

Looking back to move forward: The growth of Design and Technology pre-service teacher education in South Australia.

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Abstract

As a major Australian Design and Technology (D&T) Education provider, the University of South Australia's School of Education has undergone considerable change over the last twenty years. Change of the kind affecting all universities (e.g. globalisation and new policy directions including; a reduction in Higher Education funding, new levels of accreditation and accountability, on-line and blended modes of course delivery, and staff casualization). In the same period, the D&T curriculum has also evolved significantly, with Faculties of Education in Australian universities and schools moving away from separate jurisdictions to adopting a national curriculum in Technologies (covering both Digital and Design and Technologies) education for the first time in 2013/14.

This paper reflects on previously documented works of the authors on this topic (MacGregor 1999; Keirl & MacGregor, 2011) to describe some of the principle changes and innovations that have occurred more recently in D&T pre-service undergraduate primary and secondary teacher education at the University. Some of the identified contextual historical, curricular and political elements are revisited, while changes in program and course design, pedagogy, innovation, influences, challenges and opportunities are identified and explored. Having described the evolution of the D&T developments, the paper concludes with summary reflections speculating on what the next twenty years might bring.

Key words: *pre-service education, Design & Technology, Design and Technologies, Digital Technologies, staff casualization.*

Introduction

There are three universities in the state of South Australia. While each offers some education programs, the D&T components vary. The University of Adelaide offers a Bachelor of Education as a double degree in Secondary education but does not offer a D&T specialisation. Flinders University offers an increasingly broad range of teacher education programs at both undergraduate and post graduate levels, it also offers a core course in D&T in its undergraduate program. In recent years there has been an increasing number of interstate service providers offering online teacher education degrees to South Australian students. They vary in their offering of a D&T core course.

The University of South Australia is the largest of the three Universities in the state with 37,000 students across six campuses and an increasing number of online students. The School of Education offers undergraduate and postgraduate education programs, ranging across early childhood, primary, and secondary levels. The University of South Australia is the only South Australian University to offer a single semester D&T course in its undergraduate and postgraduate primary programs. It also provides undergraduate and postgraduate primary and secondary programs specialising in Technologies Education. This paper will primarily focus on the undergraduate programs that specialise in D &T.

Twenty Years of Political, Social and Curriculum Change.

Throughout the last twenty years there has continued to be significant change in the political, social and economic spheres in which universities operate. For instance, increased online teacher education courses have enabled universities to continue to compete for students in new markets while also seeking to be efficient and maintain standards. Local and international student cohort numbers have increased markedly, particularly in the last five years. Growth in

student numbers has resulted in an increase in the number of sessional staff employed and, for the first time the employment of contracted staff into teach only positions.

Australia continues to witness growing engagement of governments at state and national levels in education to the extent that student's achievement standards, particularly in literacy, numeracy, continue to be foregrounded on a daily basis in the media and in current federal electioneering (Keirl & MacGregor 2011). Politically, education finds itself at the centre of party politics, with calls for improved professional teaching standards. For example, the latest Teacher education Ministerial Advisory Group (TMAG, 2014) report focuses on changes to initial teacher education. The proposed reforms centre on five themes:

- Stronger quality assurance of teacher education courses
- Rigorous selection for entry to teacher education courses
- Improved and structured practical experience for teacher education students
- Robust assessment of graduates to ensure classroom readiness
- National research and workforce planning capabilities

Greater emphasis is also being placed on entry level requirements into teacher education programs with calls for increased Australian Tertiary Admission Rank (ATAR). ATAR is the primary criterion for entry into most undergraduate-entry university programs in Australia. Requirements are also proposed for final year pre-service teachers to complete numeracy and literacy tests before they can graduate and register to teach. More recently, in a bid to raise teaching standards, the South Australian government has called for Universities to abandon undergraduate programs in favour of a 'three plus two model'. This model comprises three years of an undergraduate non education feed-in degree followed by a two year Master of Teaching program.

Curriculum development across Australia has taken both professional and political paths. Twenty years ago in 1995, South Australia adopted the Technology Statement and Profile. This initiative significantly shaped both curriculum in schools and the University's teacher education programs (MacGregor, 1999). Design was given greater emphasis in a process of *design-make-appraise* (DMA) and the underpinning theory of the curriculum became both process and outcomes focussed.

In 2001 the new curriculum policy, the South Australian Curriculum, Standards and Accountability (SACSA) framework (Department of Education, Training and Employment, (DETE), 2001), was introduced and adopted. The new framework policy was seen to respect the professional judgement of teachers in assessing the outcomes of students' learning. SACSA also developed a new emphasis of *critique* to inform *designing* and *making*. At the time the new policy also introduced a name change for the Learning Area: Technology Education became Design and Technology Education.

In 2013/2014, a new National curriculum for Design and Technology was introduced into Australia. The overarching ideas that shape the *Australian Curriculum: Technologies*, written by the Australian Curriculum Assessment and Reporting Authority (ACARA) in 2012, placed strong emphasis on creating preferred futures with links to sustainable practice. The Technologies curriculum describes two distinct but related subjects:

- Design and Technologies, in which students use design thinking and technologies to generate and produce designed solutions for authentic needs and opportunities.
- Digital Technologies, in which students use computational thinking and information systems to define, design and implement digital solutions.

The content of the subject of Design and Technologies is taught through five contexts. These are:

- Technology and Society
- Engineering principles & systems
- Materials & technologies specialisations
- Food and Fibre production
- Food specialisations

(ACARA, 2012)

As a result of a growing national concern for food security (Australia Food Security in a Changing World, report of the Prime Ministers Science, Engineering and Innovation Council, (PMSEIC), 2010), climate change, personal health and wellbeing, this latest curriculum places greater emphasis on food and fibre production. For the first time the teaching of food and textiles is a mandated requirement of not only the secondary school curriculum but also includes junior and primary levels of schooling. These current political and social trends and contexts currently shape the content of the D & T courses offered in both the undergraduate and post graduate programs offered at University of South Australia.

University Restructuring

Institutional restructuring within the University of South Australia (UniSA) and more specifically within the School of Education has not diminished throughout the last twenty years. Major changes to the structure of education programs initiated in 2005, are currently undergoing review as the School of Education moves towards offering a postgraduate teaching degree only. Throughout this period (2005-2015) what had previously been separate undergraduate Early Childhood and Junior Primary/Primary programs merged to also include a Primary/Middle years focus to become the Bachelor of Education (MBET) program. This change influenced the content and number of D&T courses offered, the gender balance in the program, staffing, and resourcing. As a result, course offerings in D&T continue to be diverse in addressing early childhood through to middle year needs, for example, courses in food and textile technologies, design -based play and digital technologies are being offered. The change in program focus to a combined model of once separate programs has enriched the student experience base and profile. Over the last ten years there has been a significant increase in the number of mature-age students and males enrolling in the program. This has meant the type and depth of prior knowledge and life experiences that students bring to the program are richer, in-depth and of broader scope than in previous years. The level of digital literacy in the last ten years has risen significantly. More specifically in D & T, the use of e-portfolios to design and present ideas continues to increase, as has the use of software to design and produce artefacts using 3D technologies. Social media, including the development of face book pages connects students with recent D&T graduates.

However, in line with state government recommendations to offer only Masters level teacher education programs, the current undergraduate MBET program and its related D & T courses are under the threat of being archived. At the present time, the MBET program continues to be underpinned by core principles such as: professional competence; wellbeing; social justice; futures thinking; sustainability, education for community living (place-based learning); and, sound pedagogical reasoning that is enquiry-based. These principles are also embedded in the current D&T courses that are shaped by issues of environmental, cultural and human concerns.

In response to the needs of educational and industrial stakeholders the School of Education UniSA, offered for the first time in many years, an undergraduate secondary Design and Technology (LBDT) program in 2005. While feeder degrees in Architecture, Engineering and Food Sciences provided entry into the Master of Teaching degree (Design and Technology

specialisation) the numbers were not sufficient to meet the demand of school vacancies. With continued demand and increases in student numbers the undergraduate Design and Technology program continues to be offered in its second iteration, the Bachelor of Technologies; Secondary (LBSY). This degree has increased collaboration in course delivery across divisions and schools within the university. However, with growing state government pressure to offer only post graduate degrees as a perceived solution to raising teaching standards, the longevity of this program is also currently under review.

Design and Technology: Program, Course Design and Development

The influence of all factors reported above have led to a continued and extensive revision of the D&T courses offered at UniSA. Both the LBDT/LBSY and the MBET degrees are of four years duration with a total unit (points) value of 144 units. The courses under discussion are of 4.5 units value each. Within the degrees, two course arrangements exist, each with its own role. Core courses are compulsory for all students in the MBET program and each subject area within the degree has one or two such courses. Literacy and Numeracy have two courses, this number is currently under review with calls to increase offerings further. There are also additional calls to increase the number of Science core courses to two. D&T Education continues to be offered as one compulsory 4.5 unit curriculum core course in the MBET program. Enrolment numbers for this course are over 700 students. The core course is offered in the first year of the MBET degree and is 'linked' to a practicum placement in a primary school, thus providing greater pedagogical relevance and context. For the majority (85%) of students the core course is their only exposure to D&T in their degree.

For the last three years this course has been offered both on-campus and online. The delivery of an online course delivery has not been without its challenges. Historically, Design and Technology Education has focussed on face-to-face interaction to facilitate learners' shared understanding, and in particular, the synergy of shared design and collaborative problem solving. D & T educators have long held the belief that a group of learners becomes more empowered, engaged and capable of solving complex problems in creative ways, than a learner working alone. The challenge in designing the online courses has been to create collaborative online environments that facilitate the sharing of new knowledge, as well as finding a balance between conventional and virtual designing processes, strategies and solutions.

In past years there was an option offered for students at the UniSA, who wished to specialise in teaching D&T in primary/middle school settings, for them to complete a general study or minor in the area. In 2011 when the author outlined the nature of available courses, (Keirl & MacGregor, 2011) there were over 100 students completing the D&T general study. However, the demand of National standardised testing (NAPLAN) has placed growing emphasis on literacy and numeracy outcomes and has resulted in the employment of literacy and numeracy coaches in many primary schools. As a consequence there has been a reduced demand from primary schools for specialised D&T teachers. This resulted in a minor course offered in D & T that is currently limited to Food and Textiles technologies. The continued demand for graduates with specialisations in this area is a reflection of the introduction of food and textiles into the primary curriculum through the National curriculum-*Technologies* (ACARA, 2012). The establishment of school gardens and kitchens in primary schools, including those associated with the Stephanie Alexander (2004) Kitchen Garden Foundation, have proliferated in recent years. The food and textiles courses that these students complete are offered as part of the LBDT/LBSY Secondary Technologies program. The courses include: An Introduction to Design and Technology, Food and Society, Textiles Technology 1 & 2, Food Technologies 1&2.

In addition, all MBET (Primary/Middle school) students complete a final year Professional Pathway coupled with a 'specialist' teaching practicum experience. A small number of MBET students choose to undertake the Design and Technology specialisation. The D & T professional pathway course is also offered as an elective course in the Secondary Education Technologies

program (LBDT/LBSY). The purpose of the D & T pathway course is to build on the knowledge, skills and values that students have encountered and developed throughout their four years of study in D & T education and to apply that to community or place based projects. The combination of year levels from primary/middle (MBET) and secondary program (LBDT/LBSY) facilitates the sharing of D&T pedagogy from a grade 6 -12 perspective. As a consequence this continuity of learning, strengthens students understanding of the sequence and progression of student learning. The collaborative approach has also enabled a shared sense of advocacy for the D & T Learning Area to develop.

The four year undergraduate secondary D & T program (LBDT) and the more recent iteration, the Bachelor of Technologies Secondary (LBSY) offered for the first time in 2015 is a bespoke program. Until the introduction of the LBSY program, practical content courses in the areas of metal, wood, electronics, fashion design and commercial cookery were taught via a credit transfer arrangement with the college of Technical and Further Education (TAFESA). Changes made to University program accreditation policy at a national level in 2013 however, meant that this arrangement could no longer be offered and alternative teaching arrangements were initiated. As a result, the delivery of courses in the LBSY program is a collaborative venture between the Schools of Education, Engineering, Art, Health Sciences and Architecture and Design. Limited specialised staff and teaching spaces also necessitated the establishment of partnerships across University Divisions and Schools. Additionally, as courses have become more specialised in content (for example, Advanced Manufacturing) greater numbers of sessional staff (often practising teachers) have been employed. While, permanent staff shortages, particularly in the secondary program, continue to be an issue the number of supporting technical staff has increased. Similarly, in the last two years the budget to purchase specialised equipment has increased.

Significantly, over the last decade D&T lecturers both permanent and contractually employed have continued to deepen their knowledge and research through exploring new pedagogies, publishing, and attending D&T and other education conferences. The nexus between teaching, research and research publication is ever present, with all tenured academics at the University being required to have completed a Doctoral degree. This prerequisite has presented a dilemma for the employment of staff to teach in the LBSY program. There is a limited pool of suitably qualified applicants to draw from, when seeking new tenured staff. D&T staff continue to maintain and forge new links within the professional community, including the D & T Teachers professional association (DATTS) and the Home Economics association of Australia (HEIA) to enhance the profile of D & T education at a local, national and international level. It has been heartening over the last five years to see a significant increase in the number of LBDT graduates who are active members of these associations.

Conclusion

Twenty years ago Technology as a Learning Area was just emerging in the primary curriculum. Until this time, Technical studies, with a focus on skill development in the use of a range of materials, had been taught in secondary schools only. Now, the majority of students begin courses with a more informed understanding of Design and Technology, students generally have a greater understanding of the concept of design. More importantly, graduates from the D&T courses offered through the School of Education recognise the importance of engaging school aged children and adolescents in a curriculum area that promotes creativity and innovative thinking. All UniSA teacher education programs offer at least one core course in D&T, with the option of a specialisation in Food and Fibre. The University continues to offer undergraduate and post graduate secondary D&T programs. Efficacy and advocacy for an education in D & T is reflected in the employment and professional outcomes for graduates, and the LBDT program has a 100% employment rate. Anecdotal evidence would suggest that unlike many beginning teachers who leave the professional within three to five years (Ewing & Smith 2003), D&T

graduates from UniSA remain in the profession. Research (MacGregor, 2013) suggests that one of the contributing factors for this is that the four year undergraduate degree provides graduates with a greater depth of subject content knowledge, which appears to facilitate an acceptance into school sites. A high percentage of graduates also appear to undertake leadership positions, such as head of faculty, within the first five years of graduating.

While the teaching of D &T at the University of South Australia appears to be currently positioned with some strength and viability there is no room for complacency. Politically, new policy directions pose a threat to the offering of undergraduate programs. Increased levels of accountability and accreditation pose a further threat to the structure of current programs and course content. As stated by Keirl & MacGregor (2011),

The future need not be seen as a lottery or beyond our control if D&T can be continuously redesigning itself in response to astute reading of political and curriculum trends (p 87).

In the past twenty years we have adapted D& T courses and programs, our pedagogical approaches and strengthened our advocacy to meet political, historical and curriculum directions, our challenge is to continue to do so for the next twenty years.

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