (TCIT) project on the development of an Assessment Ecosystem is exploring innovative learning environments that include new possibilities ranging from simple web-based tests for self-assessment to group work assessment to recent developments in semantic analysis for automatic diagnosis. The new approaches which move from paper-based to ICT-based assessments, are more authentic and can show details and differences that traditional measures do not. ICT can thus allow researchers and designers to collect data on students' choices about learning, which can also be used at the level of curriculum and assessment development to shape effective design choices for learning in a virtuous cycle of testing and improvement.

The *Curtin Challenge* platform is a new digital foundation for scalable and personalised education that provides active learning and embedded analytics. It is the first such gaming-platform in Australian Higher Education. *Curtin Challenge* is a complex multi-year project which is building a scalable platform for the delivery of project based learning, that incentivises users with badges, rewards and prizes, encouraging self-learning and team collaboration in a modern, fun, challenge-based, adaptive environment, and to a global audience of millions.

Learning Analytics

Underpinning Learning for Tomorrow is Curtin's *learning analytics strategy*. The successful universities of tomorrow will command the research and theoretical space of algorithms or rules that find patterns, make predictions, and can be tapped to provide students and staff with timely information, with holistic, detailed and personalised feedback. They will also provide a curriculum experience that is dynamic and adaptive to both current needs and the changing external environment. Curtin is becoming known for adaptive, personalised learning supporting a student's journey, executed at a global scale.

Curtin has embarked on a major project to transform its information technology infrastructure, including a significant proportion devoted to teaching and learning transformation. We define the analytics challenges with a focus on the five dimensions of journey of a student: from 1) recruitment, to 2) building a personal profile and history, to 3) encountering the curriculum and assessments, 4) working with instructors, tutors and mentors in new ways, to 5) becoming a life-long member of the greater Curtin community of innovation.

This vision of analytics also impacts on basic research across the university, because in order to engage with the hype as well as the potential for big data in the transformation of higher education, bridges need to be built between the fields of knowledge to connect people who have some of the knowledge needed to apply data science methods to research and those who need to be up-skilled. Everyone who teaches in higher education needs up-skilling in applying data science methods to teaching and learning. At Curtin we have established an 'Education stream' within the newly formed Institute of Computational Science.

Curtin is taking steps to share its ideas about data science in higher education. Several activities have been undertaken to build a shared interest in this line of thinking, including:

- Outlining a new vision of research in teaching and learning based in the introduction of data science methods. An introductory text is being planned to augment the prevalent quantitative and qualitative approaches.
- Developing a vision for a global network to develop *Data Science in Higher Education Teaching and Learning* and proposing a structure for institutional membership as well as research, policy and practice leadership.
- Joining with large scale projects such as Open edX and OERu to build shared aspirations with others, including foundations and NGOs.
- Collaborating with UNESCO to develop new examples, participate in global discussions, and learn from and engage with others.

CurtinLife *Student Engagement and Retention* is another dimension and aims to decrease the attrition rate of Curtin students and increase positive engagement between students, staff and the University, with success emerging from the strategy. Curtin has developed a *Student Discovery Model* to cluster student characteristics and predict attrition. This is being achieved via analytics driven identification, intervention and tracking of at-risk students together with transforming interactions between students and the University into a more student-focused, personalised space. ICT is also being used to improve digital student support and streamline wellbeing advisor roles, learning support and on-line booking for student appointments.

New Open Platforms, Social Media and Mobile Learning

In terms of social media and mobile learning at Curtin the initial portal developed for students will be a mobile-based experience: The *Student Study Assistant*. The first release is scheduled for June 2015, with regular updates continuously after that. The previously mentioned *Curtin Challenge* platform – a highly interactive learning platform designed for mobile learning is now adding functions for team learning. Based on that platform and developed in consultation and partnership with UNESCO Bangkok, Curtin will release '*Balance of the Planet*' addressing the UN Sustainable Development Goals. This team-based international challenge aims to produce solutions to world challenges. The application will track the acquisition of graduate capabilities such as collaboration, problem-solving, and communication skills.

Provide opportunity for graduates, to equip them with skills for the future

A close association with industry has always been one of Curtin's greatest strengths. The most sought after graduates demonstrate personal initiative, community responsibility, leadership, teamwork and cross-cultural awareness in addition to academic strength. The Curtin 'value proposition' is that in addition to a high quality Curtin degree, graduates leave the University with work integrated learning (WIL) experiences, leadership development and student mobility opportunities. Curtin is currently collaborating with industry to build an ICT solution to 'graduate employability'. This will be a system that is best described as merging 'Linked-In with Match.com' for the management of WIL and employment opportunities.

Conclusion

Much has been achieved in the 24 months since the launch of Learning for Tomorrow, with strong foundations laid for transformation of Curtin's courses to take them and our high quality academics to the world's learners wherever they are. As with any large scale transformation effort there are challenges, even more so with other complex change initiatives occurring concurrently within the University and Higher Education sectors. To address the challenges we are using a collaborative and consultative approach, engaging faculty and course teams as much as possible.

This is a big vision, and a bold plan but my mantra is "if your dreams don't scare you – they're not big enough".

Professor Jill Downie (PhD), Deputy Vice-Chancellor, Education, Curtin University
Associate Professor David Gibson, Director Learning Engagement
Linda Adnyana, Manager, Education Portfolio Projects