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# Secondary technology teacher education – an attempt to juggle markets, efficiencies and academic innovation in changing times

**Steve Keirl**

University of South Australia, Australia

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## **Abstract**

*This paper reports on technology teacher education in one Australian state with a particular focus on an innovation established for commencement in 1998 and now approaching a period of review. It describes the constraints and factors that shaped a new degree programme, only one component of which was to be technology education. In the university's attempt to adopt a 'one-size-fits-all' approach, there were gains and losses.*

*A description of the four-year forerunner to this programme is included and the thinking for the new technology education component is outlined.*

*The new programme has been innovative, exciting and challenging but, in some key respects, has fallen short of expectations. Market issues and employer take-up have influenced significantly the current thinking about restructuring. Nevertheless, there have been real opportunities for creativity in programme design and delivery. Similarly, the new synergies and partnerships that have developed provide evidence of current success and of potential for future development.*

Keywords: secondary technology teacher education, learning area, graduate employment, profession

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## **The Australian context**

The country comprises six states and two territories and, constitutionally, the Federal government has no mandate for education in these jurisdictions. National collaboration on curriculum began in 1986 and nine years later a series of statements and profiles for each of eight common learning areas – not subjects – were published for the Kindergarten to Year 12 (K– 12). 1999 saw the reaffirmation across the country of the learning area (LA) structure (MCEETYA, 1999).

This structure brought together existing curriculum activities and subjects under common umbrellas. Given myriad different subjects in the secondary sector across the country, this transition was not unproblematic. For example, all mathematics subjects tended to identify readily with the mathematics LA, while media subjects might have found their home in any, some, or all of the arts, English or technology LAs. Clearly such a transition is not smooth and much settle-

ment is ongoing. Such is the case for the technology LA where the national professional associations for agriculture, computing, design, home economics, media and technology studies have gathered (TEFA, in refs.).

There are growing shortages of technology teachers across the country and many of those in service are over 40 years of age and are male. The preparation of teachers has tended to occur on a local basis. In part this has been because of the historical curriculum divergence alluded to and, in part, because of physical distance between major centres.

## **The state context and the requirement for change**

There are approximately 250,000 pupils enrolled in the state's 824 schools. Education is organised through the state Department for Education, Training and Employment (DETE), the Catholic Education Office (CEO) and the Association of

Independent Schools (AIS). Since 1999, the former two bodies have used the Technology Statement and Profile (AEC, 1994a&b) for their technology curriculum guidance. This has also been the case with some independent schools.

The State is served by three universities, only one of which, the University of South Australia, prepares secondary technology education teachers. This University was created a decade ago through the amalgamation of several well-established colleges of teacher education and of advanced education. Following this amalgamation and the onset of economic constraints, the University was forced to rationalise programmes and to staff accordingly. It was decided that the four-year secondary teacher education programmes and the one-year Graduate Diploma programme (a teaching diploma for those with appropriate non-education degrees) would cease to run and a new programme would be developed.

### **The outgoing Bachelor of Education in secondary technology education**

This outgoing specialist degree programme was typical of others across the country. Its four-year cohorts were mostly school leavers with extensive workshop-based learning from their final school years. Many would head from school to university and back to school with little ‘other world’ experience. They were mostly male and had learned alongside other males and usually had male teachers. They reflected a long tradition of preparation of the master-apprentice type (gendered reference and pedagogical model both intended). The last cohort entered in 1996 and graduated in December 1999. The last four cohorts comprised 62 students of whom one was female.

The programme reflected the design-based Statement and Profile (AEC, 1994a&b) and sought to prepare graduates in the spirit of such a framework. However, after many prior years of principally skills-based ‘technical’ education it was difficult for students to adapt to new approaches. Nevertheless, some were to develop excellent practice, some understood the educational value of design-based technology education and some were not at all convinced of its merits.

The four-year programme comprised 144 points of study. Of these, approximately 90 were based in practical skill-type activity, 36 comprised the practical experiences in schools and 18 were edu-

cation courses (formerly, subjects). It is worth noting that 12 of the 90 points were devoted to design and technology and some particularly innovative work was developed here in three-way partnerships between schools, industry and university.

The programme was of such a strong practical hue that theorising was rare and research non-existent. Essays or investigative projects were neither *de rigueur* nor valued by students as a part of a technology education culture. Assessment was for the most part of practical performance with exams to test knowledge retention. Some use was made of work/design folios.

In parallel with this four-year secondary programme there was established a four-year primary teacher education programme. This is ongoing and includes a popular and substantial technology education option.

### **Outline of the new degree**

This new Bachelor of Education (specialisation) award was to have a much greater scope than any of its forerunners. In streamlining provision and in recognition of new market forces it was to:

- be a two-year/72 point Bachelors programme (thus reflecting national trends towards a teaching profession having five years of tertiary preparation – e.g. a first degree of three years minimum followed by a professional teaching/education degree of two years). The programme was to be fast-tracked for delivery in 18 months
- position itself for national and international markets. One purpose of the fast-tracking was to enable mid-year graduation to articulate with northern hemisphere markets (the academic year in Australia aligns with the calendar year)
- create graduates for the four ‘specialisations’ (early childhood, primary, secondary, and post-compulsory) within the one award.

Given such factors, the design was also to develop:

- students’ critical awareness about the broader social, political and cultural contexts of education as well as developing the technical skills necessary to promote effective learning
- the notion of ‘reflective practitioner’ and a seamlessness between theory and practice

- students' ability to comprehend and respond to the pressures exerted on teachers' work by the rapidity of change and to work individually and collectively to shape the direction of change
- 'holistic educators' with understandings of specialisations other than their own
- educational partnerships amongst schools, employers, professional associations, unions, etc.
- the university's (then) emergent graduate qualities and exemplify its commitment to social justice.

It was believed that the psychological barrier of two years on top of three, or even four, years of a first degree programme would be somewhat overcome with an 18-month programme length. The shorter period is certainly welcomed by students although the majority also undertake extensive hours of paid employment to finance their way through their studies. As the award is a first qualification for a profession it is supported by the Australian Higher Education Contribution Scheme and is therefore non-fee-paying. Were it categorised as 'postgraduate,' fees would be applicable – and its marketing would be problematic.

The programme's 72 point structure comprises 18 points of practicum, 27 points of common educational and other, elective, studies and 27 points of learning area studies. Depending on the student's specialisation, 'learning area' in the programme's nomenclature, means:

- a concentration on early childhood
- coverage of all eight LAs for primary
- total focus on one or, commonly, a major/minor combination of two LAs, for secondary
- a concentration on adult and vocational education
- blends of the above.

The initial recruitment quota for the programme was set at 160 students. Depending on what numbers were allocated across the non-secondary specialisations and subsequently across the LAs within the secondary sector, numbers were limited for a single area such as technology education. The first intake was in February 1998 and those students graduated in mid-1999.

The key entry requirement for the programme – that entrants shall hold a degree or equivalent –

works well for some LAs, such as maths or science and not at all well for others, such as technology where the problem of 'fit' or appropriateness is significant.

### **Technology education in the new programme**

The 27 points of the technology LA are offered as six courses of equal weighting. Two are delivered in each of the three semesters of the programme and, in each pair, one takes a distinct methodological focus whilst the other maintains philosophical, curriculum, political and social dimensions. However, all involve a focus on school practice.

The first course, which is a pre-requisite for all others, involves approximately 40 hours of contact time delivered as weekly three-hour classes. The subsequent two are delivered as intensive weeks – periods of five days planned to coincide with school holidays and opening possibilities for partnership activity with the profession. The fourth takes an inter-professional focus (working with industry, professional associations etc.) links with the four-year primary degree students and is delivered weekly in evenings. The final two courses, because of their very low student numbers, are taught by negotiation with the students who are able to be self-managing with supportive mentoring.

The take-up of each course varies. Generally, the numbers are largest in the first and decrease over the programme. Students may take up to all six courses (which would virtually preclude study of a 'minor' LA that students are encouraged to undertake to enhance employment opportunities). Students studying in the technology education courses may become teachers of agriculture, computing studies, design, home economics and photography or technology studies.

The first cohort comprised 24 students, of whom half were 'majors' and half were female. Now in its fourth iteration, the programme numbers have dropped but have maintained these proportions.

On the entry side, the question arises as to what constitutes an appropriate first degree for the LA. An award such as industrial design might be nominated as the most broad-based and best-aligned to design-centred technology courses based in school workshops. However, the LA caters for more than these courses. Currently, first degrees

such as agriculture, architecture, computing, various branches of design, electronics and engineering, food technology and nutrition have all been acceptable. For the purposes of students studying the field for a ‘minor’ in their award, backgrounds in science and visual arts have been common. Where trade-based applicants have been able to demonstrate ‘equivalence’ to degree standing, they have been admitted. Some students are tradespeople with appropriate backgrounds (e.g. electronics, fitting and turning, aircraft construction) who have taken a new direction in their lives but have first collected degrees suitable for education but not immediately suited to technology education (for instance, psychology and humanities).

What is common to all these entrants, regardless of background, is that none of them has the breadth of skills to teach across the LA in the lower secondary years. Each has very great depth of knowledge in one or two specialist fields and this plays its part in the senior years in schools. However, there are designed opportunities for students to share their expertise. Each brings experience, a maturity and commitment to their (new) chosen profession (this was less the case with the school leaver entrants to the former programme). In turn, these assets can, potentially, energise and refresh the profession.

### **Benefits of the development**

The development of any new programme provides an opportunity to review and re-design its content. In preparing teachers for multiple markets and in the light of state, national and international curriculum developments and in matching the philosophy of the overall degree, the new technology courses have made significant steps forward. They are solidly design-centred, holistic (not dependent on any traditional form, discipline or content) and critical and dynamic (rather than unproblematic and static in content).

Students engage with matters of ethics, politics, curriculum design, philosophy of technology, constructs of technological literacy and critiquing. They study national and international curriculum developments and understand that curriculum is a political construct and not a matter of so much content to be delivered.

Although the assumption behind the award is that ‘content’ will have been gained in earlier learning (and this is problematic for technology education) and there are limited opportunities for ‘skilling’

within the programme, what is modelled is the need to learn for new situations and to trial new ideas.

Design briefs of an open-ended type are used so that content does not become a constraining factor. An example of such a brief would be: ‘esign and make a product, device or system to communicate with a passer-by one piece of information about, and the name of, a particular (botanical) plant’. Such approaches set students on paths of some uncertainty, shared research and learning, and produce diverse and rich outcomes – as are witnessed in their learning journals and course evaluations.

The pedagogical shift from lecturer-centred to student-centred learning has been a major benefit of the programme. This is one of the hardest change agendas to facilitate – given that the transmission model of learning is what the vast majority of past teaching and learning has been based upon. Such approaches mirror effectively both the nature of change and organisational thinking in the profession today as well as the moves towards constructivist learning theory and student-centred and democratic education (Boomer, 1999a&b; DETE, 2001a&b).

The other major pedagogical gain has been the use of intensive study weeks alongside the more orthodox weekly lecture/class. In such weeks, learning of a different form occurs. The opportunities for collaboration, teamwork and immediate critical discussion are present. Specialist presentations can be used with time for follow-up activity. It is possible to take out whole days for industry- or school-based learning. Interpersonal skills, invaluable to life with new colleagues in professional locations, are also developed. It is possible to bring in school colleagues either in a lecturing role or to offer particular sessions as professional development. The synergy of different forms of professional experience and knowledge in these situations is powerful. All such arrangements, in turn, highlight the benefits of the weekly classes which can be more focused and allow time for reflection before a next meeting.

The mixture of backgrounds within any one cohort is also a powerful source of learning. No cohort has yet had a pair of students with a similar profile and each cohort has displayed considerable differences and new combinations of backgrounds. This has led to broader understandings and knowledge for students and lecturers alike.

## Concerns with the development

After three years of the new programme it is possible to record these concerns:

- despite the preparation of the ‘new’ graduates for current curriculum frameworks, securing employment can be problematic. Some systems welcome the new graduates for their ability to implement new curricula and to practice student-centred pedagogies. Others continue, despite eight years of new curricula, to seek graduates of the ‘old’ mould – able to teach a host of ‘practical subjects’. Such systems have a mismatch between curriculum policy and staffing practice.
- externally, there exist negative discriminatory behaviours particularly towards women but also towards those who bring new and, therefore, ‘different’ forms of knowledge to the classroom/profession
- the technology dimension of the new award does not have a critical mass that will be sustainable enough to meet either market demand or the university’s minimum class-size quotas. At present only single figures of technology teachers are graduating each year
- it is problematic that, regardless of specialised background, neither tradespeople nor graduates from related degrees have the balance of knowledge and experience needed at the outset of the programme. The deficit of this balance can only be part-way met in such a short teaching preparation
- there is no ready pathway from school for school leavers.

## Conclusion

The university responsible for the degree under discussion is currently embarking on a major review of all its educational programs. National and international developments and debates are shaping the deliberations as are issues such as those raised in this paper. While there are clearly arguments to be put regarding the in-house arrangements and the questions of articulation into and out of whatever the new construction might be for design and technology, there are also external perception and change issues in need of attention.

Current negotiations amongst professional associations, employers and the university are seeking

to resolve some shared concerns and, for these, a degree of optimism can be entertained. However, a continuing concern is that curriculum adoption and the associated pedagogical shifts that are needed are neither welcomed by many in the profession nor likely to attract sustained professional development funding.

Graduates from design-based programmes are well equipped to be first-class beginning professionals. However, they also need strength and support in working with an ageing profession, many of whom are not enamoured of change. Such change will in some ways be generational. This is not to say that it cannot happen. The potential of the graduates under discussion to be key players in curriculum renewal remains high. In the meantime, it is their qualities, not their shortcomings, to which we can turn for improved professional strength.

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