

We are IntechOpen, the world's leading publisher of Open Access books Built by scientists, for scientists

6,900

Open access books available

186,000

International authors and editors

200M

Downloads

Our authors are among the

154

Countries delivered to

TOP 1%

most cited scientists

12.2%

Contributors from top 500 universities



WEB OF SCIENCE™

Selection of our books indexed in the Book Citation Index
in Web of Science™ Core Collection (BKCI)

Interested in publishing with us?
Contact book.department@intechopen.com

Numbers displayed above are based on latest data collected.
For more information visit www.intechopen.com



Learning Innovations for Identifying and Developing Talent for University

*Mel Henry, David C. Gibson, Charles Flodin
and Dirk Ifenthaler*

Abstract

As a response to global and local imperatives for organizational, operational, and social change facing education today, learning innovations developed by Curtin University's Learning Futures team offer examples of new technology-enhanced learning experiences used to identify and develop talent for university. The innovations presented are helping to reset school-university relationships to a focus on direct, scalable, and personalized digital learning services, delivered via interactive technologies that utilize game-based and team-based learning approaches. Two frameworks are proposed: one for collecting and evaluating evidence of a future ready learner and one for situating technology innovations across five domains of higher education learning and teaching. The case study indicates that new educational technology innovations can support an expansion of the university's mission, as well as its academic, research, and service-based strategic actions, by enabling a continuum of potential entry points for learners of all ages, accessible anywhere at any time.

Keywords: enabling programs, advanced studies, raising aspirations, challenge-based learning, university-school relations

1. Introduction

Remaining relevant and meaningful within a continuously evolving and increasingly connected world requires universities to transform how we teach, employing innovations and technology-enabled approaches to engage, motivate, and support students to succeed. The learning innovations profiled in this chapter apply technology-enhanced learning approaches to identify and develop talent for university. The chapter begins by introducing a modern Australian university, globally recognized for its strong connections with industry, high-impact research and wide range of innovative courses: Curtin University, and the context in which it operates. Three areas of transformation, driven by global shifts in education are then discussed, and exemplars presented of applicable social, organizational and operational innovations applied at Curtin.

1.1 About Curtin University

Curtin University's mission is to "transform lives and communities through education and research" (<https://about.curtin.edu.au/who/vision-mission-values/>),

with a vision to “be a beacon for positive change, embracing the challenges and opportunities of our times” and “provide richly interactive and personalized learning experiences” (<https://about.curtin.edu.au/who/vision-mission-values/2030-2/>). This agenda of education as transformational, and of placing students at the center of the educational experience, embodies the university’s culture of innovation. Through its innovative approaches to learning and teaching, Curtin has embraced scalable, personalized technological innovations to reset the traditional school-university relationship, while also expanding the university’s capability for academic, research, and service-based strategic actions. These innovations have arisen in response to global and local imperatives to address organizational, operational, and social challenges facing education today.

With campuses in Western Australia, Dubai, Mauritius, Singapore, and Malaysia, as well as a significant online presence, Curtin University enrolls approximately 60,000 students annually, making it the largest university in Western Australia. Curtin University’s home campus in Western Australia is situated in one of the most isolated state capitals in the world, Perth, while simultaneously perched on the doorstep of the Asia-Pacific region. The university’s size, campus locations, and culture of innovation have positioned Curtin well to adapt to the evolving needs of today’s students, including those residing within the most populated time zone in the world.

Transforming learning at Curtin University occupies the center of the “Learning for Tomorrow” program of innovations, initiated in 2012, to dramatically shift policies, people, and practices to empower a university with global aspirations [1]. More recently, a newly articulated research focus emphasizes demand-driven research, with clear impacts on partners and the community [2]. These policy choices and commitments have given rise to new ideas about what kind of knowledge and skills are needed for students to succeed, and what role technology can play in the transformational vision.

Curtin’s Learning Futures team [3] is tasked with building human and technological capacity, and leading and managing early stage innovation projects that support the university’s transformational agenda. The team’s innovations span formal and informal learning, create new pathways and partnerships, deliver aspirational and enabling programs, utilize and share expertise in learning analytics, promote faculty-based research and support continuous improvement. The team works across social, organizational, and operational dimensions of the university to implement the central learning and teaching area’s mission *to inspire and support innovation, excellence and impact in learning and teaching*. Key innovations led by this Learning Futures team are presented in this chapter.

1.2 The transformation of higher education

Beyond the university, several challenges have arisen in the intersection of national policy and funding, state opportunities, and the needs and global drivers of economy and societal well-being [4]. Today’s social and economic climates present important impetuses for change within higher education. First, the perceived *social* role and value of higher education have evolved from a traditional conduit to enlightenment, to an essential means to obtain gainful employment. There is evidence also of an emerging axiom in which students see themselves as consumers of education, who enter a transactional relationship with universities that demand a demonstrative return on investment [5]. Second, other drivers of transformation are found in the emerging digital *organization* of learning and the advancement of knowledge, sparked by the rise of the Internet, social networks, collaborative research, and big data. Finally, higher education *operations* are also undergoing transformation as a result of challenges and opportunities posed by

the technological revolution. Responding to these social, organizational, and operational transformations impacting higher education presents an innovation challenge for universities [6]. No longer can universities operate as they have for centuries, under a traditional model of standardized, objective, and predefined learning pathways. Instead, universities must explore new approaches to learning and teaching that offer increased flexibility and personalization, while simultaneously ensuring their own sustainability as organizations. New conceptualizations of who our students are, what they seek, and what makes them succeed must be considered, reframing the concept of talent, and driving essential innovations in how such talent is identified and developed. With technology offering significant opportunities to enhance access and success in higher education, furthermore, technology-enabled learning and teaching approaches present an important avenue for such innovations, facilitating unique opportunities to identify and develop talent for today's university. These significant transformations impacting modern higher education are discussed further in the following sections, before introducing a case narrative for how one university has approached this challenge.

2. Social transformations in higher education

The role of universities and of higher education in a global society is changing. Students are increasingly seeking higher education, and selecting associated courses, as pathways to employment [7]. More and more students from a wide social economic spectrum are choosing to attend postsecondary education to prepare themselves for the global workforce. The growth in access and uptake of university education specifically has conferred many benefits to growing numbers of students from a wide social spectrum, with data indicating that in Australia completion of a university degree does increase the prospects of employability regardless of gender and level of achievement at entry to university [8]. Students in greater diversity and numbers than ever before are seeking to enhance their global mobility, and to find and experience hands-on, authentic work placements integrated with their undergraduate study [9]. They want to join an institution with a strong reputation and attendant opportunities to meet and work with creative business leaders, especially those who are the founders and executives of innovative companies and organizations that deliver positive social impacts via knowledge and innovation [10].

Employers are simultaneously crying out for graduates with relevant skills and experiences to work collaboratively and creatively with diverse stakeholders and colleagues to solve complex global problems [11]. There is increasing economic and political pressure to raise the knowledge and skills of a globally proficient workforce, to respond to the requirements of the post-information age of technology-enhanced human performance [12]. In the coming age, the most sought-after people will be creative problem solvers who can work with others to design complex solutions to big challenges [13]. These *social* challenges imply the need for higher education to transform its social agenda, necessitating learning experiences that expose students to global contexts, diverse perspectives, technology, and authentic learning situations.

Alongside student and employer imperatives, the mission of universities has evolved in line with global imperatives of the post-information age, for example, leading to the establishment of the edX Consortium by Anant Agarwal of MIT [14]. The traditional mission of universities has been to educate a select few for societal leadership, and to conduct world-class research to create and preserve knowledge. The modern university's social mission, however, includes actively working toward equity and excellence for social and economic well-being of the community and world—a

mission of social transformation [15]. This evolution recognizes and builds forward from domain knowledge and excellence in teaching and research, expanding to create positive impacts on global problems, while preparing graduates for the future workforce. The new social mission has led to a focus on innovation, creativity, and entrepreneurship in order to address complex global problems, build on the university's strengths in top-ranked fields of study, and to promote and facilitate authentic work-integrated learning [16]. The transformation required to support the application of knowledge to complex problems, experiences with work-integrated learning, and to develop graduates who possess capabilities to work anywhere in the world implies that the university's relationship to the outside world also needs to change.

Students entering university today have inherited a vast array of complex global problems set in motion by the legacy of previous generations, marked by unsustainable, destructive, and isolated economic and social practices that have adversely affected global ecosystems, inflicted harm, and set in motion ongoing challenges that impact livelihoods and well-being [10]. The global workforce of the future needs the university to alert and empower young people to address these challenges. To effectively address these complex global problems, collaborative technologies such as the Curtin Challenge described further below are arising to help students learn to work with globally diverse peers, to establish a thorough understanding of associated issues, and to develop creative and workable solutions [17].

To give structure to these complex global problems, in 2015, the UN General Assembly formally accepted a new set of 17 measurable Sustainable Development Goals (SDGs), ranging from ending world poverty to achieving gender equality and empowering women and girls, by 2030 [18]. The SDGs and their targets are considered by the United Nations signatories to be essential for the ongoing viability and well-being of all people and living things. The SDGs thus form a curricular foundation of authentic complex problems that need solutions, and a key focus for higher education into the future.

3. Organizational transformations in higher education

Alongside the social evolution of higher education, the way in which learning is organized is also undergoing transformation. Learning is no longer conceptualized as a standard, predetermined pathway through which all students acquire knowledge. Today's learners seek a more personalized, accessible, and adaptive learning experience. As such, the traditional organization of higher education, primarily in multiple-week blocks of closed classes hard-coded into 3- or 4-year courses of study, is slowly giving way to shorter self-study modules, delivered at scale via technology-enhanced and automated learning systems, which are open to students at all stages of life and development [19]. Smaller modules of study may be combined into stackable combinations, forming new micro-credentials that support self-directed exploration, as well as flexible recombination of modules to suit new individual and organizational purposes [20]. Such modularization of higher education presents a more personalized learning experience, enabling a diverse body of students to access and package their education to suit their unique needs.

At the same time, the conduct of research is moving from individual "star" researcher-driven interests with short-term soft funding, to long-term, demand-driven and outcomes-focused, high-performance research team collaborations. Today's research is compelled by global problems, supported by deep integration of public and private sources for shared development of IP and mutually beneficial goals for knowledge building, development, and implementation for positive social impact [21]. These personalization and problem-focused drivers for education and research imply a need to transform higher education's organization of learning, teaching, and research.

4. Operational transformations in higher education

In addition to the social and organizational transformations in higher education, the way in which universities have traditionally operated is being challenged. A wave of closures and consolidation of small colleges in the US illustrates that where institutions do not adapt to the changing times, they face mounting challenges to their survival [22]. Artificial intelligence, to point to one of the horsemen of a potential apocalypse, presents a unique challenge, but also opportunity for higher education, offering means to automate historically complex and resource-intensive processes. Social media and the Internet, for instance, present opportunities for learners to connect with experts across the globe, offering just-in-time personalized learning experiences outside the traditional education pathway. With such opportunities at learners' fingertips, universities must clearly articulate their value proposition, and adapt to a more customer-focused approach to the management of education. Alongside the evolving social and organizational context, higher education must transform its processes to accommodate new conceptualizations of student capability and success. In particular, we believe, universities must reconsider five important dimensions of higher education learning and teaching operations: finding and selecting students; knowing learners and their expectations; just-in-time services, content, mentoring, and support; anytime, anywhere accessibility; and global connectivity.

The case narrative presented in the following sections briefly describes the innovations adopted at Curtin University, with respect to the social, organizational, and operational transformations impacting the university. The narrative shows how some innovations have become embedded in inventive products and services that prepare students for university, create greater diversity, and change the practices for identifying and developing talent. The emerging solutions at Curtin University are unified by the themes of personalization at scale; innovative challenge-based team learning; massive open online learning options; and flexible, stackable credentials delivered in new ways, supported by learning analytics, new digital learning tools and programs, and restructured learning services, while leveraging the role of the university in the broader community. Two frameworks are presented to aid the identification and development of talent for university: a reconceptualization of how future-ready learners are identified; and an exploration of the role of technology across the five domains of teaching and learning.

5. A framework for identifying future-ready learners

Curtin University is developing and improving a continuum of entry points and learning systems that expand the ways people can engage, learn, and achieve, from pre-entry into lifelong learning, as shown in **Figure 1**. Innovations are employed across the student life cycle, from partnerships and development programs with primary schools, preparatory programs with secondary schools, articulation agreements with other providers, and pre-tertiary admission and scholarship programs, to credit for advanced learning, stackable credentials, and personalized learning pathways across undergraduate and postgraduate study. Central to these approaches is a view that students and families begin identifying with and thinking about their future several years in advance of traditional admissions processes. As the university engages with the broader community, it is able to influence as well as shape the quality of preparation for success within families and school communities, enhancing the capacity for a future-ready workforce. These pathway and partnership innovations are empowered by new technology and seek to increase the number, diversity,

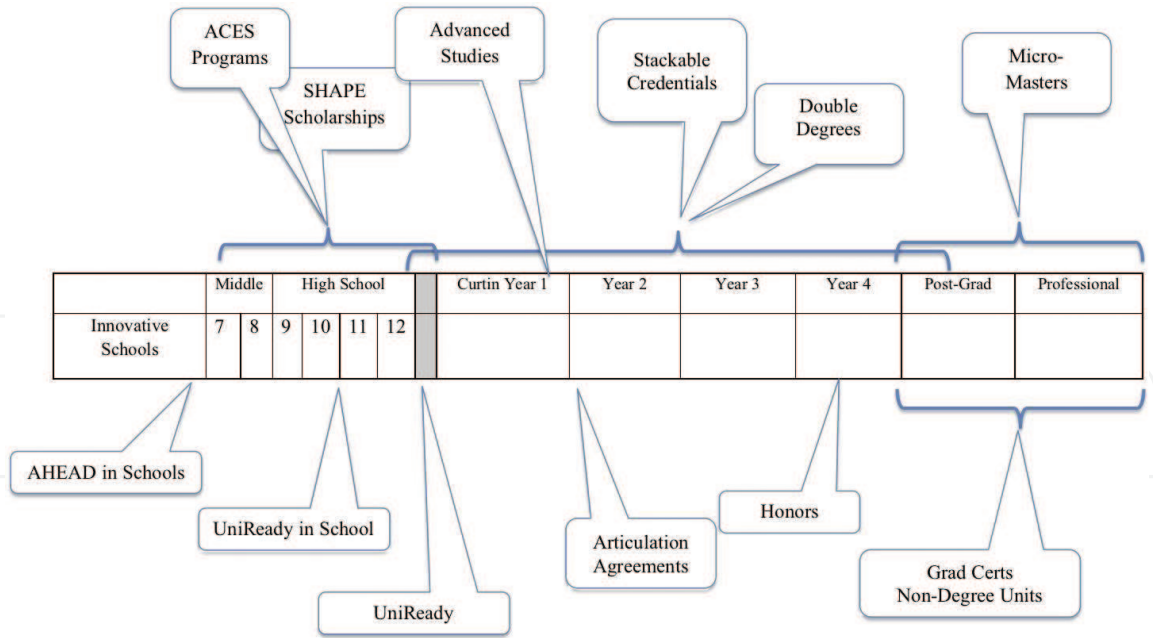


Figure 1.
Pathways and partnerships innovations for advancement at Curtin University.

and quality of talented young people who aspire to higher levels of learning, as well as to create expanded opportunities for people who have been out of school for a time, with convenient new options for retraining and lifelong learning. Our narrative begins, therefore, by exploring the realities of globally mobile learners, who can go anywhere in the world for their education, and who are the future talent of the global workforce, through a focus on primary and secondary school systems.

Figure 1 exemplifies a number of the innovative measures that Curtin University is implementing to meet the needs of a growing and diverse cohort of future students. Curtin recognizes the importance of innovating learning platforms across the breadth of an expanding student experience continuum. As a reflection of the evolution of the role of universities in society toward organizations that create capacity and mobilize communities and as key partners in offering wide access to unbundled on-demand learning opportunities within a lifelong learning and skills development paradigm, that is crucial to individual success in the twenty-first century. Some key pathway and partnership innovations focused on the identification and development of talent for entry, which support the social transformation of higher education, are presented below.

5.1 The AHEAD program

Addressing Higher Educational Access Disadvantage program (AHEAD) is a multifaceted program that works to create and implement practical solutions to the university access challenges faced by those community and school groups that are traditionally underrepresented in higher education. AHEAD has a proven track record in effecting change for its targeted demographics in improving access to university and positively impacting attitudes associated with aspiration for higher education [23, 24]. The AHEAD school partnerships target students from primary to year 12 in regional, remote, and access-disadvantaged situations. Long-term relationships are built with students, parents, and school staff to support the aspirations of promising young people. The program offers a range of services to help students envision and achieve their goals for postsecondary learning. A key function of AHEAD is to provide a safe context that includes time and language-appropriate information about careers, pathways, and access options to

support students working through the complex problem of university selection [25]. Students become known to the university through multiple engagements and innovative technologies, which help create a digital portfolio of evidence for their strengths, interests, and aspirations. This evidence portfolio is linked to attributes of successful university students and “future-ready” learners, reflecting collaboration, creativity, personal knowledge, problem-solving, and global sustainability knowledge and skills.

A set of indicators grounded in research and practice are embedded in AHEAD program offerings and online learning experiences, used to assess and evaluate student learning, as well as program focus (see **Table 1**). Five “attributes of future-ready learners” with 19 indicators form the backbone of an assessment framework embedded in the Curtin Challenge technology platform (described further below) and help to organize evidence of learning from a wide variety of school, community, and university offerings that engage students and develop talent. The research underpinning the attributes is founded in well-documented projects with global reach; for example, the attributes of “collaboration” and “problem-solving” come from the assessment framework of the Program for International Student Assessment [26]. Evidence of learning anytime, anywhere goes into a portfolio that is later used to award recognition, scholarships, and support services to the student.

The AHEAD program also supports professional development in schools and communities to improve counseling, pastoral care, and youth development as well as the knowledge and skills needed for success in higher education and lifelong

Attribute	Indicators
Collaboration [30]	Establishing and maintaining shared understanding
	Taking appropriate action to solve the problem
	Establishing and maintaining team organization
Creativity [31]	Idea generation
	Design and refinement
	Openness and exploration
	Working creatively
	Creative production
Personal learning [32]	Sharing experience
	Examining diverse concepts
	Articulating, applying and building understanding
	Communicating new powers and creations
Problem-solving [33]	Exploring and understanding
	Representing and formulating
	Planning and executing
	Monitoring and reflecting
Global sustainability [34]	Recognizing and valuing the needs and cultures of others
	Active involvement in addressing global needs
	Supporting the development of the social, economic, and environmental pillars

Table 1.
Attributes of future-ready learners.

learning. In planning is the “AHEAD Academy” which will offer direct learning services to both adults and students and will enhance the existing catalog of workshops, campus visits, mentoring, and case management support to the disadvantaged communities and the practitioners and professionals who work with them.

The AHEAD program is an expression of the university’s corporate social responsibility portfolio, which contributes to positive outcomes on three important dimensions: community development through the promotion of tertiary affinity [27], undergraduate work-integrated learning [28], and more broadly the university corporate culture [29].

5.2 ACES programs

Achievement Centered Engagements for Students (ACES) is the university’s accreditation program for university, school, and community offerings that enable students to evidence their learning from participation using the portfolio process and assessment framework outlined above. ACES accreditation serves as a tool to verify both quality and alignment with Learning Futures’ goals in the provision and recognition of pre-tertiary activities that promote knowledge and capabilities beneficial to successful transition and completion of a university degree. Students benefit from informal and formal learning opportunities offered by a wide range of community partners and recognition of their commitment and completion of such programs through eligibility for SHAPE Awards (see below). Community partners and schools benefit by additional recognition, support, and promotion of their offerings. AHEAD activities, in addition to other supportive learning activities offered by the school community, local museums, and interested educational organizations, are accredited by the university as “ACES programs.”

ACES programs can be offered by Curtin University, a school, or any community organization working with the university. The process of accrediting offerings involves a detailed self-examination of the learning opportunity by the candidate organization, which examines and seeks to improve how students are supported to reflect on and draw lessons from their experiences. University staff provide feedback on the self-assessment by an organization seeking ACES accreditation, using a scoring rubric with specific learning objectives, linked to broad conceptualizations of intelligence, performance, interest-driven learning, and personal initiative. The aims of the ACES programs are advanced and supported by:

- Repurposing outreach activities toward recognition of learner development.
- Recognizing a broader scope of learning beyond the classroom.
- Incorporating new focus on developing learner capabilities.
- Adding value to third-party programs by recognizing their role in developing the learner.
- Building engagement in learning through partnership and collaborative models.
- Creating linkages between student engagement and relevance to the student as a global citizen through challenge-based, games-based, and real-world learning experiences.

Examples of ACES-accredited programs include the AHEAD programs suite of aspiration, awareness, and capability-raising activities offered at the university, as well as external program offerings such as UNAOWA Global Citizenship and Sustainability program, a state-recognized school curriculum, and the UNEP-DHI Eco Challenge, a global serious game competition that develops awareness of water resource management issues.

5.3 SHAPE awards

Scholarships for High Achievement and Performance Engagement (SHAPE) rewards and recognizes the commitment of students to self-development in pursuit of advancing awareness and capabilities directly related to the pursuit of higher education readiness and success. SHAPE provides participants the opportunity to showcase extracurricular achievement that may not be captured within their university application. In so doing, it provides appropriate recognition for that activity and affirms a wide array of knowledge and capability acquisition that is highly beneficial to the success of a broad spectrum of student's access, transition, and completion of university. Such awards provide a framework of endorsement that promotes the undertaking of ACES-aligned activities and underscores the benefit to the individual of their completion. Students place evidence from ACES activities into portfolios that can be submitted for SHAPE awards. The SHAPE program offers awards of up to \$3000 for innovation, creativity, and entrepreneurship demonstrated through ACES programs. The SHAPE awards include one-off awards as well as a series of smaller awards that build slowly over time to accumulate to a maximum of \$3000 per student.

5.4 UniReady in schools

UniReady in Schools provides high school students with a structured higher education course and unit experience that allows them to prepare for a successful university learning experience. The four-unit course of study, which is typically undertaken over one or more semesters, helps to establish accurate expectations and supports students to test their readiness for higher education. Academic writing, for example, and all other courses in the program are taught and practiced with the same rigor as students will encounter at university and help students to develop associated skills and expectations so that they are ready to study and succeed at the university. The program is designed with a core of two required units—academic writing and communication—and a selection of two other units from six options that can be flexibly combined to give the best introduction to the major fields of study at the university. The university licenses schools to deliver the UniReady curriculum primarily online, within a monitored classroom led by a master teacher in the school trained and supported by the university. Marking practices and grades across all sites are monitored and moderated by the university. Schools are allocated a limited number of places in the program and make a commitment that the program will be used to enhance and not detract from the existing pathways to university. Schools that wish to utilize the program are carefully selected, trained, and monitored through a close working relationship, underpinned by mutual strategic commitments to lift the performance of targeted students and increase the number of capable students enabled to enter university. The program builds upon a successful broader program called *UniReady*.

The *UniReady* program is open to anyone post-high school, except for students who have completed *UniReady in School*. Students are aged 18 and older who are

seeking to demonstrate readiness to succeed at university. Successful program completion enables students to meet the minimum entry requirements for most undergraduate programs at the university. The program is comprised of two core courses (referred to as “units”): academic writing and communication; and a choice of two other units that introduce students to the first-year expectations of particular discipline areas: health sciences, business and law, indigenous studies, humanities, and science & engineering. Units are designed to meet specific requirements of their desired faculty and subject area and enter programs with confidence, skills, and experience. For example, a degree program such as engineering that requires a high level of mathematics includes a high-level mathematics UniReady unit.

5.5 Innovative schools consortium

Schools that demonstrate high levels of innovation and wish to strategically partner with Curtin University are invited to join the Innovative Schools Consortium (ISC). The 15-member ISC enables schools to identify, develop, and support high-potential students by working toward mutually agreeable strategic objectives and offering pre-university learning credits, scholarships, learning challenges, and alternative entry pathways. Together, the university and school develop and implement project-based learning experiences and curricula that incorporate digital technologies, as well as STEM (science, technology, engineering and mathematics) and STEAM (science, technology, engineering, arts and maths) approaches focusing on scientific knowledge and skills, and arts and humanities interdisciplinary integration with scientific fluency, in collaboration with university academics and industry partners.

As an example, a STEM curriculum development workshop was held at Curtin University at the request of Scotch College, one of the founding ISC partner schools. Subject matter experts from the university met with teachers and senior leaders from the school for three intensive days, to develop and design a curriculum for a new cross-disciplinary STEM subject empowered by technology. The innovative new curriculum integrates action research and learning practices through the incorporation of learning challenges that encourage students to reflect on the UN Sustainable Development Goals, while demonstrating creativity and innovation. The program has been scaled to several grade levels and has led to additional strategic actions by both the university and the school, including plans to offer high-level maths offerings to regional and remote schools and expand the professional development role of the school in promoting the adoption of international baccalaureate programs by schools in WA and elsewhere.

The ISC forges connections between schools, universities, businesses, government departments, and community partners. It has established a community of like-minded organizations committed to teaching, learning, and work readiness, to ensure student employment and support a sustainable future. The ISC allows students to remain responsive to changes in technology, while building strengths in innovation, creativity, and entrepreneurship through practical action learning challenges and experiences. Ultimately, the consortium advances the idea that imaginative teaching approaches—supported by advanced technologies and collaborative learning—best equip students to become the leaders of tomorrow.

5.6 Learning futures network

Established in 2017 to meet a growing interest by K-12 schools to have a meaningful and engaged relationship with Curtin University and other educational partners, the *Learning Futures Network* (LFN) now has over 130 member organizations. The

process of membership is less intensive than in the ISC and is open to all schools and educational organizations. The organizations and schools share mutual interests in improving learning, education, arts and culture, the future of work, global sustainable development, and science and technology foundations. Through the LFN, the university supports a new social infrastructure with resources to develop more authentic and future-aware processes to enable transformation and collaboration across student learning, and school and staff development. The LFN is a common ground for making connections between and across higher education, industry, culture, and community. Schools in the LFN learn about the expectations of higher education, alternative entry pathways, portfolio entry processes, teacher professional learning, and postgraduate opportunities. The digitally facilitated network makes it easy for innovators in schools to be more proactive in developing collaborative engagements with higher education. The network coordinates the recognition of ACES activities, and to date 18 activities have been granted recognition for supporting a broadened conception of intelligence, developing promising students for further education, increasing school engagement and encouraging student aspirations for further education.

6. A framework for technology innovations across five domains of learning and teaching

Supporting the wide range of initiatives focused on talent development and new pathways into Curtin, the university's vision for learning and teaching is undergoing several technological transformations. These technical innovations focus on five domains of higher education learning and teaching, as well as new and rebalanced roles of corporations as partners in demand-driven research. The technology platforms are evolving to facilitate unbundling of content and personalization of learning at scale and the operational innovations are evolving from a mindset of curriculum as primarily a sequence of units, courses, and degrees to one of lifelong, anytime, anywhere learning. Global and local business partnerships are increasingly becoming significant long-term research collaborations that are co-inquiring and co-developing transferable solutions for smart campuses, smart businesses, and communities of the future [1, 35].

The five domains of higher education learning and teaching illustrate where technology enhancements are poised to make significant contributions to transformation:

1. Developing talent: understanding the market, creating personalized recommendations, and transforming community engagement.
2. Personalizing at scale: personalizing support services, proactively managing engagement and retention, and personalizing communications.
3. Emergent curriculum: adapting content to learners in near real-time, delivering engaging content at scale and integrating content with rapidly changing global workplace needs.
4. Dynamic delivery: analytics-led understanding of student learning needs, adaptive assessments, and a managed outcomes framework anchors curriculum delivery.
5. Global networks: strategic employment of graduates, alumni networks that support entrepreneurship and innovation and targeted recruitment into research areas are empowered by technology.

These five domains were developed in 2013 and 2014 as part of the “Transforming Learning at Curtin” initiative [1], based on a university-wide strategic project that conducted international comparisons, literature research, focus group interactions, and workshops. Pilots have been continuously spun out of the model since 2014 and in part have led to innovations such as the Curtin Challenge described below. Looking ahead, with automated processes and artificial intelligence likely to eventually form part of these domains of operations of learning and teaching, a strategic vision of technology-enhanced operations (see **Table 2**) guides thinking, shapes conversations, and engenders new ideas for the future. In the vision for technology-enhanced operations are statements of “end state” visions for specific goals within each of the five domains. A discussion of all the goals is beyond

Developing talent	
Market understanding	The university generates profiles of in demand skills in the market, tracks education trends, and reacts accordingly
Personalized recommendations	Student and market information are used to aid course selection and align student expectations
Community engagement	The university’s market knowledge is reflected in its outward facing marketing and community engagement
Personalization at scale	
Personalized support	Support services use interaction history to learn from interaction and become tailored to individuals
Proactive retention management	Students with high attrition risk are identified early and receive targeted preventative interventions
Personalized communication	Learning materials are targeted at students based on learning style and level of attainment
Emergent curriculum	
Adaptive curriculum	Curricula are dynamic, adapting in real time to student needs and the external environment
Scalable delivery	The latest technologies deliver content to all students & staff and allow near-real time feedback and decisions
Integration with industry	Curricula are designed to deliver the competencies in demand and allow relevant work place learning
Dynamic delivery	
World leading pedagogy	Analytical research into student cognition and teaching method are used to define the university’s practices, and drive student self-awareness
Adaptive assessment	Student evidence of learning is measured continuously, allowing targeted, dynamic assessment
Managed outcomes framework	Students are assessed against a granular framework, allowing for an iterative approach to learning
Global networks	
Strategic employment	Market analysis and a unique assessment framework allow students to secure positions with high prestige employers
Alumni communication	Alumni are engaged with information on market and industry trends and opportunities for further study
Targeted recruitment into research	Engagement in research is developed from specific analysis of history and student competency

Table 2.
Vision for technology enhanced operations.

the scope of the article, which is focused on the first goal—talent development—but the full framework is offered here to form a broader context to understand how the university is thinking about its future.

Common to the organizational transformation of education across all five of the domains is a conception of using technology to digitally enhance learning at scale. Enhancement at Curtin is based on two primary strategies: (1) unbundling and recognizing learning at “micro” levels (micro-credentials and micro-masters) and (2) offering personalized and team-based learning digitally at scale [20, 36]. New gamified self-paced individual and team-based learning experiences are constructed on the university’s *Challenge* platform—an authoring and learning experience deployment system for highly interactive online learning. The use and promotion of technology to innovate learning for undergraduates has been criticized for over emphasizing its real-world impact, as the lived experience of the students’ use of technology can be characterized as only creating digitally augmented process efficiencies, for example watching/re-watching video, digital library access, online curriculums guides, etc. [37]. However, Curtin’s approach emphasizes the focus and commitment to innovating learning and teaching through team-based activities and hyper-connected learning offerings, creating the potential for significant digitally driven students’ learning transformations. Challenge-based learning [38] is applicable to all levels of education, is flexible for any level of team project or individual learning experience, and is thus making its way into capstone projects and other project-based learning experiences in formal and informal offerings of the university and its partners. In addition, the university’s massive open online course system and membership in the edX Consortium [14] support large-scale deployment of learning experiences. The following section will describe Curtin Challenge in more detail and link it to the global aspirations of scalable delivery of digital learning experiences.

6.1 Curtin Challenge

Curtin Challenge is an interactive online learning platform that uses game-based elements to motivate individual and team learning [39]. The platform supports self-directed learning at scale with automated feedback and assessment in real time, at the point of learning. It promotes active engagement to enable deeper learning, evidence of which is captured via fine-grained data collection by a learning analytics engine. Challenge has the capability, for example, to identify and track who does what during team work to promote individual responsibility among participants. It can also engage students in peer feedback, supporting development of critical thinking and reflection skills, as team members work toward solving a wide variety of challenges.

Originally built for the university’s own students but now offered worldwide, the Challenge platform offers teachers new ways to create, administer, and evaluate learning experiences, which extend beyond the traditional classroom, with capacity for students to work collaboratively with others across the globe. Challenge is designed to support the development of graduate attributes, such as leadership, employability, and global sustainability, in both informal and formal learning contexts. The innovation projects outlined earlier are actively reworking their face-to-face and traditional e-learning offerings into the Challenge platform.

Learners are offered rewards and/or recognition, based on evidence of achieving objectives, creating work products, and participating in self-scoring throughout their challenge. Educators are enabled to monitor and collect valuable data to verify achievement, as well as to evaluate and enhance learning design. Four learning pathways grounded in real-world problem-solving are currently available through the platform, focusing on leadership skill development, career planning, English

language proficiency, and preparation to study abroad. These challenges are made up of 12–14 modules that each takes about an hour to complete, and can be stopped and started at any time. Each module includes around five interactive activities. Students engaged in these challenges to date have completed over 186,000 activities, with over 10,000 modules completed in the Careers Challenge and around 22,000 modules of the Leadership Challenge completed, since their launch in 2014 [40]. With such massive uptake, the cost of delivering these learning experiences amounts to “pennies per student.”

Challenge allows educators to author their own customized modules and activities and link these to their Blackboard units. Challenge is also successfully being used by international students, with new programs currently piloted with Hong Kong universities and a Perth high school. Challenge is part of Curtin’s digital learning and teaching ecosystem that includes edX (massive open online courses) and Blackboard (learning management system) delivery systems. These delivery systems are supported by the university’s Analytics Insight team who work with the UNESCO Chair of Data Science in Higher Education Learning and Teaching [41] to provide global context for data, establish and manage international research projects, promote local pilots, and propel momentum for innovation in learning and teaching.

7. Conclusion

As a response to global and local imperatives for organizational, operational, and social challenges facing education today, learning innovations developed by Curtin University’s Learning Futures team are examples of new technology-enhanced learning experiences used to identify and develop talent for university. The innovations, set in the context of a vision for using technology in all areas of the university, are helping to reset school-university relationships to a focus on direct, scalable digital learning services delivered via interactive technologies utilizing game-based and team-based learning approaches created with a new authoring, delivery, and analytics platform. The educational technology innovations support the university’s vision of academic, research, and service-based strategic actions by offering new options along a continuum of entry points for learners of all ages to access from anywhere at any time.

Author details

Mel Henry, David C. Gibson*, Charles Flodin and Dirk Ifenthaler
Curtin University, Perth, Western Australia, Australia

*Address all correspondence to: david.c.gibson@curtin.edu.au

IntechOpen

© 2018 The Author(s). Licensee IntechOpen. This chapter is distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/3.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. 

References

- [1] Downie J. Curtin Converged: A new model of teaching and learning. Curtin University News [Online]. 2012. Available from: http://www2.curtin.edu.au/learningfortomorrow/our_approach/curtin-converged.cfm [Accessed: 18 September 2015]
- [2] Moran C. Research Strategy 2017 at Curtin University: A Discussion Paper. Perth: Curtin University; 2017
- [3] Gibson D. Learning Futures Network [Online]. 2018. Available from: <http://www.learningfuturesnetwork.org/> [Accessed: 12 August 2018]
- [4] Bradley D, Noonan P, Nugent H, Scales B. Review of Australian Higher Education: Final Report. Canberra, Australia: Australia Department of Education; 2008
- [5] Tomlinson M. Student perceptions of themselves as 'consumers' of higher education student perceptions of themselves as 'consumers' of higher education. *British Journal of Sociology of Education*. 2017;**38**(4):450-467
- [6] Sarrico C, Teixeira P, Magalhães A, Veiga A, João Rosa M, Carvalho T, editors. *Global Challenges, National Initiatives, and Institutional Responses*. Rotterdam: Sense Publishers; 2016
- [7] Bhardwa S. Why do students go to university and how do they choose which one? *Times Higher Education: The World University Rankings* [Online]. 2018. Available from: <https://www.timeshighereducation.com/student/news/why-do-students-go-university-and-how-do-they-choose-which-one>
- [8] Marks GN. Do the labour market returns to university degrees differ between high and low achieving youth? Evidence from Australia. *Journal for Labour Market Research*. 2018;**52**(1):5
- [9] New Media Consortium, NMC Horizon Report: 2014 Higher Education Preview, 2014
- [10] Altbach PG, Reisberg L, Rumbley LE. Trends in Global Higher Education: Tracking an Academic Revolution Trends in Global Higher Education. Higher Education; 2009. Retrieved from: <http://unesdoc.unesco.org/images/0018/001832/183219e.pdf>
- [11] Ifenthaler D, editor. *Digital Workplace Learning. Bridging Formal and Informal Learning with Digital Technologies*. New York: Springer; 2018
- [12] Regenstein C, Dewey BI. *Leadership, Higher Education, and the Information Age: A New Era for Information Technology and Libraries*. New York: Neal-Schuman Publishers; 2003
- [13] Mishra P, Cain W, Sawaya S, Henriksen D. Rethinking technology & creativity in the 21st century: A room of their own. *TechTrends*. 2013;**57**:5-9
- [14] Severance C. Anant agarwal: Inside edX. *Computer*. 2015;**48**(10):8-9. <https://doi.org/10.1109/MC.2015.308>
- [15] Gibson D. Game changers for transforming learning environments. In: Miller F, editor. *Transforming Learning Environments: Strategies to Shape the Next Generation, Advances in Educational Administration*. Vol. 16. Bingley, UK: Emerald Group Publishing Ltd; 2012. pp. 215-235
- [16] Curtin University. Strategic Plan 2020: Delivering Excellence. Strategic Plan 2017-2020 [Online]. Curtin University; 2018. Available from: <http://strategicplan.curtin.edu.au/>
- [17] Gibson D, Irving L, Scott K. Technology-enabled challenge-based learning in a global context. In: Shonfeld M, Gibson DC, editors. *Collaborative*

Learning in a Global World. Charlotte, NC: Information Age Publishers. p. 450

[18] UN SDG Report. The Sustainable Development Goals Report 2016 (The Sustainable Development Goals Report). United Nations (Vol. 2016). United Nations. 2016. <http://undocs.org/A/68/970> <https://doi.org/10.18356/3405d09f-en>

[19] Anderson T, McGreal R. Disruptive pedagogies and technologies in universities: Unbundling of educational services. *Educational Technology & Society*, 2012;15(4):380-389

[20] Gibson D, Coleman K, Irving L. *Learning Journeys in Higher Education: Designing Digital Pathways Badges for Learning, Motivation and Assessment*. Cham: Springer International Publishing; 2016

[21] Priem RL, Li S, Carr JC. Insights and new directions from demand-side approaches to technology innovation, entrepreneurship, and strategic management research. *Journal of Management*. 2012;38(1):346-374. <https://doi.org/10.1177/0149206311429614>

[22] Seltzer R. Days of reckoning. Inside Higher Education [Online]. 2017. Available from: <https://www.insidehighered.com/news/2017/11/13/spate-recent-college-closures-has-some-seeing-long-predicted-consolidation-taking>

[23] National Centre for Student Equity in Higher Education. *Higher Education Participation and Partnerships Program: Seven Years On*. Perth, WA: Curtin University; 2017

[24] Flodin C, Vidovich N. Innovations and insights in higher education outreach programs. In: Hoffman J, Blessinger P, Makhanya M, editors. *Strategies for Facilitating Inclusive Campuses in Higher Education: International Perspectives on Equity*

and Inclusion. Bingley, UK: Emerald Group Publishing Ltd; 2018

[25] Flodin C. Raising Aspirations. *Bulletin*, No. 192, London. 2017. pp. 8-9

[26] PISA. *Draft Collaborative Problem Solving Framework*. Paris, France: Organization for Economic and Community Development; 2013

[27] Thorn C, Flodin C. Clontarf to Curtin: Row AHEAD and tertiary affinity. *International Journal of Learning in Social Contexts* [Special Issue: Indigenous Pathways and Transitions into Higher Education]. 2015;17:1-112

[28] Karnovsky S, Flodin C, Beltman S. The Curtin coaches: Benefits of an outreach tutoring program for first year pre-service teachers. A practice report. *International Journal of the First Year in Higher Education*. 2015;6(1):163-169

[29] Asrar-ul-Haq M, Kuchinke KP, Iqbal A. The relationship between corporate social responsibility, job satisfaction, and organizational commitment: Case of Pakistani higher education. *Journal of Cleaner Production*. 2017;142:2352-2363

[30] Roschelle J, Teasley S. The construction of shared knowledge in collaborative problem-solving. In: O'Malley C, editor. *Computer-Supported Collaborative Learning*. Berlin: Springer-Verlag; 1995. pp. 69-97

[31] Mishra P, Henriksen D, D. P. R. Group. A NEW approach to defining and measuring creativity: Rethinking technology & creativity in the 21st century. *TechTrends*. 2013;57(5):10-13

[32] Friedrichs A, Gibson D. Personalization and secondary school renewal. In: DiMartino J, Clarke J, Wolf D, editors. *Personalized Learning: Preparing High School Students to Create their Futures*. Lanham, Maryland: Scarecrow Education; 2003. pp. 41-68

- [33] Mayer R, Wittrock M. Problem-solving transfer. In: Berliner D, Calfee R, editors. *Handbook of Educational Psychology*. New York: Simon & Schuster Macmillan; 1996. pp. 47-62
- [34] Keeble BR. The Brundtland report: Our common future. *Medicine and War*. 1988;4(1):17-25. <https://doi.org/10.1080/07488008808408783>
- [35] Gibson D, Broadley T, Downie J. Blended learning in a converged model of university transformation. In: Lim CP, Wang L, editors. *Blended Learning for Quality Higher Education: Selected Case Studies on Implementation from Asia-Pacific*. Paris, France: UNESCO; 2016. pp. 235-264
- [36] Cassily C, Flintoff K, Gibson D, Coleman K. Campus policy framework for open badges. Perth, WA. 2014. Retrieved from: https://www.academia.edu/8830797/A_collaboratively_drafted_campus_policy_framework_for_open_badges
- [37] Henderson M, Selwyn N, Aston R. What works and why? Student perceptions of 'useful' digital technology in university teaching and learning. *Studies in Higher Education*. 2017;42(8):1567-1579. <https://doi.org/10.1080/03075079.2015.1007946>
- [38] Johnson L, Adams S, Apple. *Challenge Based Learning: The Report from the Implementation Project*. 2010
- [39] Gibson D, Irving L, Scott K. Challenge-based learning in a serious global game. In: Lee N, editor. *Encyclopedia of Computer Graphics and Games*. Cham: Springer International Publishing; 2017. pp. 1-4
- [40] Ifenthaler D, Gibson D, Dobozy E. The synergistic and dynamic relationship between learning design and learning analytics. In: *ASCILITE 2017*. Tooumba: ASCILITE; 2017. pp. 1-5
- [41] Gibson D. UNESCO Chair [Online]. 2018. Available from: <https://research.curtin.edu.au/projects-expertise/institutes-centres/unesco/>