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A DIVERSITY OF DOCTORATES: FITNESS FOR THE KNOWLEDGE ECONOMY?

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ABSTRACT

There is now an increasing diversity of doctoral education in the Australian higher education landscape. As well as the traditional PhD by thesis, there are professional doctorates, doctorates by publication and PhDs by project. They are a particularly significant development since for the most part they are entirely work-based with minimal formal disciplinary input.

This paper seeks to relate this diversity of doctoral degrees to the growth of the knowledge economy and the imperatives it is said to impose on universities and the education of doctoral students. Changes in knowledge production and what constitutes legitimate knowledge are related to doctoral education. Can research training any longer remain an education in disciplinary knowledge and skills? Does it also need to include the skill development required by the knowledge economy?

In this context, the growth of doctorates by project becomes particularly significant since these programs, it is argued, are most appropriate for fitting doctoral studies to the needs of the knowledge economy. However, their growth also poses serious problems of accreditation and assessment, in the process raising fundamental issues concerning the academic mission and purpose of universities.
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Introduction
The contemporary landscape of Australian higher education is increasingly characterised by a diversity of doctoral education programs. As well as the traditional PhD by thesis, there has been a growth in professional doctorates and latterly doctorates by project. These last have now spread from their former confinement to the Architecture and Design disciplines to Business Studies, Engineering and Education. In this paper I want to relate the growth of doctorates by project to the growth of the knowledge economy and its implications for universities and doctoral education.

In the course of this paper many questions will be posed and few answers given. In this sense it reflects the current state of doctoral education in Australia. Doctoral education globally is undoubtedly experiencing a period of transition. What has been the norm historically still remains to some extent; what it will become is still unclear although some aspects are beginning to be discernible.

The paper draws upon my work experience at RMIT which like all technological universities is going through a period of rapid and painful change as it seeks to adjust and perform in the Commonwealth government’s new regime of performance-related research training. Essentially this is a paper that attempts to conceptualise the issues of doctoral education in the underlying trends that constitute the contemporary moment.

The question or issue which structures this paper is that if we now have a knowledge economy where a certain type of knowledge production (let us call it Mode 2 since this term now seems to have entered the vocabulary) is increasingly critical, then does this mean that a Mode 2 type doctorate is needed to provide graduates with the right skills for the knowledge economy? And if this is any way the case, what would such a doctorate look like? Would the doctorate by project model fit the bill? Indeed, is the increasing diversity of doctoral programs already a response to the knowledge economy and its demands?

The Knowledge Economy
I start by looking at the notion of a knowledge economy. The first thing that can be said about this is that it replaces an epistemological with an economic definition of knowledge. Knowledge becomes a factor of production, more critical in the production process as economic performance comes to rely more and more heavily on knowledge inputs.
At the same time, the knowledge economy is one where knowledge is not only a key input but also an increasingly significant output that can be grown in an unlimited way. The implication of this is that knowledge must be effectively and efficiently managed and locked into systems and processes that enhance innovation. Economic growth is now seen to be vitally dependent on the development of an infrastructure that facilitates and enables sustainable knowledge development. With universities therefore now increasingly seen as significant knowledge producers, they take on a hitherto unrecognised role as agents of economic growth.

Looking at this from the viewpoint of skills and capabilities we can ask what's required for servicing, maintaining and growing such an economic configuration? What's needed for innovation as the engine driving the knowledge economy? This is a complex issue with no easy answers but one aspect that is much emphasised is the notion of 'flexibility', fast becoming a central policy goal for organisations and governments in their attempts to stay ahead in the global economic race in a situation of what has been termed 'disorganised' capitalism (Lash & Urry, 1987). In this environment technological innovation becomes the means of keeping ahead. As Luke (1996) points out the capacity of labour to process information and generate knowledge with the aid of IT is now the premier source of productivity and economic growth.

Flexibility has come to be equated with an awareness of the importance of change and its acceptance. Associated with this are necessary attributes such as initiative, creativity, problem-solving and a collaborative ethic. Individuals and organisations are required to be reflexive and to have a mind-set that understands the need for continuous or lifelong learning. Organisations cast themselves as 'learning organisations' with a capacity to reflect on and learn from their practices. However, this emphasis on learning by both individuals and organisations is not necessarily the kind of learning that universities would define as learning. It is a learning which is not in the main 'bookish' nor discipline based but one which involves doing and interacting, a learning that is highly contextualised and problem-oriented.

Of course, flexibility is not the whole story. Knowledge in the knowledge economy also requires and indeed depends upon the sophisticated means of communication and information management provided by IT. As Gibbons et al (1994) argue what is now needed is the bringing to bear of multi- and trans-disciplinary skills and perspectives to the solution of problems -- a process 'being built around the clustering of innovations in information, communications technologies' (p125). There has been an increase in the number of sites where knowledge production is and can be carried out and IT has created the capability for these sites to grow and interact.

What then can be said about the kind of workers needed by such an economy? In very simple terms, one answer would be that knowledge workers with the kind of attributes I have touched on are needed. They need to be flexible and multi-skilled...
with an openness to learning. They must be at home in a work environment shaped by globalising processes and the information and communication revolution. They must as a minimum be IT literate. These skills required have been described as 'soft skills' and are themselves knowledge intensive -- skills to do with problem-solving, collaborative work, leadership and knowledge application.

The term 'human capital' is used very frequently in the context of discussions about the knowledge economy. It points to the importance of a capital embodied in individuals which enables them to assume a productive place in the knowledge economy. Those with much human capital are individuals with highly developed soft skills and the attainment of educational qualifications is not the only factor.

Here we begin to approach the crux of the issue. If knowledge is the currency of the new economy, universities are inevitably involved in its production. Their activities are knowledge intensive. They are also critically involved in the formation of those who take their place in this economy as knowledge workers. This means that universities have to ensure that these workers take their place with the right amount and kind of human capital -- with in other words the right skill set. Government and society, rightly or wrongly, now demand no less. Furthermore as Delanty (2001) points out graduates themselves realise that possessing a doctoral degree is no longer a passport to a job for life. They are very much aware that they need human capital in the form of the soft transferable and flexible skills.

However, with the emergence of a knowledge economy of a kind hitherto unknown in degree if not in kind, universities find themselves in a situation where the kinds of education needed places new pressures and expectations upon them and their offerings. As the highest, most specialised and most knowledge intensive and knowledge producing form of education offered by universities, doctoral education is now right in the middle of a fierce contestation that pits the traditional values of the academy against the new values of the knowledge economy.

**Knowledge**

Before looking at this in more detail however some more scene-setting is required. I need to say more about what constitutes 'knowledge' in the knowledge economy and to see how this way of constituting knowledge differs from how the academy understands knowledge.

A significant feature of the contemporary landscape is that not only is knowledge constantly changing and through the impact of IT becoming more rapidly and overwhelmingly available but what constitutes knowledge is itself highly contested. Here I want to foreground the between knowledge and performativity -- a link which is highly germane to the growth of the knowledge economy. In The Postmodern Condition of Knowledge, Lyotard (1984) argued that knowledge is now legitimated by its performativity or capacity to enhance the efficiency and
effectiveness of the socio-economic system. It is its performative usefulness rather than its adherence to epistemological canons that is of most significance.

If knowledge is produced and legitimated through its performativity, then inevitably it can make no claim to universality. There are different kinds of knowledge and different modes of producing knowledge each with their own legitimacy. As Gibbons et al (1994, p81) point out 'knowledge can no longer be regarded as discrete and coherent, its production defined by clear rules and governed by settled routines'.

What then are the implications of this? First, the linking of knowledge with performativity has played a significant part in orienting knowledge production to the applied and to tangible 'real world' outcomes, while in the process helping to subvert the notion that knowledge has to be validated by invariant epistemological canons. In broad terms, this has contributed to the undermining of traditional ways of doing research and the power of disciplinary communities. One consequence of this is that anything anywhere is now potentially researchable by a wide variety of knowledge producers in a wide variety of sites. These knowledge producers are no longer solely accountable to the gatekeepers and epistemological policing of disciplinary communities. Indeed, they are much more likely to be responsible to communities of practice within their workplace. Moreover, they no longer have to be exclusively located in the academy.

Knowledge production is now something that many in different forms and sites are engaged in as knowledge workers. This perhaps is what Gibbons et al are alluding to when they highlighted a new form of knowledge production which they called Mode 2:

The new mode [Mode 2] operates within a context of application in that problems are not set within a disciplinary framework. It is trans-disciplinary rather than mono- or multi-disciplinary. It is carried out in non-hierarchical, heterogeneously organised forms which are essentially transient. It is not being institutionalised primarily within university structures. (Gibbons et al 1994, pvii).

For Gibbons et al, Mode 1 is the kind of pure or curiosity driven research that characterises the knowledge produced in universities. Mode 1 knowledge production is conducted by a disciplinary community oriented to knowledge accumulation -- 'traditional "truths" accumulated over time...universal, objective, disciplined, planned, tested and reliable findings' (ibid p8). If it is applied, it functions through a linear model of application where the context of discovery is strictly separated from the context of application and where those who discover and those who apply are different in nature and location. Mode 2 is quite different and according to Gibbons et al becoming increasingly prevalent. For me, the most significant difference is that there is no distinction between discovery and application, discoverers and appliers. Given that Mode 2 knowledge is produced in the context of application it is
inevitably performative. It is perhaps for this reason that Mode 2 is seen as a more appropriate conception of knowledge for the knowledge economy.

The University in the Knowledge Economy
I start this section with a paradox which many scholars in the field of higher education studies have noted. The paradox is that on the one hand the knowledge economy would appear to need what universities are traditionally best at ie producing high quality knowledge yet on the other hand, the university is no longer the only or even the main producer of knowledge. Or to put it another way -- if knowledge is the new fashion why isn't everyone clamouring for the best designer? (Jacob & Hellstrom 2000)

This paradox can be multiplied further -- for example, if universities are the main source of the next generation of knowledge producers for the knowledge economy and if doctoral education is the way in which these knowledge producers are formed then why is there so much dissatisfaction with doctoral education -- why are so many questions being asked about its fitness for purpose?

The answer to this paradox is not hard to find although it goes to the heart of the issue that concerns this paper. The answer to a large extent lies in the kind of knowledge foregrounded by the knowledge economy, the kind of knowledge foregrounded by the university and the conflict between them.

This is not the place to engage in a deep analysis of the current problems and pressures faced by universities. Suffice to say that the university forged in the 19th century and tempered in the early years of the 20th century is changing fast (for more on this see Smith and Webster 1997, Barnett 2000, Delanty 2001). There are many factors at work here all of them interacting in complex ways -- for example, reduction in state funding and the pressure upon universities to not only develop closer links with business but to become businesses themselves. This is often referred to as the universities' path towards corporatisation or the onset of academic capitalism and the embracing of corporate values (Slaughter & Leslie, 1997). At the same time, the universities' need for extra and different sources of funding has coincided with the imperative of the knowledge economy that businesses need to find new, knowledge-intensive inputs and outputs. From this has emerged what Etzkowitz and Leydesdorff (1997) have called the 'triple helix' -- the intertwining of universities, government and businesses in the innovation process and the converging of their interests in the creation and development of the soft infrastructure of the knowledge economy.

As knowledge increasingly becomes an integral and necessary part of the economic production process, socially distributed knowledge comes to be recognised as significant and legitimate and dilutes the coherence, autonomy and universality of
Mode 1 type knowledge. Mode 2 is firmly located within specific contexts -- as Nowotny et al (2001) argue with Mode 2 the context has spoken back.

Delanty (2001) points out that Mode 2 represents the penetration of the market into the groves of academe. These groves are now no longer what they once were. To illustrate this we can look at the ways in which academics have typically understood themselves and what they were doing and contrast this with the pressures and expectations generated by the demands of the knowledge economy.

**CHANGING UNDERSTANDINGS OF ACADEMICS**

<table>
<thead>
<tr>
<th>TRADITIONAL UNDERSTANDINGS OF ACADEMICS</th>
<th>UNDERSTANDINGS DEMANDED BY THE KNOWLEDGE ECONOMY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research is the central endeavour and focus of academic life</td>
<td>Commercialisation of research is the central endeavour and focus of academic life</td>
</tr>
<tr>
<td>Quality maintained by peer review and professional autonomy</td>
<td>Quality maintained by social accountability</td>
</tr>
<tr>
<td>Knowledge pursued for its own sake</td>
<td>Knowledge pursued for its performativity</td>
</tr>
<tr>
<td>Task of the academic is the pursuit of cognitive truth</td>
<td>Task of the academic is the pursuit of knowledge in the service of innovation</td>
</tr>
<tr>
<td>Pursuit of knowledge best organised according to disciplines</td>
<td>Pursuit of knowledge best organised in a trans-disciplinary way</td>
</tr>
<tr>
<td>Reputations established through professional activities such as publication, conference attendance and research grants</td>
<td>Reputations established through links with industry</td>
</tr>
<tr>
<td>Rewards come to those who specialise in their discipline</td>
<td>Rewards come to those who can best market their intellectual property</td>
</tr>
</tbody>
</table>

(Table derived from Nicholls, 2001)

What is expressed here is how the academy has been historically, perhaps as an ideal type. It is very doubtful whether what is depicted in both sides of the table exists anywhere in pure form -- if indeed it ever did. Nor should the right hand side be construed as expressing all those characteristics which the academy lacks.

Undoubtedly however, universities have now lost their traditional status as primary producers of 'worthwhile' knowledge. They have become part of a wider and globalised knowledge market. Universities both because of the demands of the knowledge economy and the sheer explosion of information enabled by IT are now largely unable to control the production, legitimation and exchange of knowledge as they once did. So the university, willingly or otherwise, has had to respond by itself getting into the marketplace -- by forging collaborative research partnerships with
government and industry, by getting into the intellectual property game and by leveraging its specialised Mode 1 knowledge.

Whilst universities have been more resilient and adaptable than they are given credit for, there has undoubtedly been considerable opposition on the part of many academics to the trends I have been delineating. As the table notes, albeit in extreme form, the university and its processes of knowledge production are a major site of contestation. For example, Mode 2 knowledge production poses particular problems for the traditional university based researcher. In the academy, the dominant mode of dissemination and the main instrument of career advancement is still the academic book, the scholarly refereed paper and the conference presentation. Mode 2 knowledge is disseminated much more informally if at all through such means as the summary report and the on-line posting. With Mode 2, advancement is not through publication but through the successful solution of the problem or the innovation which can increase the organisation's profitability.

However it also needs to be pointed out that Mode 2 knowledge production still needs Mode 1, albeit not in its pure form, and Mode 2 knowledge producers still need to be initially trained as Mode 1 researchers -- hence perhaps the still significant role that universities have in research training and in building research capacity. Universities still have the most prestigious credentials and a university education particularly at doctoral level is still the best way of accumulating cultural capital. Granted all of this however, there are still questions that need to be raised about the appropriateness or fitness for purpose of doctoral education in the knowledge economy. Whilst it may still be the best way of accumulating cultural capital is it still the best way of accumulating the human capital needed to succeed in the knowledge economy? Is it necessarily the case that Mode 2 knowledge production needs knowledge workers trained in Mode 1? Does Mode 2 knowledge production need a Mode 2 type doctorate?

**Doctoral Education**

To begin looking at these issues, I want to go back to the adaptability of the academy to the new knowledge economy. One aspect of this is the undoubted shift in attitudes and practice of academics. The latter are now becoming increasingly familiar with the environment of contract research and of collaboration in knowledge production with practitioners in industry. It is possible to discern shifts in understanding about the ways in which knowledge is produced. Academics, albeit reluctantly, are getting used to the idea that they are in the commercialisation rather advancement of knowledge business. In the light of this therefore it could be said that there is now much greater acceptance of diversity in knowledge and knowledge production processes with synergies being created between the academy and the knowledge economy.
One implication of this is that the conventional PhD by thesis may now not be the only or best way to generate the knowledge needed for the knowledge economy or to train knowledge workers. The criticism of the PhD by thesis involves a number of issues. First, it is criticised for being excessively narrow and specialised. Second, that it does not encourage multi-disciplinary or trans-disciplinary work. Third, that the kind of training involved in completing a PhD does not provide a broad enough skill set. Fourth, that the thesis is not an appropriate vehicle for collaborative work. Fifth, that the form and culture of the conventional PhD precludes the involvement of industry practitioners who as we have seen are likely themselves to be knowledge producers.

In effect, what these criticisms amount to is that the conventional PhD by thesis is too embedded in Mode 1 -- that it is not flexible enough for the needs of the knowledge economy and that it doesn't produce workers who are sufficiently flexible. This is perhaps not entirely surprising given that a PhD by thesis was essentially an apprenticeship into an academic career. The very culture of the PhD by thesis orients research into narrow disciplinary channels and encourages a lone, 'ivory tower' way of working which does not sit well with notions of useable knowledge collaboratively produced.

It is not too difficult therefore to account for the rise of alternative forms of doctoral education. Professional doctorates are a good case in point, their development owing much to a recognition of the need for doctoral education which would more readily bring together the academy and the workplace. Doctorates by project can be seen as their logical extension in the sense that the coursework element has been dropped and the emphasis is entirely work-based.

In doctorates by project, the workplace becomes the site of research. Knowledge production takes off from specific problems or issues in the workplace. The research is action-oriented in the sense that it seeks to make a difference in the workplace. It is collaborative either because the 'student' is actually a member of that workplace or because the research is conducted with the full participation of members. This doesn't mean that there are no disciplinary elements but it does mean that they are not the starting point or the structuring agency. In all likelihood, the research will be multi- or trans-disciplinary. The outcomes of this form of doctoral education is not a thesis but a short written exegesis. More significant is the 'artefact' produced through the project. This is the outcome of the project with direct tangible benefit to the workplace. Its significance also lies in the fact that it subverts the primacy of the written thesis as the dominant assessable outcome.

Earlier I argued that the knowledge economy required particular kinds of soft skills that mostly were not developed in the conventional PhD by thesis. This is not the case in the doctorate by project. Here, the acquisition is embedded or situated in the research process. The kinds of skills required in knowledge economy workplaces are developed through the location in the workplace and through the research itself.
requiring these kinds of skills to be developed for the successful realisation of the project.

It’s clear then that this is very much Mode 2 type knowledge production both in terms of content, outcomes and process. It has a clear advantage in that it does not simply encourage wider and deeper links between universities and industry and direct contact with workplaces but actually requires it as a condition of possibility. It encourages good practice in relation to the demands of the knowledge economy for partnerships in the sense that project work requires collaborative negotiation of research questions and collaborative agreement about outcomes, intellectual property and the management of the research process.

In effect, the curriculum of this education is work itself and here of course as a mode of doctoral education it becomes radical and contentious. Such a curriculum and such a mode of researching is not sufficiently familiar and acceptable to the academic community. There are fears about the dilution of the standing of the PhD. There are concerns about academic freedom and university autonomy. There are issues to do with projects satisfying both workplace needs and academic standards. An extraordinary number of person hours have been spent trying to equate the learning from this mode of knowledge work to the understood categories of assessment of the academy -- so far with little success. There are also practical issues to do with the fact that there is little expert supervisory and examining capability for this kind of work. Related to this are questions as to what constitutes an ‘artefact’ that is fit for assessment. This may be relatively straightforward in Architecture and Engineering but much less so in Education and Social Science.

These practical issues are very complex and difficult to resolve. However, on the other side of the practicality issue is that this kind of doctoral program is more likely to have performative outcomes congruent with Australia’s performance based research training system. In this, completions play a very significant part in determining funded student places and effective completion strategies are now considered vital for the securing of the competitive edge in the funding stakes. Doctoral programs by project with their shaped processes and focused outcomes are thought to be more likely to secure timely completions than traditional doctoral programs. For this reason, if for no other, they are likely to be embraced further by universities.

Thus, to sum up. It seems that doctorates by project are a Mode 2 type doctorate which have a good fit with Mode 2 type knowledge and a Mode 2 type economy. They are a means of producing knowledge which is useable and relevant to industry. Given the location in the workplace the skill sets required for the contemporary workplace are necessarily acquired through the carrying out of the project. Everyone it would seems gains -- the student, the industry, the university and the economy.
Transition and diversity
As always however, things are never quite that simple. Universities are in state of transition, their future direction fiercely contested. The same too is the case with doctoral education. It is hard to imagine that universities will reverse direction from the way they have been moving so far. It is hard also to imagine that there will be no further changes in doctoral education. These changes, as we have seen, are being manifested in the move to a diversity of doctorates.

Whilst giving a qualified welcome to the growth of alternative doctoral forms, there is still a place for the conventional PhD. Indeed in certain knowledge producing areas, for example the physical and chemical sciences it is likely to remain the only form of doctoral education. Thus my conclusion would be that if the knowledge economy requires flexibility as its operating principle then doctoral education with a fitness for such an economy requires structures, processes and relationships that are equally flexible -- and an important and vital aspect of flexibility is diversity.

Of course, this pluralistic view is open to criticism on the grounds that it takes no account of power. There are and there will continue to be important hierarchies in the production, reading and evaluation of research. The power of disciplinary communities and academic gatekeepers should not be underestimated and these can act as significant inhibitory forces in institutionalising diversity in doctoral education. Diversity is easier spoken of than instantiated even in a situation where universities are in transition.

Whilst resistance to diversity might be regarded as outdated and ostrich-like, there is a point to it because ultimately it is a resistance based on a conception of what a university should be which is entirely opposed to corporate conceptions. Here the university is not seen as geared to performativity and to mission-oriented research. The university is conceived as a community of scholars, discipline-based and autonomous. A doctorate by project doesn't figure in this conception because such an activity would be considered neither educational nor doctoral. Equally, the notion that universities existed to service the knowledge economy would be rejected on the grounds that the university's main function is cultural and social.

I'm putting the case in a very extreme way here obviously. I doubt whether one would find many in the academy who held all these views, or who if they did would be prepared to translate their beliefs into action. Nonetheless however extreme these views might be, they still need to be foregrounded and debated. If we in universities are to encourage a diversity of doctorates we need to know what we might be losing as well as what we might be gaining.
References