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The creative citizen: Understanding the value of design education programs in the knowledge economy

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Abstract: *The knowledge economy relies on the diffusion and use of knowledge as well as its creation (Houghton and Sheenan, 2000). The future success of economic activity will depend on the capacity of organisations to transform by increasing their flexibility. In particular, this transformation is dependant on a decentralised, networked and multi-skilled workforce. To help organisations transition, new strategies and structures for education are required. Education systems need to concentrate less on specialist skills and more on the development of people with broad-based problem solving skills that are adaptable, with social and inter-personal communication skills necessary for networking and communication. This paper presents the findings of a 'Knowledge Economy Market Development Mapping Study' conducted to identify the value of design education programs from primary through to tertiary level in Queensland, Australia. The relationship of these programs to the development of the capacities mentioned above is explored. The study includes the collection of qualitative and quantitative data consisting of a literature review, focus groups and survey. Recommendations for the future development of design education programs in Queensland, Australia are proposed, and future research opportunities are presented and discussed.*

Keywords: *Knowledge economy, creative economy, design education*

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Education in the Knowledge Economy

Over the last twenty years societies have transitioned away from labour intensive 'smoke-stack' industries towards a knowledge intensive and creative organisational focus. A consequence of this transition has been the transformation of the workforce, from labour intensive into flexible, decentralised, networked and multi- skilled. This transition requires new cross-public-sector strategies, systems and policies for educational innovation. It has become imperative for individuals and organisations to continuously evolve, learn, create and apply knowledge – to participate in "lifelong learning" (Bentley, 1998, p.81). To this end, Bentley argues that education systems should strive for three things (1) autonomy, (2) responsibility and (3) creativity (1998, pp.356-357).

The generation of a "networked economy" (Seltzer and Bentley, 1999) dictates that education needs to focus on the connections between schools and society, relating learning to the challenges of adulthood, and giving young people exposure to a wide range of contexts, role models and experiences of genuine responsibility (Bentley, 1998). A new "landscape of learning" that understands the business climate and extends beyond teacher responsibility in the classroom, to address the pressing challenges of promoting active citizenship, developing employability and tackling underachievement and social exclusion, is required (Bentley, 1998). Landry's *The Creative City* (2008) and Florida's *The Rise of the Creative Class* (2004) have stimulated rich discourse on the socio-cultural and economic implications of developing formal and informal intellectual infrastructures in cities to attract a new 'creative class' population. As universities are seen as the central actors in this networked knowledge economy, it is critical that their role and contribution as a key stakeholder is understood and clarified to ensure future policy is directed to generating conditions in which they best perform (Dodgson, 2012).

New education policy and modes of education that go beyond the current "back-to-basics" core secondary curriculum organised around the discrete disciplines of mathematics, science, English, and languages, need to be explored to allow the 'missing middle' of the K-16 education pipeline (Carnevale and Desrochers, 2002) to effectively drive the future economic engine. In a new "participatory" (Jenkins 2006) culture, a transition from the traditional "teacher-based approach" towards a "learning based approach"(Thomas and Brown 2011) will see students learning from the building of their own networked communities or 'collectives' based on shared interests and perspective, and assisted by digital technologies as a source of rich information and play. Future learning environments will centre on students proving that they can embrace the unknown - and through inquiry, embark on a process of re-creation (Thomas and Brown, 2011). These new models of education are demand-led, do-it-yourself, individualised modes of learning.

As the 21st century knowledge economy relies on the diffusion and use of knowledge, as well as its creation (Houghton and Sheenan, 2000), education systems must concentrate less on specialist skills and more on the development of adaptable people with broad-based problem solving skills, diversity of perspective, and social and inter-personal communication skills necessary for networking and communication. According to the Partnership for 21st Century Skills, preparing students, workers and citizens to thrive in the global skills race to ensure economic competitiveness involves a focus on innovation, creativity, critical thinking, problem solving, communication and collaboration (The Partnership for 21st Century Skills, 2009). Further, Burnette (1993)

indicates, these graduate attributes "are all directly addressed through the different ways of thinking during design". Design is often viewed as the most appropriate tool in which we can better understand the processes of change and becoming capable of change-making (Kimbell and Perry, 2001). Design is now being flagged as a form of knowledge-based capital that can be used to drive innovation and growth (OECD, 2012a). Design as a discipline has become a significant domain of activity which demands the full attention of policy and decision makers (Chapman 2002).

This paper presents the findings of a Knowledge Economy Market Development Mapping Study (Wright, Davis and Bucolo, 2013) commissioned by Queensland Government Arts Queensland in response to a state government design policy focus to "build design knowledge and learning" (Queensland Government Arts Queensland, 2009). This study was conducted to identify the scope and value of the design education and research program activity from primary schools through to the professional design sector in Queensland, Australia. The relationship of these programs to the development of the creative citizen in the 21st century knowledge economy is explored. Recommendations for the future development of design education programs in Queensland are proposed and future research opportunities are presented and discussed.

It is anticipated that the findings of this research will contribute to the development of a comprehensive national resource pool of academic support literature demonstrating the need for education policy to acknowledge the critical role of design thinking and practice in education, in fostering future productivity and community.

International and National Design Initiatives

The inaugural UK Design Commission's report, *Restarting Britain – Design Education and Growth*, recognises that design skillsets provide an extra visual language and a logical structure and framework for critical and creative thinking. Design also encourages behaviours which unlock practical competence in non-academic students to help them develop resourceful optimism, motivation and a sense of agency (Design Commission 2011). The report acknowledges that the UK has a rich history in design education, however reviews by McGimpsey (2011) and Miller (2011), of its inclusion in the National Curriculum since 1988, highlight a surprising lack of evidence-based research assessing the impact of design on national innovation and education systems. This lack of evidence-based research has prompted a call for an urgent re-evaluation of design education at all levels (Design Commission, 2011; Design Council 2011).

Increasingly, design is being valued by governments and international organisations as a tool to promote innovation and development (Patrcinio and Bolton, 2011). The European Design Leadership Board (European Union, 2012) highlights six different areas for strategic design action towards growth and prosperity, including the education system, indicating a clear trend toward design integration across, and between, disciplines and stakeholders. An international analysis of design education policy (Design Commission, 2011) highlights, that due to the high cultural value placed on design and creativity across all levels of education, industry and practice, Finland is ranked as one of the top-performing countries in terms of the quality of its educational system (OECD, 2012b), and has dramatically improved its global competitiveness. The establishment of the first interdisciplinary university - Aalto University, Helsinki - demonstrates Finland's commitment to fostering interdisciplinary practice at all levels towards national innovation.

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The United States is also viewed as a world leader in interdisciplinary design education initiatives, particularly at the primary and secondary level. Project H Design is one example of a new era of design education and non-profit sector level engagement. The goal of Project H is to use design to activate communities and build creative capital within public education. In the Asia Pacific region, Singapore, South Korea and more recently Hong Kong are re-examining design education at all levels to ensure delivery of a workforce for future industry innovation. In Singapore, children are exposed to design education programs in both primary and secondary schools, and 'Design and Technology' is a compulsory subject in lower secondary schools. In New Zealand, the Growth and Innovation Framework (GIF) has been used to develop a knowledge-based economy by providing new ways for government to link cultural and economic values (Bill, 2011).

Comparatively, Australia's activities in this area are limited. While it is well regarded as a high performing country economically, much of this has been attributed to an unsustainable mining sector boom. Viewing 2011 data in the World Bank Knowledge Economy Index (KEI), Australia is ranked second (KEI 9.71) for education (based on three variables of adult literacy rate, secondary enrolment and tertiary enrolment) and 19 for innovation (KEI 8.92), behind some of its Asia Pacific neighbours (The World Bank, 2012). This highlights the urgent need for Australian institutions (and specifically Queensland) to engage in deeper collaboration in order to generate, disseminate and apply knowledge generated by design, to build a reputation in manufacturing innovation (Prime Minister's Manufacturing Taskforce, 2012).

The Creative Industries Task Force 2001 report (2001) highlights design as a growing sector, emphasising four key areas that design will need to address in the future – (i) Aging population; (ii) Social responsibility; (iii) Competitive advantage; and (iv) New technology. However, the current National Design Policy, and National Cultural Policy fail to recognise the contribution of design-led thinking in the cultural and economic sectors. Furthermore, these policies also fail to acknowledge the importance of design-led thinking in education for future sustainment. The Australian National Curriculum has seen a nation-wide reconfiguration of learning to create efficiencies across states and also to recognise 'higher order thinking' and complex problem solving abilities. However, design is not yet recognised in the education context as a vehicle for achieving these aims. This is primarily due to a lack of local (Australian) evidence-based research, and the lack of understanding surrounding the critical role design-led thinking can play in fostering these student (learner) capabilities.

The Queensland State Government has a very successful, internationally applauded Design Strategy (See Project, 2009) that positions Queensland as a leading centre for design in Australia and the Asia-Pacific region. The *Queensland Design Strategy 2020* (Queensland Government, 2009) is a whole-of-Government framework, to be implemented over three four-year periods, to lead industry, community and the public sector in adopting and valuing design, with four key objectives:

1. Strengthen the Queensland economy
2. Foster a design culture
3. Build design knowledge and learning
4. Support public sector innovation

The Queensland Design Council (QDC), a high level strategic advisory body whose role is to inform the Queensland Government's design agenda and the direction and

priorities of the Queensland Design Strategy 2020, believes that design-led thinking and practice is central to Queensland's development, productivity, culture and quality of life. It also believes that the role of design thinking and practice in education is critical.

Background to the Study

For Queensland to position itself as a knowledge economy, and as part of the Asia Pacific design community, it must demonstrate leadership in valuing, prioritising and measuring the success of design and creative education across all levels. Moreover, if Australia's world position for education is to change, then the current social and professional status of teachers must change (Hattie, 2010). With this agenda, *The Knowledge Economy Market Development Mapping Study* (Wright, Davis and Bucolo, 2013) was commissioned by the Queensland Government, Arts Queensland to garner a direction for future prioritisation and funding of design education and research activities and to drive market development in Queensland. Moreover, the study responds to the *Queensland Design Strategy 2020* objective to "build design knowledge and learning" (Queensland Government 2009).

This study aimed to contribute to design sector development by establishing a platform to assist the Queensland Design Council to visualise current activity, assess existing programs and funding, and advocate for the development of new programs, projects or strategies (with appropriate funding). This is necessary in order to address deficiencies responding to future knowledge economy demands in design education and research in Queensland. By examining activity in design education/research across primary school, secondary school, tertiary, continuing professional development and postgraduate research, this study demonstrates the breadth of public engagement in design.

Building on the National Cultural Policy Discussion Paper (2011) and Australia's omission from the *Restarting Britain: Design Education and Growth* Report (Design Commission, 2011), this study was designed as an initial phase with the aim of building momentum for future academic research. Moreover, it is anticipated that this study will encourage other state government departments to contribute to the development of a national resource pool of academic support literature. In doing so, this knowledge pool would demonstrate the need for policy to acknowledge the critical role of design thinking in fostering future productivity in education and industry.

Survey

The study began in July 2012 with a review of national and international design education programs, and a scan of literature and relevant government and resource sector information. To complement this information, key targeted stakeholders representing design professionals, government, academia (tertiary) and teachers (primary and secondary) were encouraged to participate in an online survey. The survey was designed to gather information about design education and research programs, and gauge participant perceptions of these programs in Queensland. Given Queensland's geographical scale and unique reliance on industry clusters in regional centres for economic growth (Queensland Government, n.d.), the survey was distributed across Queensland including both urban and regional areas that spanned Mt Isa, Cairns, Emerald, Chinchilla and Quilpie, South East Queensland and Brisbane city.

A quantitative 5-point Likert scale was used to gauge perceptions of design education and research programs across five areas (i) self-reflection of program success, (ii) students/participant engagements, (iii) participant and facilitator engagements, (iv) resources, and (v) the host organisation/school. A total of N=40 respondents completed the survey, including participants from primary, secondary, tertiary, post-graduate and research level engagement, as well as continuing professional development, yielding a response rate of 28% (13% regional responses).

PARTICIPANT DEMOGRAPHIC

Of those surveyed 40% are involved in Tertiary level programs, 25% in Secondary level, 15% Primary, 12.5% CPD and 7.5% Post-graduate/research. Participants were aged 22–61 or over, with 27.5% 41-50; 25% aged 51-60; 20% 22-30; 15% 31-40; and 12.5% 61 or over years of age. 60% of respondents were Male and 40% Female. In terms of job identification, 28% of participants identify as a professional working in the private industry as a designer, manager or creative director, etc. Academics made up 28% of the participant cohort, teachers 18%, facilitators 13% and Government representatives 13%. Half of the participants (50%) have been involved with design education programs for 10 or more years and just under half (46%) have been in their current position for 10 or more years. 82% indicated that they facilitate, run and or teach distance learning/online learning initiatives.

FOCUS GROUPS AND IN-DEPTH INTERVIEWS

Following on from the survey, two focus groups and an in-depth interview with self-selected key stakeholders who participated in the survey, were conducted. Participants included representatives from primary, secondary, tertiary and professional design education programs, as well as recent tertiary graduates. This provided an opportunity to discuss more pointed issues surrounding design education and research in Queensland, and this included regional participants. Each focus group was audio recorded and a thematic analysis was conducted to identify key themes and categories emerging from the data. The questions sought to identify participants' thoughts on:

- The role and value of design education and research
- The current and future challenges for design education and research programs facing related sectors
- Who is responsible for driving design education program development?
- Ways of establishing and maintaining design education and research initiatives in Queensland
- The impact design education programs have on the broader economy
- The role of design thinking and practice in education and the relationship between this and future productivity
- Future opportunities for design education and research programs

Findings

The Education Landscape

Servicing a current population of 4 585 776 (Queensland Government Treasury and Trade, 2012), collectively there are 1,239 State Schools (including prep, primary, secondary and special schools) in Queensland, the majority of which are located within

the Metropolitan and South West regions. As highlighted in the Action Plan for Rural and Remote Education 2011-2015 (Queensland Government, 2010), approximately half of the state schools cater for almost a quarter of the state school students in rural and remote areas. This equates to approximately 616 rural and remote schools. In 2011, 18% of Australian primary schools (1708) were in Queensland (ABS, 2011). Most notably, Queensland has a higher proportion of small regional primary schools than other States in Australia (McCollow 2012). This provides unique challenges and opportunities for Queensland, different to other states of Australia, to develop programs that can be easily transferred, shared and disseminated across schools and regions. The Queensland Government *Smart Classrooms* initiative (2012) provides a comprehensive student-centric strategy for digital education in Queensland state schools. Other initiatives such as *Design Minds* (State Library of Queensland, 2012) also provide opportunities for schools to network, connect, share and collaborate, utilising resources and information freely available through digital technologies.

In 2011 there were 494 Secondary schools registered in Queensland (ABS, 2011). Of all state schools in Queensland, 15% are secondary schools, 4% special schools, 7% combined primary and secondary, and 74% primary schools. This is a concern, given the need to increase secondary and tertiary enrolment figures to drive innovation in the knowledge economy. Currently, design is not delivered as an Overall Performance (OP) Ranking subject for immediate university entrance in schools as part of the National Curriculum. Queensland primary and secondary teachers operate within strict pre-existing teaching frameworks and benchmarks including NAPLAN (National Assessment Program for Literacy and Numeracy), Australian National Curriculum, C2C (resources assisting teachers in implementing the National Curriculum in the classroom), and Queensland Professional Standards for Teachers. The Queensland Studies Authority (QSA), a statutory body of the Queensland Government, provides Kindergarten to Year 12 syllabuses, guidelines, assessment, reporting, testing, accreditation and certification services for Queensland schools. Currently, limited aspects of design exist within the syllabuses of Graphics, Visual Arts and in limited schools, Industrial Technology and Design (formerly Manual Arts). Teachers delivering design education programs are taking their own initiative to integrate 'design' within existing subject areas and learning benchmarks.

There are nine universities across Queensland, each offering different educational objectives, but all offering programs related to design education across a variety of levels including: Graduate Certificate, Bachelor, Graduate Diploma, Honours, Masters (Coursework and research), as well as Doctor of Philosophy (research). Two universities offer mostly distance education programs, one of these offering 8 campuses across Queensland including 6 regional campuses. Overall, the tertiary sector offers 32 university campuses across the State, 37.5% (n=12) have campuses in regional locations. All, except one university, offer HDR programs with design as a potential research theme. A number of college institutions offer opportunities for skill development related to the design industry. In Brisbane, international higher education is the largest export industry. Estimates indicate that $2.27 billion in course fees was acquired in 2010, plus a further $4.11 billion in non-course related spending (Study Brisbane, 2012).

Compiled from survey and literature scoping data, the study highlighted the design education/research programs (Refer Table 1 in Appendix) that have been conducted across Queensland since the inception of the *Queensland Design Strategy 2020* (2009).

It is evident that Queensland has cultivated a strong culture around design education for the secondary education sector, engaging with industry, tertiary sector, and state funded programs in conjunction with the State Library of Queensland. Queensland also has proactive professional design institutes providing continuing professional development programs for designers. More work, however, is required to develop and capture activity in the primary education sector.

Design Education and Research Activity

Participant responses emphasised the passion that exists for those who participate in design education (DE) and research programs. The majority of participants (76%) enjoy participating in these programs and indicate that they strongly agree that DE programs have been worthwhile. Most participants (82%) understand the value of such programs and 92% strongly agree or somewhat agree that they would like to participate in more programs. The value of these programs for students was also emphasised, with 97% of the respondents strongly or somewhat agreeing that students/participants enjoyed the DE program/s, and 60.5% strongly agreeing students/participant's benefit greatly from them. Despite this, over half (55%) of respondents somewhat agree that students/participants are capable of understanding the value of the program/s. Finally, 84% strongly and somewhat agree that students/ participants would like to participate in more DE program/s.

Of the respondents, 73% strongly agree that staff/facilitators who have assisted or co-organised the DE program/s have enjoyed participating and almost all (92%) indicated that they strongly or somewhat agree that staff/facilitators benefit greatly from DE program/s. Well over half (71%) strongly agree that staff/facilitators are capable of understanding the value of DE program/s. However, 13.5% indicated that they rarely have other staff/facilitators from their school/organisation enquiring about design education program/s.

A clear challenge facing most programs is the provision of ongoing funding. Underlying, systemic support from the State Government was highlighted as important by many, with one participant indicating, "Government support is critical to ensure that design is taken seriously as a method to improve business success and not a cosmetic treatment" (Survey respondent P17), another respondent noted:

> The viability of programs over the long term depends on mutual interest, ongoing systemic support and funding by appropriate funding groups. The outcomes are usually of great educational benefit to individuals, help build social capital and are of great potential benefit to the economic and strategic futures of the wider community. Investment in innovative teaching and learning at secondary level will be critical in the development of a skilled, flexible and critically aware community. (Survey Respondent P20)

Over a quarter (32%) of participants strongly disagree that DE programs require minimal resources. 63% strongly or somewhat disagree that DE programs require minimal external support. Well over half of participants (65%) strongly disagree or somewhat disagree that DE programs require minimal internal support.

For regional respondents, additional concern centred on "a general misunderstanding of the importance of the impact of design in education and its role in rural areas" (Survey respondent P31). In addition to continuity of funding, participants also cited other factors such as resources, workload, teaching ratios and National

Curriculum as points of concern. Most respondents (84%) strongly or somewhat believe their school/organisation understands the value of design education programs and almost half (45%) strongly agree that their school/organisation supports DE programs. However, in terms of program expansion, 22% indicated they strongly or somewhat disagree that their school/organisation is working hard to increase the number of DE programs. 60% strongly or somewhat disagreed that DE programs are easy to organise.

Participants also indicated the broad social, economic and community impact from positive experiences with design programs (94% strongly or somewhat agreed), however, the key challenges to ensuring program success are the over reliance on individual (often volunteer) commitment, greater involvement of the wider design community, and teacher uptake.

Mapping the programs across the State, it is clear that the majority of these programs centre on cross-sector and cross-disciplinary engagements. For the most part, survey participants indicated participation in somewhat generic design education activities that focus on bringing awareness of the role of design in fostering creativity and the 'process' of designing as a tool to empower and problem solve.

Perceptions about Design in the Knowledge Economy

In response to the motivation for this research study, one respondent voiced their concern for the priority of design education to feed the economy, but to urgently address systemic environmental challenges.

> The usual 'economic' factors as narrowly defined by standard definitions of 'the economy' is the key variable. The compelling need to fundamentally change our thinking on a local and global scale has to be addressed as a matter of urgency. Continual 'growth' economies are not possible: the Earth is finite yet we continue to plunder and trash it at an increasing rate (…..) and meanwhile talk about how we use design to grow the 'knowledge economy'. There won't be a recognisable economy of any description unless we drastically rethink our whole social, political and industrial approach. Design thinking is key to changing our worldview and to providing ways to mitigate the worst of the ecological changes humans are precipitating — but not the sort of clichéd puerile 'designer' approach that has been widely promulgated as a means to sell more stuff. (Survey Respondent P15)

In this regard, it was evident that the perceived value of design education is that it provides an opportunity to challenge current educational models because education "is the best way to have broader change across society" (Participant 06). Current education systems are perceived as inefficient and centred on "wrote learning" which does not foster discovery and exploration or provide "enough encouragement to think more broadly" (Participant 04). As this is viewed as a systemic challenge, discussion centred on how to make "design thinking" intrinsic and cross-disciplinary.

Participants generally agreed that design education is less about "turning out designers" and more about skilling "people who are empowered to think" and "engage with problems in an optimistic and enterprising way" (Participant 08), and producing "people who are good leaders" (Participant 10). "Design Leadership" (Participant 01) was flagged as a new emerging discipline, one that isn't design discipline specific, but which focuses instead on leadership of the design process.

> Design offers a different paradigm and design education seems to encourage that different paradigm of thinking (…..) its about questioning, constantly questioning

and understanding that you don't have the answers and understanding that even if you do have the answer it might not be the only one. Discovery, exploration these are all… they're things that are more engrained in the culture of design. (Participant 05)

Demonstrating the economic value of the "intangible asset" of design was viewed as a key challenge to design engagement and registering with government representatives. "Nothing related to design is recognised by treasury" (Participant 01). Central to this challenge is the fact that the "people at the top, in charge, don't have a design awareness. Therefore it is really hard to build a business case for it because they don't see the value" (Participant 4). 'Design' as a word and the use of language to describe design was also discussed as a future challenge - as expressed by one participant:

I think the word design is one of the first challenges (..).The perception is that design is elitist and it's for others and that this is the normal paradigm and then there is creative thinking or design thinking. I think demystifying design, democratising design, whether it's using language that is accessible… (Participant 06)

Planning for the Future

It is apparent, given the interest in this study and the extent and quality of design education programs developed since the implementation of the Queensland Design Strategy 2020 in 2009, that participants are reliant on the government to have the foresight to implement and retain long term design and education policy. However, it is perceived that the departmental government structure and political terms limit the capacities of stakeholders to work towards integrated holistic solutions for design and education. The "conflict between the political paradigm, political terms of three years, and design thinking as a longer-term device" (Participant 06) was discussed, and highlights the need to draft co-aligned policy that takes into consideration the long-term planning required for effective design education program development alongside the often short-term focus of government agencies. To enact a cultural change involving the integration of design in generic education at all levels, evidence-based research communicating the value of design in preparing the next generation to be multi-skilled, is urgently required. However, there were concerns about the fact that firms tend to look to the government for support in the first instance, and problems associated with this (reliant) approach were discussed.

I think for me, in my head the biggest challenge would have to be the red tape in terms of the bureaucracy around change, fundamentally changing something going forward […] I'd love to say that's possible, but I'm thinking how is that ever possible because the people at the top that are in charge of these decisions don't have a […] design awareness. (Participant 04)

It was acknowledged that opportunity for design practitioners to engage with local educational institutions are limited, but improving; "But if industry is to drive education, how does industry do that?" (Participant 09). Discussions centred on the development of economically sustainable and engaging design programs and initiatives independent of Government as a primary source of funding, resource and promotion support. Participants also discussed the need for development of new growth industries

for the future generation, and the importance of ensuring that education and technology are viewed as central to this growth.

> On the world stage Australia needs to pick up its act. […] I believe in schools and universities and even in our own manufacturing industries, if we don't train people to be savvy, we're not going to compete with China/Asia. Where we need to really pick up is in design. (Participant 14)

Education and Curriculum Development

Curriculum was seen to be a key driver or enabler for change in thinking, particularly in regional areas. It was deemed a responsibility for academics to evolve and develop their curriculum accordingly, in conjunction with industry and community. Participants discussed the challenges in primary and secondary school education surrounding the limited capacity of educators to develop and innovate curriculum. Comments about the new National Curriculum highlight concerns for the future of design related programs within primary and secondary education in Queensland. As illustrated in the quotes below, discourse centred on the conflict surrounding education structures and the challenges of engaging holistically with design education programs and potential mechanisms for professional (design industry) and educational (teacher training and community education programs) change.

> … for all the boys and girls we have in high school in the regional areas we've got to show them what the big world is out there and start making them step up to the plate … (Participant 14)

"Both the current and future challenge for design education in secondary schools is the national curriculum" (P11). This concern stems from the fact that there is a push (transition) to a uniform education system. A consequence of this process has meant the authority developing the curriculum are not designers, nor are they obtaining consultation from experts or industry, and as a consequence participants believe they are "watering down the design elements of those subjects" (Participant 11).

Tertiary Sector Development

The key challenge facing the tertiary sector is defining the contribution of design education in the higher education sector, and to acknowledge and account for the graduates from these programs. Specifically, the distinction between design thinking and design research was highlighted as a challenge. This is because these programs seek "to harmonise the real value of research and bring that to practitioners" (Participant 10). The translation of tertiary sector work (research) into a tangible output for industry (practitioners) can be improved. Moreover, the issue of graduates and jobs was also discussed with one participant highlighting, "From a tertiary point of view we are aware we graduate more than what industry will employ" (Participant 13). This participant expanded this point to highlight the need for the tertiary sector to better communicate to students/graduates that design is more than 'seeking employment' in one specific discipline. It was implied that design can cross disciplines and boundaries, and that this is accepted within the academic community, however, it was acknowledged that this isn't always so well communicated to students and industry alike.

Akin to this, was the discussion by participants, surrounding the challenge of graduates who are "job ready" and the "tension between being job specific and theoretical design thinking". Academics and professionals alike argued, "we need to

educate professionals" to better understand the concept of design thinking, and that when embarking on course design, academics need to understand the challenges of industry and "keep coming back to the touchstone of what practitioners do" (Participant 10). However, the goal of educating for future practice and future global challenges was also briefly discussed. Participants debated the merits of 'training' for an industry that is rapidly changing. One participant highlighted this complexity by simply stating, "how do you prepare students for practice but also for a non practice?" (Participant 10). Industry too, was worried about the over-abundance of graduates and the lack of available opportunities, with one industry professional emphasising that "I don't think we need more designers, we need better designers" (Participant 09).

More broadly, it is evident that all sectors - primary, secondary, and industry – rely on the tertiary sector as a point of intersection and congruence for design program development, implementation and facilitation, and it therefore has an important role to play in fostering the future development of collaborative and engaging design education and research programs. One participant stated, "Everyone is concerned for the future, however, it is the role of academia to suggest alternatives. Not just one or two but a number of ways." (Participant 12)

Recommendations

Recommendations emerging from this study were tabled under the five main areas of (i) The Value of Design Education and Research in the New Economy; (ii) Up-skilling and training educators; (ii) Learning Beyond the Classroom and Challenging Curriculum; (iv) Responsibility and Accountability; and (v) Measuring Impact and Disseminating Knowledge.

The Value of Design Education and Research in the New Economy

For future global competitiveness, Queensland needs to re-examine design education at all levels as part of a democratised design-led culture, to actively nurture creativity and design–based thinking skills. This is because there is a lack of knowledge and awareness of the potential for the application of strategic design to governmental challenges. A key priority of Queensland's *Design Strategy 2020* is to 'Build design knowledge and learning' (2008) to, in turn, deliver outcomes for the other three strategy objectives. There is a need for design thinking to infuse all sectors of government and for the Queensland Design Council to seek out opportunities to more strategically align design to address emerging local challenges. It is an economic imperative that universities, government departments and business and community partners build on the traditional triple helix mode of innovation, utilising interdisciplinary, multi-dimensional, collaborative design thinking models to form creative alliances which can mobilise knowledge, talent and investment in order to address societal problems through coordinated action.

Moreover, government investment in design education programs involving all education sectors are valuable in communicating the importance of design education and research in the new economy, and connecting and mobilising community in this mission through valuable ongoing independent cross-sector partnerships.

Ongoing development and support for regional programs, including hands-on workshops connecting students and teachers with design professionals and tertiary

educators is required. To do this, design thinking must be embedded across all disciplines in education, and design must be conceived of as interdisciplinary and even meta-disciplinary, to cater for the growing numbers of people who will be designers by persuasion and not by profession (Cope and Kalantzis, 2010).

Up-skilling and training educators

Preparing creative citizens for a participatory culture will require educators to shift their attention from "content delivery to capacity building, from supplying curriculum to co-creating curriculum, from supplying education to navigating learning networks" and to shift student attention from "their own individual performance to their capacity to learn through their own networks" (McWilliam and Haukka 2008, p.23).

The omission of design from the Australian National Curriculum and existing teacher benchmarks dissuade teachers to engage with design pedagogy or develop and innovate curriculum, unless they can see benefits for student engagement. There is a need for professional development for teachers in design pedagogies, especially in regional areas where they are not exposed to design professionals or tertiary design educators. Hands-on professional development programs need to demonstrate that design-based learning does not add to workload.

Furthermore, changes to tertiary pedagogies for primary and secondary teacher training will ultimately be required to include design. Therefore, new models of engagement between education sectors in potential disciplines of business, education and design/creative industries need to be investigated and led by the tertiary sector.

Learning beyond the Classroom and Challenging Curriculum

Educators need to consider new emerging modes of learning that consider "social, distributed and networked dimensions" and the "broader economic and technological landscape" in which the learning occurs (Brown, 2010, p.xii). An open learning model needs to be constructed to allow innovation-generating possibilities and to leverage future development in this sector through ongoing action research.

Ongoing support for design immersion education programs and design education competitions is needed from industry, government and education sectors to ensure they continue to fill a gap in education, not prescribed by the National Curriculum. This will help to address issues in relation to the 'missing middle' education pipeline. Capturing ongoing research data and publishing on these programs will encourage further interest in design-based learning. This requires greater collaboration between the Queensland Studies Authority and professional designers/design educators to update curriculum to integrate design thinking and design processes.

Engagement with the tertiary design sector to develop a cohesive future evidence-based research data collection strategy for design education is needed, and funding for research programs in Queensland needs to be investigated.

Responsibility and Accountability

There is a required 'shift in the balance of agency' with design practices and professional acquiring greater social significance and reconsidering the scope of everyday professional practices. (Cope and Kalantzis, 2011) This brings with it a required rethink about design education at all levels, and who is responsible and accountable to enact this cultural change. New funding models need to be investigated

as a revenue source for further activity, therefore mobilising local involvement, collaboration and promotion in all design education sectors.

Investment in creative capacity building in regional hubs must tackle social exclusion arising from socioeconomic divide and regional diversity. The establishment of a Creative Education Trust utilising financial legacy from the finite mining boom could prioritise design education and research activity across the state.

A Foundation established to engage schools, universities, government and the business and design sectors to actively explore partnerships and the educational value of design to solve issues related to the Asia Pacific, would provide further momentum for design education and research programs. Furthermore, the tertiary sector is a key player in driving design education and research. Universities must embrace interdisciplinary learning on both the undergraduate and graduate levels, spanning business, design and education. University design schools need to consider new programs that anticipate industry needs, including degrees in cross-disciplinary design, design management and design leadership, which teach design thinking as an approach to solving complex problems. Finally, capitalising on the interest shown in this study, the development of a Design Education and Research Taskforce, reporting to government, and responsible for the coordination of education sectors and industry, may be a useful next step in engagement, agenda setting and funding development for key programs and research.

Measuring Impact and Disseminating Knowledge

There is a need for funding and infrastructure to be developed locally to allow ongoing prototyping and associated research measuring the impact of design in the education sector, toward innovative national policy reform. Ongoing funding support for the continued development of programs, and associated research and dissemination of knowledge, will provide internationally significant findings. Future research on the impact of design education on regional Queensland needs to be conducted and prioritised to provide evidence of its value in building innovative, adaptive and resilient communities, and on future requirements for design education and research centres in regional Queensland.

This study was designed as an initial phase to build momentum for future academic research supporting the need for design thinking and creative practice to be embedded in education at all levels. Future opportunities for funding to support ongoing design education research should be considered and a strategic plan for future research in this area developed. An ongoing dialogue between Government and the tertiary education sector must be maintained for future progress.

Summary

Overall, the findings of this research draw attention to the need to better integrate design across all levels of education in order to build creative capacity. To do this, a greater understanding of the role of designers in the new economy is needed. This requires the up-skilling and ongoing professional development and training of current and future educators and teachers about the processes of design; and encouragement, wherever possible, to engage in learning beyond the classroom. This is necessary to ensure future graduates (of any discipline) are appropriately skilled, but also have the capacity to think and engage in critically reflective discourse. It is evident that the tertiary sector will continue to play an increasingly important role in nurturing a

creative, innovative and adaptive culture fostering design education and research across all levels of education and training.

Finally, there is an urgent need to continue gathering state-centric, empirically derived evidence surrounding the impact of design and its role within the knowledge economy. Relatively little is known about the value of design and the role it can play in building innovative, adaptive and resilient communities. The report provides the first critical step in this process, however, further work is needed to help inform, transform and shape the future of Queensland through design. If indeed, "using creativity and design-based thinking to solve complex problems is a distinctive Australian strength that can help meet the emerging challenges of this century"(Commonwealth ofAustralia 2012, p.8), as stated in the *Australia in the Asian Century White Paper*, then Queensland's efforts to date in cultivating this strength must be supported through open innovation and ongoing reform and investment in design skills, education and research.

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Appendix 1

Table 1. Mapping Design-related Research and Education Activities in Queensland.

PROGRAM	Primary	Secondary	Tertiary	Post-grad / research	Industry/ CPD
AGDA Annual CPD Program					⊙
AIA Annual CPD Program					⊙
AILA Annual CPD program					⊙
Asia Pacific Design Library	⊙	⊙	⊙	⊙	⊙
APDL[1] Lecture Series					⊙
Australian Space Design Challenge		⊙			
Cardboard Chair Pressure Test		⊙			
Centre for Subtropical Design				⊙	
Creative[3]					⊙
Creative Business Benchmarker				⊙	
CCI ARC Centre of Excellence for Creative Industries and Innovation				⊙	
Design Futures Program	⊙	⊙			
Design Futures Hothouse Conference			⊙	⊙	⊙
Design Integration Workshop					⊙
Design Integration Workshop Program					⊙
Design Minds	⊙	⊙	⊙	⊙	⊙
DIA Accredited Designer™					⊙
DIA Annual CPD Program					⊙
Design Thinking in School	⊙				
Experience 2012 National Architecture Conference					⊙
Explore University Day and/or Camp - goDesign Express Program	⊙	⊙			
F1 in Schools program	⊙	⊙			
Flood of ideas – School of Ideas Competition	⊙	⊙			
Giddy Widdle	⊙				
goDesign Travelling Workshop Program for Regional Secondary Students		⊙		⊙†	
Gold Coast Digital Marine Challenge	⊙	⊙			
Grey Street 2020 Workshop Program – goDesign Express Program		⊙	⊙		
Homegrown 2011: 'life in the slow lane' Exhibition and Workshop Program		⊙	⊙		⊙
Design Awareness Talks	⊙				
KGSC Art + Design School of Excellence		⊙		⊙	
KGSC Engineering Technology School of Excellence		⊙		⊙	

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[1] ADPL - Asia Pacific Design Library, State Library Queensland

PROGRAM	Primary	Secondary	Tertiary	Post-grad / research	Industry/ CPD
Living City		⊙			
Optimism					⊙
Origami	⊙	⊙			
Out of the Box Festival (OOTB)	⊙				
QLD Academy of Creative Industries		⊙	⊙		
QAGOMA Children's Art Centre Program	⊙	⊙	⊙	⊙	⊙
QLD Art Teachers Association (QATA) In-service Day Conference		⊙			⊙
QLD-Smithsonian (Cooper-Hewitt) Design Museum Fellowship Program	⊙	⊙			⊙
RACQ Technology Challenge, Maryborough	⊙	⊙		⊙	
Second Skin	⊙	⊙		⊙†	
Sit-Art 60 Chair Design Challenge		⊙	⊙		⊙
TEDx Brisbane					⊙
The Edge, State Library of Queensland		⊙	⊙	⊙	⊙
The Window Project			⊙		
Ulysses: Transforming Business Through Design					⊙
Unlimited: Designing for the Asia Pacific	⊙	⊙			⊙
Urban Design Alliance Forums					⊙
Vibrant City		⊙			
Widening Participation - goDesign Express Program	⊙	⊙			
Year of Creativity	⊙	⊙			

⊙† *Both 'Second Skin' and 'goDesign' are linked to research programs and/or projects.*
Dissemination of work surrounding these activities is currently in development and/or press.