

Australian vocational education institutions' potential contribution to national innovation

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AUSTRALIAN VOCATIONAL EDUCATION INSTITUTIONS' POTENTIAL CONTRIBUTION TO NATIONAL INNOVATION

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Abstract

This paper distinguishes research – the discovery of new knowledge – from innovation, which is understood to be the transformation of practice in a community or the incorporation of existing knowledge into economic activity. The paper considers vocational education's participation in the innovation process rather than as a provider of services to innovative firms and industries. It suggests that Australian vocational education institutions base their contribution to the national innovation system on their consciously not conducting research, since the traditional research culture diverts effort from innovation. Vocational education institutions have a potentially crucial role in mediating between the creators of new knowledge – researchers and their institutions – and the users of knowledge. They are ideally placed to develop this role since innovation is a local activity and vocational education institutions are much more widely geographically dispersed than universities.

Introduction

Previous studies of Australian vocational education's contribution to innovation have considered how vocational education institutions may become more innovative (Callan, 2004) and vocational education's role in providing skills and skilled workers needed by innovative firms or an innovative economy (Dockery, 2001; Toner *et al*, 2004; Whittingham *et al*, 2004, p. 116). Ferrier and colleagues (2003, pp. 80-9) and Curtain (2004, pp. 38-41) also considered Tafe's role in the diffusion of technology and Pickersgill & Edwards (2005) usefully put the issue in a broader context before moving to their main interest, the contribution of vocational education to innovation in regional industry. This paper considers vocational education's participation in the innovation process rather than a provider of services to innovative firms and industries.

The background paper for the Australian Government's innovation summit in February 2000 prepared by the Department of Industry, Science and Resources (1999, p. 9) defined innovation as 'the process that incorporates knowledge into economic activity'. The department (Department of Industry, Science and Resources 1999, p. 9) argued that 'Innovation covers "the million little things" which improve the operation of firms or other institutions. It is a much broader concept than research and development (R&D), although the outcomes of R&D are among its most powerful expressions' (reference omitted). The department's position is supported by Marceau (2001, p. 8) and by Lundvall & Borrás (1997, p. 133) who observe that 'Incremental technical innovation based on learning, diffusion of technology and organisational change are certainly more important for the performance of any single national or regional economy than major innovations'.

Denning (2004) puts the general case for innovation –

An innovation is a transformation of practice in a community. It is not the same as the invention of a new idea or object. The real work of innovation is in the transformation of practice. In this definition, community can be small, as in a workgroup, or large as in the whole world. A transformation of practice in the community won't happen unless the new practice generates more value to the members than the old. Value may not be economic; it may be pride, reputation,

health, safety, freedom. Many innovations were preceded or enabled by inventions; but many innovations occurred without a significant invention.

Traditional research-intensive universities are not best at supporting innovation

Much research and research policy is directed at winning esteem from other researchers. There is a hierarchy of research esteem which differs somewhat by discipline and context. A rough hierarchy starts with publication of a research article and proceeds upwards to earning a research doctorate, refereeing manuscripts submitted for publication, winning research grants, being cited extensively by other researchers, occupying a senior academic appointment, winning prizes and awards, membership of editorial boards, refereeing grants and membership of learned academies. At the acme of research esteem is winning a Nobel prize other than for peace or literature or winning a Field medal in mathematics.

Governments invest far more heavily in research than in the creative arts, music or poetry not for its intrinsic worth nor to win research esteem and still less to indulge researchers' curiosity, but for its contribution to economic development. To generate economic benefit and thus to warrant its extensive support by governments research has to be incorporated into the productive process. As Salter & Martin (2001, p. 512) observe paraphrasing the OECD, 'knowledge and information abound, it is the *capacity* to use them in meaningful ways that is in scarce supply' (emphasis in the original). Gibbons (2004, p. 97) argues that 'much innovation, and hence economic development, is dependent, less on original discoveries, and more on the timely take up, modification, and marketing of knowledge solutions that already exist but need to be adapted to local environments.' This is a radically different orientation to cultivating research esteem which is judged by the interests and values of other researchers, not those who use research. Nobel laureates are as successful at stimulating national innovation and economic benefits as olympic gold medalist are at improving a nation's fitness and they are as successful as prima donnas are at improving a nation's singing.

The traditional universities and other institutes that concentrate on research and maximising research esteem are therefore rarely major stimulations of community innovation. Lundvall & Borrás (1997, p. 154) therefore argue that knowledge production at universities needs to be integrated more closely with the innovation process since much innovation depends on tacit knowledge (Polanyi, 1967) which is socially embedded in organisational networks as Lundvall (1992, pp. 8-9) had earlier observed. They (Lundvall & Borrás 1997, p. 154) argue that innovation blurs the conceptually distinct but in practice continuous stages of invention, innovation and diffusion. This is supported by Moussouris (1998, pp. 93-4) who argues that there is too much concentration on research 'breakthroughs' and too little attention to the importance of research diffusion in generating economic development.

Nowotny *et al* (2001, p. 90) argue that since the knowledge economy depends on the dissemination of research 'the small number of universities which are research-led rather than access-orientated . . . no longer occup[y] such a central role in this new economy. . . . Indeed, it is possible to argue that non-elite universities [and other institutions] may be better placed to play these "knowledge games", because they have more experience of – and less distaste for – training and building up "knowledgeable" communities.' Scott (2000, p. 200) notes that 'it has proved difficult to contain research within the emergent elite [research-intensive university] sector; it has spread into other, newer and more open, sectors of higher education'. While the spread of research beyond designated research institutions may be a problem for mode 1 research, it is a

success for mode 2 research. Scott (2000, pp 200-1) says that ‘mode 2 expands the number of research, or knowledge, actors. . . . Other actors, once dismissed as mere “disseminators”, “brokers” or “users” of research results, are now actively involved in their “production” (which itself has become a more capacious, and ambiguous, category)’.

Innovation mediating processes and institutions

Shapiro (1993, p. 60) argues that ‘It will, in the final analysis, be the quality of the mediating social, political and cultural institutions that enable a society to actually benefit from the value of its investments in higher education.’ Edquist and colleagues (2001, p. 17) argue that organisational learning is important for gaining benefit from the knowledge economy and that this is developed by interaction with a range of organisations, presumably not just research-intensive universities and institutes.

As I have argued elsewhere (Moodie, 2004), part of the explanation for the high efficiency of much of Australian agriculture, which is in stark contrast to many other OECD countries, may be the broad diffusion of research and innovation through the applied research laboratories, demonstration farms and extension and outreach activities of State departments of agriculture that operated during most of the 20th century. Australian rural research and development was restructured in 1989 into 14 national rural research and development corporations funded by industry levies and matching Government funds (Roberts 2005, p. 61) which are strongly committed to the uptake and adoption of research (Rural Industries Research and Development Corporation, 2005). One such corporation is the Grape and Wine Research and Development Corporation which plays an important role in the Australian wine cluster described by Porter (2002). In contrast there is no comparable applied research laboratories and diffusion, demonstration and outreach for secondary industries in which Australia’s performance has generally been much weaker.

Gibbons (2004, p. 97) argues that since much innovation depends on ‘the timely take up, modification, and marketing of knowledge solutions that already exist but need to be adapted to local environments’, innovation ‘remains a local phenomenon and serves as a constant reminder that globalisation turns on differences in sentiments of a population, in its particular institutional structures that are designed to achieve collective purposes, and in the cultures that give meaning and value to the decisions taken.’ Innovative clusters are normally located within a relatively small geographic area, at least in the early stages of innovation. This is because innovation relies on tacit knowledge (Polanyi, 1967) picked up in the informal sharing of knowledge and ideas in ‘dense’ networks of firms and other relevant institutions (Salter & Martin 2001, p. 524). Rosenfeld (1998, pp. 1-2) argues that the close proximity and spatial interdependence of clusters create ‘collective externalities’ that allow participants to transact business more cheaply and easily, achieve a scale that attracts specialised services and resources, resolve problems more quickly and efficiently, and learn sooner and more directly about new technologies and practices.

Since a country normally wants to foster innovation more widely than it can afford to maintain research-intensive universities and institutes, more widely dispersed bodies may have a role in knowledge production or reproduction, and vocational education institutes are ideally placed to take up such a role. Rosenfeld (1998, p. 4) argues that in the US ‘community colleges are particularly helpful to small and midsized enterprises, since they are better positioned to reach them than universities, consultants, and service agencies, many of which prefer not to bother with “know-how” needs that may not be

technologically challenging or of a scale that can be sufficiently profitable'. Wolfe (2002, p. 22) argues that the highly decentralised nature of the US's post-secondary education is, amongst other factors, 'absolutely central' to the formation and success of Silicon Valley and many other innovative clusters studied in the US.

Grubb (2005) elaborates that Canadian and US 'community colleges carry out a variety of activities intended to enhance the local community, including advice to local firms (especially small- and medium-size enterprises) about new technologies, convening industry clusters and groups of local employers around common needs, identifying the education and technology needs of local employers, surveying the business environment for new developments and technologies, and helping attract new employers by providing customised training'. Grubb (2005, p. 26) adds that various research and development roles, particularly for their regions, are carried out by Finnish polytechnics (see also OECD, 2003, pp 52-3; Curtain, 2004, p. 26), French *instituts universitaires de technologie*, 'German *Fachhochschulen*, which are responsible for research transfer into smaller and medium sized enterprises and for working with public administration' and Norwegian state colleges.

Perhaps the strongest role of vocational education institutions in knowledge (re)production is in Yusuf & Evenett's (1998, p. 52) description of technology development in the German *Land* or State of Baden-Württemberg, which produces cars and commercial vehicles (DaimlerChrysler), sports cars (Porsche), electrical products (Bosch, Boss), software (SAP) and printing presses (Heidelberg) amongst other high quality products (Ministry of Science, Research and the Arts of Baden-Württemberg, 2005). Baden-Württemberg coordinates and supports its vocational education through local chambers of industry and commerce and company levies in the standard arrangement in the German coordinated market economy. The universities have their own technology transfer advice services, there are public research centres and inventors' advice services, and Fraunhofer institutes provide specific contract-based technology transfer and development services, mainly to large companies (Yusuf & Evenett 2002, p. 52). In addition The Steinbeis Foundation for Economic Promotion has established over 300 specialised transfer centres at the region's universities (European Communities, 2003), mostly at Fachhochschulreife (universities of applied sciences) and 'often in cooperation with a nearby technical college' (Yusuf & Evenett 2002, p. 52). Baden-Württemberg is also distinctive in Germany in having ten vocational academies, or *Berufsakademie*, that offer 'premium apprenticeships' mostly in the field of commerce and technology/engineering (Deißsinger, 2005, p 102). Technical schools (*Berufsschulen*) are linked to between 10 and 20 firms closely associated with the universities.

A role for Australia vocational education in stimulating innovation

Australia's vocational education institutes have so far generally not had a strong role in stimulating innovation. The *National strategy for vocational education and training 2004 – 2010* (ANTA, 2003a, p. 1) specifies four objectives for vocational education and training. The only object even indirectly relevant to innovation is the third: 'Communities and regions will be strengthened economically and socially through learning and employment'. However, innovation appears in one of 12 strategies, contributing to the first goal of training industry's workforce (ANTA, 2003a, p. 9). In its strategy 2004-2010 action plan the Australian National Training Authority (ANTA 2003b, p. 2) complained that Australian innovation policy concentrates on 'high-end' research and development, leaving out vocational education and training. Ferrier, Trood

& Whittingham (2003, p. 16) report that vocational education and training has been involved only marginally if at all in Australia's cooperative research centres, which they say are a small but crucial element in the national innovation system in their strong commitment to applied research and to the implementation and/or commercialisation of research. However, the authority (ANTA, 2003b, p. 6) acknowledged that vocational education and training is still at the early stages of engaging with the issues and the national innovation system. Australian vocational education might consider founding its contribution to national innovation on these points.

1 Emphasise innovation; eschew research

Vocational education's role should be to stimulate 'the timely take up, modification, and marketing of knowledge solutions that already exist but need to be adapted to local environments' (Gibbons, 2004, p. 97) and not to conduct research in any of its pure or applied forms. Vocational education needs to emphasise this at the outset and keep reminding itself and everyone else since governments, universities and research institutes will, with some justification, repress what they perceive to be research aspirations entertained by vocational education and any other institution not currently engaged in research. It is necessary to keep emphasising this because research so heavily dominates Australia's thinking about innovation that many assume that it is not possible to contribute to innovation without also having a research role. Furthermore, vocational education needs to protect its role in innovation from migrating to and being overtaken by the very powerful research paradigms.

To do this vocational education should forswear all the trappings of research and research esteem: it should not seek research grants (although participating in Australian Research Council link projects and cooperative research centres would be appropriate), while its staff should read research journals they should generally not publish in research journals and they should not have research titles. Because Australia has such a rudimentary innovation system in many areas it will be necessary to adapt processes, structures and symbols of innovation from successful areas such as Australian agriculture and from overseas.

2 Develop a distinctive role in the national innovation system

Vocational education should develop a distinctive role in the national innovation system. I would base this on 2 characteristics: that they don't conduct research and that they operate locally.

3 Act locally, learn globally

Innovation is a local activity, although it often applies knowledge learned from overseas. Each vocational education institute should therefore identify opportunities to stimulate innovation in their region. Innovation opportunities will be different for each vocational education institute since they are in different regions and have different strengths.

4 Form multiple partnerships

Vocational education institutions will contribute to innovation by broadening the partnerships they already have with local businesses, service providers and industry associations. They will also need to form partnerships with businesses and service providers in other regions in Australia and overseas which have practices of interest to those in their own region, and other partnerships with universities and research institutes in Australia and overseas conducting research relevant to their region.

5 *Establish an Australian network of vocational education innovation institutes*

Since much knowledge about innovation is tacit it is best learned and shared by networks of bodies with shared interests. Australian vocational education institutes interested in contributing to national innovation should therefore establish a network to share experiences and insights.

6 *Act in the long term*

While the final introduction and impact of a new technique may happen remarkably quickly, innovation builds on knowledge, skills, attitudes, capabilities and processes developed over a long period. Vocational education should therefore develop its role in stimulating innovation over a long period, say 10 years initially.

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