White Paper: A 21st Century Education Paradigm

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Abstract

The following White Paper is intended as a provocation, discussion starter, and outline for a blueprint for a future education system that is designed for the 21st Century. It is evidenced by research pertaining to Australia, and refers to Australia specifically as an exemplar of how the education system is failing, but is equally applicable to any country or state that applies a content based, school driven education system, where the delivery is organised for the convenience of the school and the teachers rather than the students. This White Paper outlines a major paradigm shift in how we think about and deliver education, and is the policy representation of the design principles that underpin the Inventorium, an education co-operative that offers a curriculum online for delivery to 15+ year olds.

Keywords: 21st century education; paradigm shift; education system, high school education

Introduction

The current school education system is broken. One in four children are dropping out of school without a leaving certificate[1]. Sir Ken Robinson highlighted this particularly eloquently in his RSA presentation[2] back in 2010 when he notes we have a batch processing school system that was designed for the industrial era. We've moved beyond the industrial era now but continue to educate children for the past. Our school system designed for the 19th century has witnessed little real change as it has propelled into the 21st century, and rather than embrace the changes society has seen and technological opportunities and advancements, schools are inclined to exclude them[3]. The result has been a decline, the extent of which is widespread and equivalent to a generation of Australian school children falling short of their full learning potential[4].

> "In education, technology can be a life-changer, a game changer, for kids who are both in school and out of school. Technology can bring textbooks to life. The Internet can connect students to their peers in other parts of the world. It can bridge the quality gaps." **Queen Rania of Jordan**

Our response to date has been to educate youngsters for longer[5] and send more through the University system[6], hoping that higher education will 'fix the problem'. But the university system is broken too (although not the focus of this paper).

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[1] Longbottom, J. (2015) *One in four Australian students drop out of high school, study finds*. The World Today. 26 October.
[2] Sir Ken Robinson (2010) Changing Education Paradigms. @ https://www.youtube.com/watch?v=zDZFcDGpL4U
[3] See, for example, Raper, A.& Wylie, B. (2018) Banning mobile phones in classrooms takes education back in time, experts say. ABC News @ http://www.abc.net.au/news/2018-02-05/debate-on-mobile-phones-in-the-classroom/9397898
[4] Gonski et al (2018) Through Growth to Achievement: Report of the Review to Achieve Educational Excellence in Australian Schools. Commonwealth of Australia. March.
[5] Patty, A. (2012) Disruption, time wasting after school leaving age raised to 17. The Sydney Morning Herald @https://www.smh.com.au/education/disruption-time-wasting-after-school-leaving-age-raised-to-17-20121101-28my8.html
[6] See, for example, government statistics @ https://docs.education.gov.au/node/46066

Universities are one of the most inefficient and ineffective organisations in the 21st century[7] producing thousands of unemployable graduates each year[8].Only 40% of employers believe that the education system overall is doing a good job of preparing people for organisations like their own.[9]

> "The principle goal of education in the schools should be creating men and women who are capable of doing new things, not simply repeating what other generations have done."**Jean Piaget**

The problem, therefore, is that we have an education system that is not preparing young people with what they are going to need in order to thrive in the 21st century. There are also a wide range of educational outcomes in the same classroom or school, with the most advanced students in a year typically five to six years ahead of the least advanced students.[10]As we move beyond the knowledge economy to the next iteration of creative digital existence, the education system needs to be fundamentally redesigned. By 2030 it is predicted that up to 30% of current jobs will have been replaced by automation, and of those that remain, most will be at least partially automated from their current format[11].

Like many countries, Australia still has an industrial model of school education that reflects a 20th century aspiration to deliver mass education to all children. This model is focused on trying to ensure that millions of students attain specified learning outcomes for their grade and age before moving them in lock-step to the next year of schooling. It is not designed to differentiate learning or stretch all students to ensure they achieve maximum learning growth every year, nor does it incentivise schools to innovate and continuously improve[12].

The old assumptions underpinning the current education systems no longer apply, and a paradigm shift in education is needed. Rather than continuing to pour good money after bad in trying to fix a broken system with 'elastoplast initiatives', governments now need to lay their corpses to rest and invest instead in supporting new emerging offerings that educate people for the 21stcentury, and prepare them for a future existence and world of work appropriately.

The foundations of such a system, fit for purpose for the 21st century, are outlined in this paper.

21st Century Assessment Outcomes

ATAR is a ranking system based on testing. Youths get ranked as to how well they passed 'the tests' in comparison to everyone else who sat them in their year. The system is norm referenced rather than criterion referenced, meaning that the year in which you sit the tests can impact significantly on the outcome. As it is not criterion referenced, it is not possible for everyone to do very well and be successful.

The 'competition rules' therefore push students to opt for subjects that are perceived as easier in which to gain higher scores and are driving them away from the higher level STEM subjects[13]. "The total percentage of people studying advanced mathematics has almost halved between 1992 and 2012, from 16 to 9 per cent"[14]. In addition to swaying student choices, the system also impacts on young people's self esteem, self confidence, self efficacy and sense of success and failure[15].

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[7]Dodd, T. (2017) Universities lack the spur of competition to boost efficiency and productivity. Australian Financial Review, 25 August @ http://www.afr.com/leadership/universities-lack-the-spur-of-competition-to-boost-efficiency-and-productivity-20170817-gxyoy2

[8] Creighton, A. (2018) *Unis failing to deliver for business.* The Australian. January 8.

[9]PwC (2017) The future of talent: opportunities unlimited. The Chartered Accountants Australia and New Zealand.

[10] Masters, G. 'Towards a growth mindset in assessment' in *ACER Research developments,* viewed 21 February 2018, https://research.acer.edu.au/cgi/viewcontent.cgi?article=1017&context=ar_misc.

[11] McKinsey Global Institute (2017) Jobs Lost, Jobs Gained: Workforce transitions in a time of automation. December.

[12]Gonski et al (2018) Through Growth to Achievement: Report of the Review to Achieve Educational Excellence in Australian Schools. Commonwealth of Australia. March.

[13]STEM Partnerships Forum (2018) Optimising STEM industry-school partnerships: Inspiring Australia's next generation. Victoria: Education Council.

[14]Fernando, G. (2018) Why it's time to ditch the ATAR. New.com.au quoting Dr Finkel, Chair of STEM Partnerships Forum. 24/4/18.

[15]Kim S.-I., Lee M.-J., Chung Y., Bong M. (2010) Comparison of brain activation during norm-referenced versus criterion-referenced feedback: The role of perceived competence and performance-approach goals *Contemporary Educational Psychology*, 35 (2) , pp. 141-152.

It is comparative and hence demotivating for those who know they are not going to do as well as some others. However, if they have the possibility of being equally successful, the motivation to succeed shifts because it is up to the individual and them alone. An education system for the 21st century will be criterion referenced and allow for differentiation of levels of mastery, encouraging further learning and the development of personal expertise and a differentiated portfolio skillset.

21st Century Assessment Processes

It is important to consider assessment processes here, and note that what is considered 'cheating' in the education system is considered best practice in the workplace. The education system therefore works against the requirements of employers, rather than promoting the skills that they need. The number one reason constantly given for the continued inclusion of the examination in the assessment process is that you genuinely know it is the individual's own work. That is, it is about the most difficult assessment process at which to cheat. But cheating is a disposition and frame of mind, and to assume everyone is going to cheat unless you prevent them from doing so, suggests a much deeper problem about how the education system views its students. And – many of the skills that education consider 'cheating' would be considered best practice out in the workplace. For example, gaining the advice of an expert; asking people who've done it before so you learn from their mistakes; borrowing good ideas from other contexts and re-applying them to your situation; looking things up to check your facts and get the most up to date information rather than relying on memory etc. Including these in the assessment criteria (appropriately referenced) flips the approach to action that many currently consider plagiarism.

An education system for the 21st century will recognize multiple means of assessment as appropriate to the learner and the outcome they are seeking to achieve, and allow them to demonstrate mastery at a range of levels as they progress and gain experience over time.

21st Century Teaching

"Everyone who remembers his own education remembers teachers, not methods and techniques. The teacher is the heart of the educational system."**Sidney Hook**

Teachers enter the profession because they want to make a difference to others; they want to help others succeed. The skillset currently used in teacher training education is one that pushes children through the batch processed industrial age system rather than developing their transferable, enterprising skills[16]. The skill set they need to use is one of facilitating learning, so that they work with the students to help them develop their curiosity and learn as they experiment and experience different achievements, supporting them in becoming lifelong learners. This shifts teacher education from being one of delivering a content based curriculum, to one of answering questions, developing enquiry skills, and facilitating journeys where they are unlikely to know what the outcomes are going to be. In essence, teachers help develop the research skills of their learners, making them expert researchers themselves. This in turn requires are search based approach to teacher education[17]. An education system for the 21st century will be facilitated by a teacher population who support learners in their quest for knowledge and development, and guide them through learning processes as a facilitator, coach, mentor and networker;
supporting the lifelong learning bug of inquiry, the quest for new knowledge, and the search for and evaluation of evidence. This will meet the Gonski recommendation priority one: Deliver at least one year's growth in learning for every student every year. 'These reforms also depend on creating the conditions that will enable teachers and schools to successfully adopt practices that support tailored teaching for growth, such as collaborative planning, teaching and assessment, and personalised learning for students.[18,]

21st Century Curriculum

A government document obtained by *The Age* shows more than 10,000 students in years 9 to 11 disengage from the education and training systems every year.

[16]ACER (2014) Australian teachers and the learning environment: An analysis of teacher response to TALIS 2013.
[17]Toom, A., Kynäslahti, H., Krokfors, L., Jyrhämä, R., Byman, R., Stenberg, K., Maaranen, K. &Kansanen, P. (2010) Experiences of a Research-based Approach to Teacher Education: suggestions for future policies. E*uropean Journal of Education,* Vol.45(2), pp.331-344.
[18]Gonski et al (2018) Through Growth to Achievement: Report of the Review to Achieve Educational Excellence in Australian Schools. Commonwealth of Australia. March. (p. x)

A further 6,000 drop out within 12 months of transferring to the vocational education and training (VET) system.[19] The issues they face then become a static cycle of lack of social capital leading to lack of opportunity to build social capital.[20]The issues are exacerbated for young people in regional, rural and remote Australia where engagement with education, employment and community are all issues with limited choices available, and the perception that their contribution is not valued or used.[21]

Juxtapose this with the Mission Australia 2014 survey of 13,000 young people which found '… all young people, regardless of location or social background, aspire to career success and financial security.'[22]The problem is not with the young people themselves and their future aspirations, but rather with a curriculum that they are not seeing as relevant to meeting their needs and furthering their futures.

"Education is what remains after one has forgotten what one has learned in school."
Albert Einstein

In an instant society where the internet offers immediacy and the mobile phone is an extension of the human hand, learning about content is largely irrelevant. Young people are becoming disengaged from learning because the learning delivery is not engaging them. They can find out anything they want to know on the internet so the experience of a content-based curriculum in schools loses value. Young people seek meaning for their learning and real application for its content-the current schools delivery model does not consistently provide either.

The curriculum needs to shift from being content driven to process and experience driven, so that young people develop their learning processes through building on a range of experiences, and they seek the content they need as part of completing the learning experience.

It also needs to be organised around career outcomes rather than subject matter in silos, so that subjects are put together in an interdisciplinary manner to provide linkage and build curiosity rather than being taught in isolated silos. The Foundation for Young Australians report 'The New Work Mindset[23]' outlines 7 job clusters that offer a framework for organising curriculum around career foci.

An education system for the 21st century will have an ever evolving, responsive curriculum base that responds to the needs and challenges that society and individuals face, providing a foundation for building the skills, disposition, knowledge and application required to succeed in the pursuit of a goal. This will meet Gonski recommendation priority two: Equip every child to be a creative, connected and engaged learner in a rapidly changing world.

21st Century Employment

More than 50% of young people want to be their own boss[24] but there is nothing in the current school curriculum that prepares them to do this.
Whether this desire stems from them being budding 'entrepreneurs' or simply that they don't want to be told what to do, the realisation that work is an unproductive, unhappy endeavour for many of their parents and the generations before them takes them to a point where they don't want others to profit from their efforts; they want to profit themselves. That said, while many like the idea, the reality of putting the idea into practice is not economically or practically possible for many[25].

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[19] Cook, H. (2014) 10,000 children dropping out of school. The Age. http://www.theage.com.au/victoria/10000-children-dropping-out-of-school-20140511-zr9me.html (accessed 4/10/16).
[20]Scharr, S. (2016) Tackling long-term youth unemployment. yourtown.
[21]Davie, A. (2015) Engaging young people in regional, rural and remote Australia. Australian Clearing House for Youth Studies.
[22] Clarke, K. (2015) Australia's School Dropouts: Why we need to intervene. @
https://pursuit.unimelb.edu.au/articles/australia-s-school-dropouts-why-we-need-to-intervene (accessed 4/10/16).
[23]Foundation for Young Australians (2016) The New Work Mindset. Melbourne: FYA.
[24]See, for example, US Small Business Development Centre report @ https://www.prnewswire.com/news-releases/half-of-millennials-plan-to-start-a-business-in-the-next-3-years-300465835.html
[25]Alton, L. (2017) Are millennials more or less likely to start their own businesses? @
https://www.forbes.com/sites/larryalton/2017/02/15/are-millennials-more-or-less-likely-to-start-their-own-businesses/2/#2936603d3f34

An education system for the 21st century appreciates that the future of work is uncertain and that the skills that make some employable, also allow them to be self-employable. Where work is not available through large employers, people will thrive through self-employment and community engagement, and preparation for such will future proof the economy, and the well-being of many individuals.

21st Century Purpose

Whether the role or purpose of education is preparing people to live in the here and now, or in preparation for the future; and whether it is to prepare for survival as an individual in a competitive manner, or as a person contributing to a wider society; the focus on 'knowledge' per se is a distraction because it can be measured, while the broader purposes of education are harder to assess. In developing the 4-6-1 model (below), Claxton focusses on the development of habits of learning that lead to frames of mind, and presence of mind, which can fit any purpose[26].

> "Develop a passion for learning. If you do, you will never cease to grow."**Anthony J. D'Angelo**

An education system for the 21st century requires learners to be motivated to succeed; it requires learners to have aspiration and vision; and it requires them to be open to change. In a world that is continually changing at an exponential rate, the system needs to be able to support individuals in responding to that change at the level, depth and breadth that they require to maintain their mastery in their chosen professional field. Education therefore needs to focus on developing the habits of learning that leads to the frames of mind which can support the presence of mind to enable people to succeed in the 21[st]century.This meets Gonski recommendation priority three: Cultivate an adaptive, innovative and continuously improving education system.

Figure 2 **The 4-6-1 model**
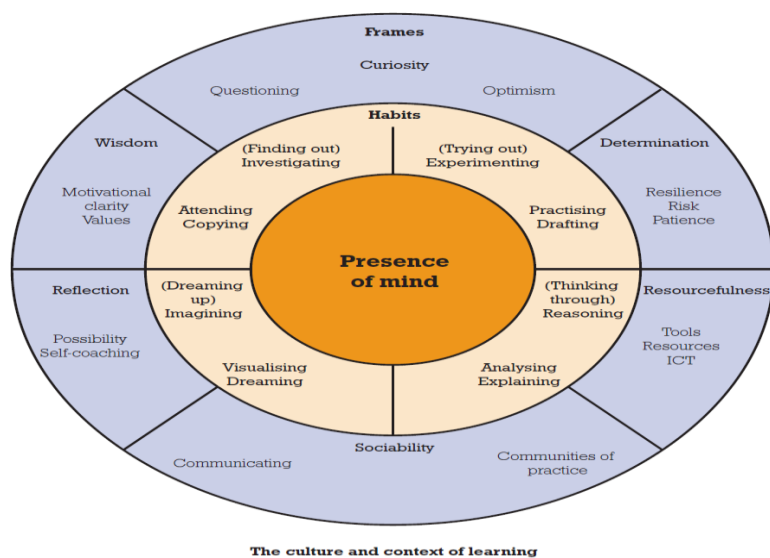
Source: Claxton et al, (2010) Bodies of Knowledge. [27]

So what does this mean for the education system?

Gonski notes that in the current education system 'the constraints include inflexibility in curriculum delivery, reporting and assessment regimes, and tools focussed on periodic judgements of performance, rather than continuous diagnosis of a student's learning needs and progress'[28]. There needs to be some fundamental changes to the assumptions and foundations on which the education system is built. It is easiest to demonstrate the scope of the change by doing a comparison of what we have and what a future system should embrace. These are summarised in this next table.

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[26]Claxton, G. (2008) *What is the purpose of school?* Oneworld publications.
[27]Claxton, G., Lucas, B. & Webster, R. (2010) *Bodies of Knowledge.* Edge Foundation, London
[28]Gonski et al (2018) Through Growth to Achievement: Report of the Review to Achieve Educational Excellence in Australian Schools. Commonwealth of Australia. March. (p.ix)

Current Education System	Future Education System
Curriculum based on content delivery determined by externals who have decided students need it	Curriculum based on activities that require learners to access content as they decide they need it
Curriculum based on content delivery which is then questioned/tested	Curriculum based on questions/tests that lead learners to content
Curriculum assessed by examination, tests and assignments	Curriculum assessed by completion of projects and demonstration of skills
Students attend because they are legally required to	Learners attend because they want to
Teachers are assigned to classes and students	Learners choose and seek out their teachers
Curriculum has been written remote from industry input	Industry embedded in the curriculum writing process
Curriculum teaches content in silos	Curriculum is project based so interdisciplinary
Curriculum is school and teacher centred; the school decides what they do, when and in which order.	Curriculum is learner centred; they decide what they do, when, in which order.
Students progress in age groups	Learners progress according to their achievements
Curriculum is delivered in set time periods decided by the school	Curriculum is completed in the timeframe that suits the leaner
Assessment is completed at fixed points in time	Assessment is submitted when the learner feels ready
Qualifications are awarded for attainment in specified time periods	Qualifications can be attained at any time when sufficient evidence is provided

This is not a soft option. This is very challenging as the learner takes responsibility for their outcomes, and is accountable for their own choices. Their success is firmly anchored in themselves, and the lack of time boundaries means that if they screw it up first time, they can go back when they're ready and motivated to succeed. They can continually dip in and out throughout their careers, and the system flexes and is adaptable to micro-credentialling to help record increased levels of mastery.

> "Nothing in this world can take the place of persistence. Talent will not: nothing is more common than unsuccessful men with talent. Genius will not; unrewarded genius is almost a proverb. Education will not: the world is full of educated derelicts. Persistence and determination alone are omnipotent."**Calvin Coolidge**

Conclusions

Building a new education system to fit a 21st century paradigm requires courage. We are all products of the current system; it is familiar to us; it is embedded in our culture and society; and it is all that we have known and can know. We have invested much time and money in creating systems to support, sustain and reify what we have created. Shifting to a new system does not mean we have to throw everything away and start again; it means we evaluate what we have against new criteria and make changes as appropriate to keep the areas that will work within the new system, and leave the blockers and restrictors behind. For too many years successive governments and education leaders have been investing in putting 'bandages' on a corpse, hoping to stem the decay and preserve what is there. But it is time to lay this corpse to rest and build from new foundations. A new education paradigm fit for the 21st century is needed if our younger population are to succeed in an increasingly global, digital and social world. We need to be driving this new network as education leaders and policy makers to ensure Australia is seen as a leading force in education.