



Higher Education Research and Development Society of Australasia, Inc.

Enhancing Higher Education, Theory and Scholarship

Proceedings of the

30th HERDSA Annual Conference [CD-ROM]

8-11 July 2007
Adelaide, Australia

Suggested format for citing papers:

Author (2007) Title of Paper, in *Enhancing Higher Education, Theory and Scholarship, Proceedings of the 30th HERDSA Annual Conference [CD-ROM]*, Adelaide, 8-11 July.

Published 2007 by the
Higher Education Research and Development Society of Australasia, Inc
PO Box 27, MILPERRA NSW 2214, Australia
www.herdsa.org.au

ISSN 1441 001X
ISBN 0 908557 72 8

Copyright © 2007 HERDSA and the authors. Apart from any fair dealing for the purposes of research or private study, criticism or review, as permitted under the Copyright, Designs and Patent Act, 2005, this publication may only be reproduced, stored or transmitted, in any form or by any means, with the prior permission in writing of the publishers, or in the case of reprographic reproduction in accordance with the terms and licenses issued by the copyright Licensing Agency. Enquiries concerning reproduction outside those terms should be sent to the publishers at the address above.

Curriculum in higher education in Australia – Hello?

Owen Hicks

The Carrick Institute for Learning and Teaching in Higher Education, Australia
ohicks@inet.net.au

‘Curriculum’ in higher education in Australia is a term given very limited currency. Either a limited ‘content’ focused use of the term is assumed, or the term is used as a vehicle for the discussion of a particular issue in higher education. The paper briefly reviews the literature on curriculum in higher education with particular reference to Australia. A comparative analysis of the literature from the UK, US and Australia provides a context in which to discuss the present and future utility of ‘curriculum’ in an Australian higher education context. Alternative definitions of the term are outlined and discussion of these invited. The multiple meanings of ‘curriculum’ as conceptualised by students, lecturers, course co-ordinators, and institutional planners and administrators are considered. The paper draws on Australian literature on curriculum in the school sector, relating this to higher education, as well as reviewing recent international initiatives focusing on curriculum in higher education. Models and mechanisms to encourage a deeper understanding and more rigorous application of the concept of curriculum in higher education are developed and presented for discussion.

curriculum, higher education, Australia

Introduction

‘Curriculum’ is a term that has been given little currency, or at least little profile, in higher education in Australia. Either a limited ‘content’ focused use of the term is assumed, or the term is used as a vehicle for the discussion of critical issues in higher education e.g. ‘*inclusive curriculum*’, ‘*learner-centred curriculum*’, ‘*internationalising the curriculum*’. However, the term, effectively employed, has considerable potential, both conceptually and practically. It could bring together:

- content focused discipline interests,
- learning and teaching improvement initiatives, and
- key issues in higher education such as
 - inclusivity,
 - internationalisation,
 - coverage and future direction of programs of study, and
 - the role of communication and information technologies in higher education.

The unifying potential of ‘curriculum’, defined broadly, could:

- re-position or re-shape disciplines and discipline-based courses,
- aid the promotion of cross- inter- and trans- disciplinary programs and pedagogies,
- re-define the notion of ‘service’ units,
- appropriately place ‘prior’ and ‘work-based’ learning in formal education, and
- embed ICT and generic teaching and learning improvements within institutional learning environments.

As such, ‘curriculum’ is a notion worthy of exploration and elaboration in a higher education context. Existing and future learning and teaching development initiatives, funded and

supported through organisations like the Carrick Institute for Learning and Teaching in Higher Education could be contextualised within a construct of curriculum. Making use of these initiatives at institutional and school or department level could be enhanced through an engagement at the level of curriculum. Curriculum as a construct could both consolidate such initiatives undertaken to date and highlight coherent strategies or foci for the provision of more valuable and meaningful learning opportunities in higher education.

A Brief Review of the Literature

From an initial review of the literature on curriculum in higher education in the United Kingdom, the United States and Australia, the most striking outcome is the dearth of writing on the subject. Where there is more publication the focus is usually either on 'curriculum design', with an assumed understanding of what curriculum is, or on what could be characterised as writing on curriculum related issues such as those noted earlier in the paper.

In the most recent in-depth treatment of curriculum in higher education, Barnett and Coate (2005) claim that in universities in the United Kingdom: "The very idea of curriculum is pretty well missing altogether" (p.1). They argue that: "There is little in the way of a constituency – at the moment – for whom an interest in the idea of curriculum would be an attractive proposition" (p.15). The whole thrust of their book, however, is to argue most convincingly in favour of academics engaging with curriculum. The value they place on curriculum as well as their arguments as to why curriculum has had such a limited currency in higher education appear worthy of exploration in an Australian context.

Barnett and Coate noted that the Deering Report in the UK failed to list 'curriculum' in its index. The same omission is also noted in the index of the *Learning for Life – Final Report* (West, 1998) in Australia and Ramsden's (2003) seminal publication, *Learning to Teach in Higher Education*. By contrast, a chapter of the *National Report on Australia's Higher Education Sector* (DEET, 1993) was devoted to "The curriculum and the delivery of courses". However, a more detailed appraisal of the use made of the term in this chapter suggests curriculum was somewhat narrowly defined.

One of the most progressive developments in curriculum in higher education can be found in the activities of the UK Higher Education Academy, Imaginative Curriculum Project (2007). This initiative has created "a network of practitioners who believe that designing a curriculum is a creative process in which knowledge, skill, imagination and passion for a subject, come together." Their website states: "We are particularly interested in curricula that seek to engage students in active process-based learning, and imaginative curricula that enable students to develop and apply their creativity." In their view, "curriculum embraces:

- what is to be learnt - content
- why it is to be learnt - rationale and underlying philosophy
- how it is to be learnt - process
- when it is to be learnt - structure of the learning process
- and includes consideration of how the learning will be demonstrated and achievement assessed."

A similar initiative may have some currency in Australia.

The literature from the United States suggests a somewhat functionalist use of 'curriculum' in higher education. The extensive work of Gaff and Ratcliff (1997) claims that in the US: "For nearly two decades, the undergraduate curriculum has received a great deal of national

scrutiny. It has been a time of strident criticism of the curriculum, laments that students are not learning what they should, proposals for change, studies and analyses of alternative curricula, development of new knowledge and approaches to knowledge, innovations in curriculum offerings, and assessments of student achievement” (p.1). Gaff and Ratcliff claim that the ‘curriculum’ in universities and colleges is now “an intellectually rich concept that may be viewed and analysed from many different vantage points. One can look at purposes, experiences, or outcomes of the curriculum” (p.1). However, according to Ratcliff, “When a committee, a dean, or a department chair contemplates changing the curriculum, it is dangerously easy to make an assumption that everyone agrees on what a curriculum is” (Gaff and Ratcliff, 1997, p.5). He notes that “the vision of what is a curriculum is heavily shaped by disciplinary values, educational philosophy, the diversity or homogeneity of students enrolled, and the social and institutional context” (p.5).

In Australia, according to Candy, Crebert and O’Leary (1994, p.60) “the concept of ‘curriculum’ in the university setting was unfamiliar to many academics, who developed and taught units or courses to reflect their own interests with little attention to ensuring coherence or identifying the aims and objectives of teaching”. By contrast, in the school sector the term is in common use with a longstanding and extensive literature (e.g. Brady, 1995; Marsh, 1984; Marsh and Stafford, 1988; and Lovat and Smith, 2003). In relation to assessment in higher education, James and McInnes (2001) argued that: “Assessment literally defines the curriculum for most students – by spelling out the learning that will be rewarded it is a potent strategic device for educators” (p.4) This suggests perhaps the tail (assessment) wagging the dog (curriculum) in our universities. A recent unpublished conference paper by Laurine Hurley argued for exploration of the term ‘curriculum’ as a guiding influence on the direction being taken by higher education in Australia, highlighting in particular the Barnett and Coate distinction of ‘curriculum as it is designed’ and ‘curriculum as it is enacted’.

Alternative Definitions and Multiple Meanings

Scottish universities have been using the term ‘curriculum’ in its Latin form since 1633 (Dictionary.com Unabridged (v 1.1), 2007). It has origins in the Latin ‘currere’, ‘to run’, ‘a course of action’, ‘the action of running’. Dictionary.com Unabridged (v 1.1), drawing on Random House defines curriculum as “1. the aggregate of courses of study in a school, college, university, etc.: *The school is adding more science courses to the curriculum.* 2. the regular or a particular course of study in a school, college, etc.”

However understanding the various usages of curriculum is not quite so easy. In definition are risks of over simplification on the one hand and supercomplexity, or perhaps obscurity on the other. Lovat and Smith (2003), listing thirteen ways of defining curriculum, argue that achieving a specific definition is of lesser importance than recognizing that people use the term to mean different things and being sure that the meaning given in a particular context is understood. The term is currently in common use, more often in association with ‘schooling’, and the TAFE sector, rather than with university education. What is unfortunate is the lack of clarification, sought by Lovat and Smith, of the multiple and sometimes conflicting meanings. This is certainly true of references to curriculum in higher education.

In some cases ‘curriculum’ is perceived, however mistakenly, as ideology free. In more critical writings its ideological underpinnings are made explicit (e.g. Barnett and Coate, 2005; Lovat and Smith, 2003; Grundy, 1987). Grundy (1987) argues that ‘Curriculum is not a concept, it is a cultural construction’ (p.5) and that curriculum “does not exist apart from

human interaction” (p.6) “Curriculum is a social construction” and “the form and purposes of that construction will be determined by some fundamental human interests which imply concepts of persons and their world” (p.19). She argues along similar lines to Freire (1972) for an ‘emancipation curriculum’, one that allows “both ‘freedom from’ the dogmatism of tradition that disguises an interest in domination in the cloak of an interest in client well-being, and a ‘freedom to’ in the guise of autonomy and responsibility” (p.187).

Temporal aspects of curriculum help to add complexity. Is curriculum conceptualised as static, a ‘fixed curriculum’, at best subject to review and redrafting to keep it up to date? Should curriculum be seen as emergent, something that unfolds, or is specified or defined, through a process of students engaging in learning? In this context the distinction of ‘curriculum-as-designed’ vs ‘curriculum-as-action’ elaborated by Barnett and Coate (2005) is useful and arises from their “sense that a curriculum is as much an achievement as it is a task” (p.3).

The actual substance of curriculum is also a subject of debate. Barnett and Coate (2005) argue strongly for curriculum design to be seen as the design of ‘spaces for learning’ rather than the design process being seen as the filling of spaces, timeslots and modules.

And who has the prerogative to define the curriculum? The multiple perspectives of student, lecturer, course co-ordinator, educationalist, institution, and external stakeholders such as parents, employers and governments may claim legitimacy. Both conceptual and substantive differences are likely to be evident in these potentially different perspectives.

Do we use ‘input’, ‘throughput’ or ‘output’ definitions? Is curriculum about intention? Is the curriculum a published offering of learning opportunities? Is it little more than a syllabus, a list of topics to be covered in a course? Or, is curriculum defined by the reality of the ‘actions’ that take place within a structured learning environment? Or further, is it better defined by outputs, or achieved learning outcomes? In this context the notion of the hidden curriculum may be worth revisiting.

The boundaries given to the term may also be critical. What is included and what excluded? Some academics appear to use the term almost exclusively related to content, to a syllabus. Many would find difficulty distinguishing between syllabus and curriculum. Others would want to engage with the ‘how’, and ‘why’, while also interrogating the structuring of learning opportunities in terms of ‘when’ and ‘where’.

The Current positioning of ‘Curriculum’ in Higher Education in Australia

A search on internet sites of Australian universities (from home pages listed at Australian-Universities.com) tells an interesting story in relation to use of the term ‘curriculum’ in higher education. Discounting reference to ‘curriculum’ in the context of courses in teacher education (which is not the focus of this paper), one is left with an impression of something partial, used atomistically, in a limited and assumed way, usually attached to some other issue. While almost all institutional sites do use the term, only one clearly stated definition was found. The Guidelines for Curriculum Development and Review at the University of Adelaide (Kiley, 1994) stated:

The term ‘curriculum’ used in these guidelines is in accordance with Print’s [Print, 1987] definition in *Curriculum Development and Design*. “**Curriculum** is defined as all the planned learning opportunities offered to learners by the educational institution **and** the experiences learners encounter when the curriculum is

implemented” (1987, p. 4). For the University of Adelaide, this definition means that ‘curriculum’ is not only what is written in the Syllabus Outlines of the *Calendar* but also encompasses among others things, course and subject design, course development and approval, content, teaching and assessment strategies, facilities, timetabling and access to information. Importantly, the curriculum is affected by what is and is not included. For example, by omitting to teach problem solving skills and by not providing problem-solving activities the implication to students is that problem-solving is unimportant. (p.2)

What is interesting to note in this definition is that it includes not only planned, published offerings but also the experiences of learners during implementation. In contrast, the recent and laudable blueprint for The University of Melbourne, *The Melbourne Model: Report of the Curriculum Commission* (2006) provides no clear definition of what is meant by curriculum and this must be inferred from the terms of reference given to the Commission and the text of the report.

Searching for ‘curriculum’ on university web sites also reveals:

- at the institutional level, one-off curriculum planning and review, in some instances at whole-of-institution level (e.g. *The Melbourne Model*);
- standing committees for curriculum review and approval (of note here is the now common existence of ‘Teaching and Learning committees’ at various levels in institutions, but the rare occurrence in some of ‘Curriculum, Teaching and Learning Committees’);
- numerous references to discipline focused use of the term (often appearing synonymous with ‘syllabus’), e.g. the science curriculum, the social work curriculum, the history curriculum, the medical curriculum;
- curriculum issues such as internationalising the curriculum, the inclusive curriculum, the flexible curriculum;
- curriculum structure – core curriculum, common curriculum, undergraduate curriculum;
- curriculum development or design workshops (some on-line) in a small number of institutions; and
- central resources to support curriculum development, design and review in almost half of the institutions.

Further, the following significant new initiatives were identified:

- a dedicated Curriculum Co-ordination Unit (2007) supporting a substantial Curriculum Framework Project (2007) in higher education at Swinburne University of Technology. “The mission of the Curriculum Coordination Unit is to support the development of the Swinburne Model for Professional Learning, providing an innovative, supportive learning environment that produces graduates who are work ready and have strong career skills as well as being up-to-date in their chosen specialisation” (Swinburne Curriculum Coordination Unit, 2007)
- the establishment of a Curriculum Design and Development Unit at Central Queensland University, apparently in response to recommendations from the Australian Universities Quality Agency (David’s WebLog, 2007) and
- the Carrick funded Curriculum Improvement Leaders Project at Murdoch University, which aims to develop curriculum leaders in nine schools. “Working with colleagues they will conduct research, build upon existing initiatives, disseminate best practice and lead sustainable curriculum change aligned with University and School goals and

strategic directions” (Murdoch University, Curriculum Improvement Leaders Project, 2007).

It would appear that while the term curriculum is largely used in a narrow way in Australian universities, generally focusing primarily on course content and structure, the scope and complexity of curriculum is beginning to receive more attention.

Models and Mechanisms for a Deeper Understanding and Application of ‘Curriculum’.

Considerable benefit may result from an exploration in the higher education sector of models to encourage a deeper understanding of curriculum and promote an ‘intellectually rich’ application of the concept. These models could incorporate a juxtapositioning of ‘curriculum’ as institutional offering, as learning opportunities provided by academics and as the learning undertaken by students. Curriculum as intention, delivery and outcome could be elaborated. Contextual dimensions could also be explored including the wider social/community/political context of curriculum, the context brought by individual academics involved in ‘delivering’ the curriculum, and the context in which learners, indeed different types of learners, find themselves. The diagrams and models that follow are an attempt to address some of these issues.

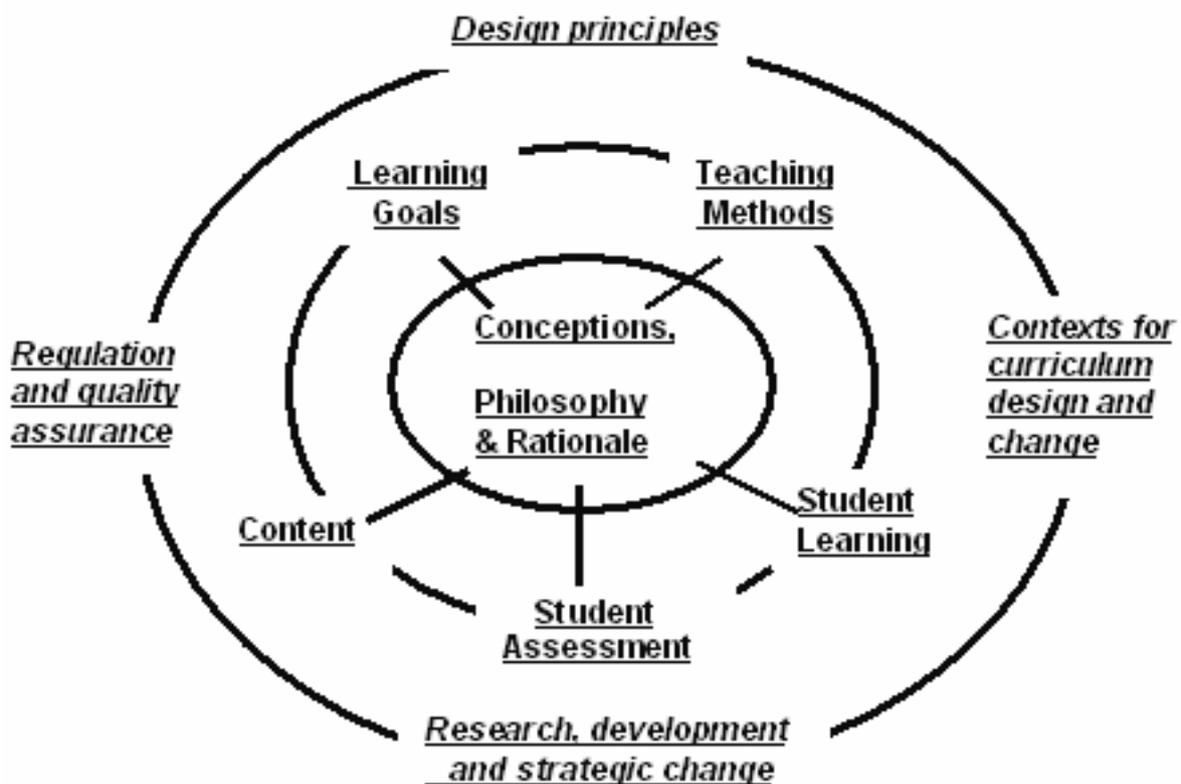


Figure 1: UK Higher Education Academy Model of a Curriculum

A somewhat static but useful model of ‘curriculum’ (Figure 1.) is provided on the ‘Curriculum Design’ page of the UK Higher Education Academy. The model is designed “to provide useful information about curriculum design in contemporary higher education.” Information is arranged around eleven themes arranged as shown in the following diagram. It

is argued that: “This model can be applied at the level of the whole curriculum (course or programme) or the individual curriculum building blocks (units or modules)” (Higher Education Academy, 2007). Similar visual representations of the curriculum can also be found at the LTSN Generic Centre website (see Jackson and Shaw, 2002).

Unfortunately this diagram is more about curriculum design following an assumed understanding of what is meant by ‘curriculum’. The Academy’s main curriculum page (Higher Education Academy, 2007) also fails to elaborate on what curriculum is, choosing rather to immediately highlight the importance and challenging nature of ‘curriculum development.

Barnett and Coate (2005) have produced a schema for understanding curricula based on their three domains of student engagement - knowing, acting and being. Through this schema they seek “a frame through which to understand and communicate different patterns of curricula across disciplines, courses and curricula” (p.70). The framework for curricula that they propose “recognizes that curricula have distinctive but integrated components, as well as allowing for different weightings of each domain within any one curriculum” (p.70). Figure 2 shows the general schema and models for curricula in various disciplines illustrating the integration of differently weighted domains.

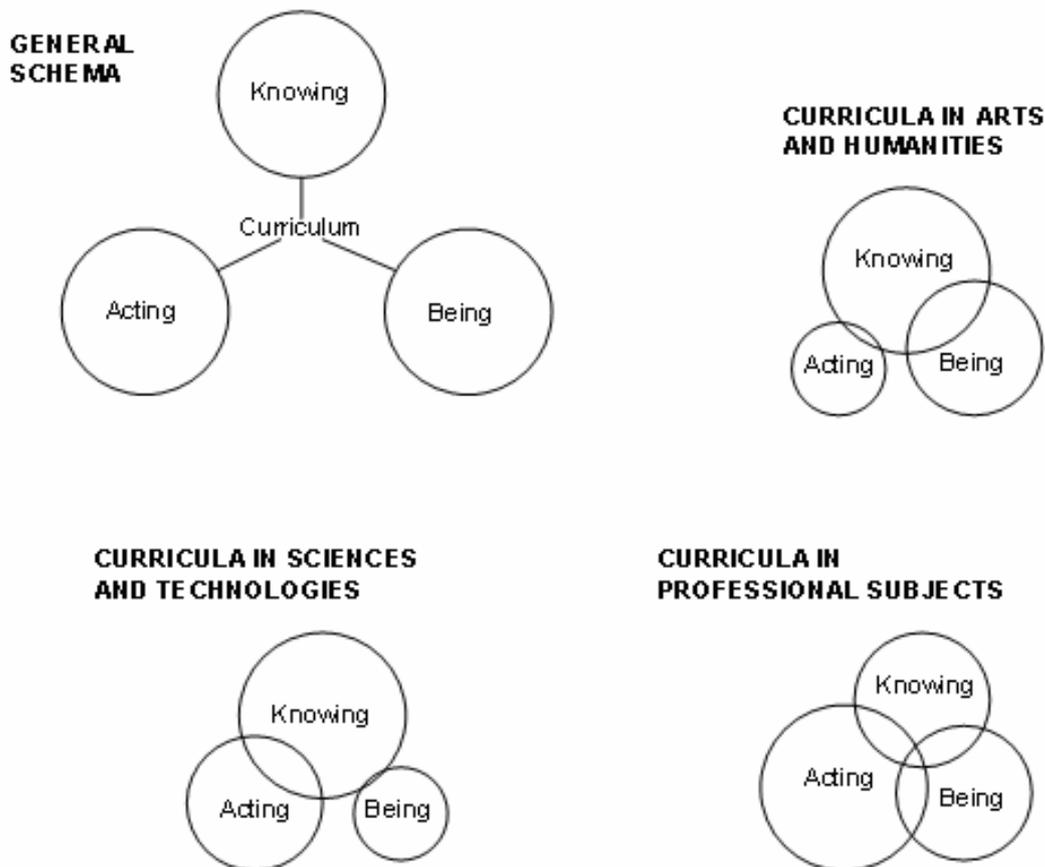


Figure 2: Barnett and Coate’s Schema for Curricula

Figure 3 is an attempt to highlight at least some of the factors influencing curriculum in present university arrangements in Australia. It is not exhaustive in its inclusions but does highlight a range of elements needing consideration when reflecting on curriculum. Given a more prominent and elaborated meaning, curriculum could act to bring many of these elements together more effectively.

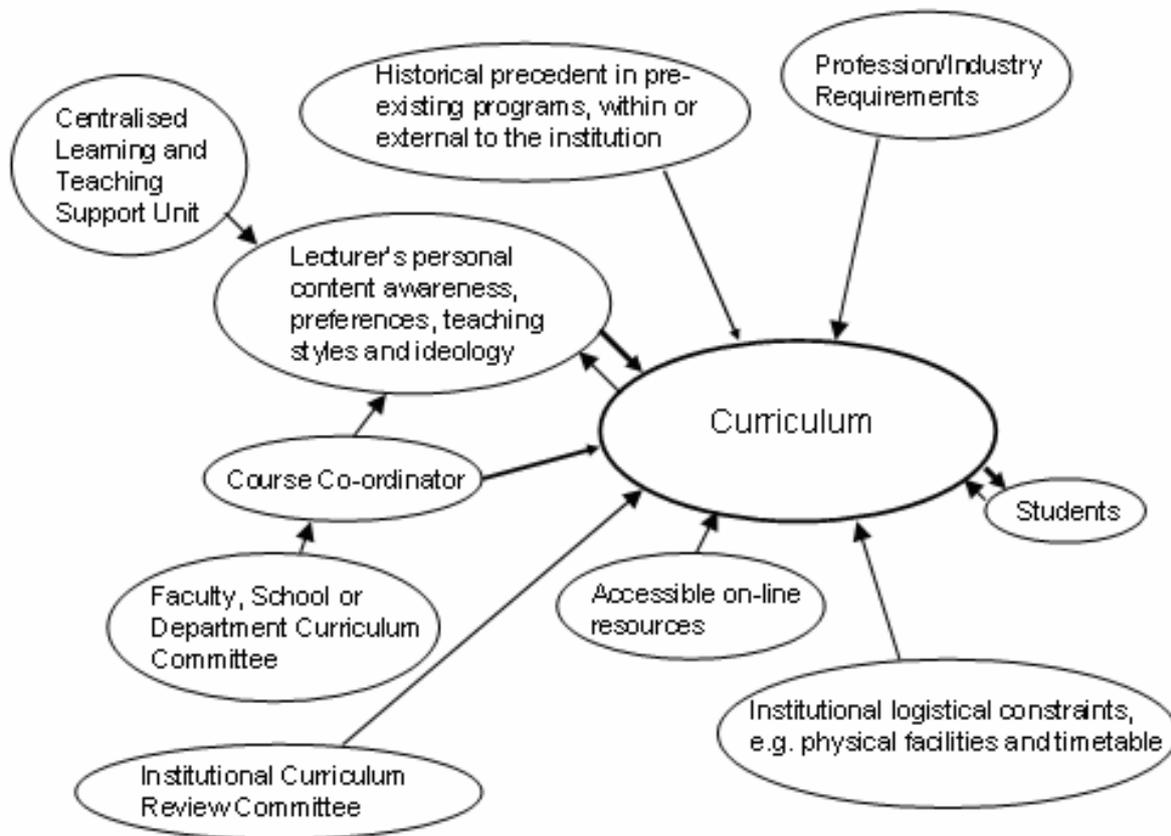


Figure 3: Typical Influences on Curriculum

Figure 4 represents a somewhat controversial vision of the attention given to various arrangements for student under a ‘teaching and learning’ focused approach, arguably the status quo, and a ‘curriculum’ focused approach. The figure requires further refinement but may be worthy of discussion as an heuristic device challenging a too dominant focus on ‘teaching and learning’.

	Teaching and Learning Focused Student Learning	Curriculum Focused Student Learning
What – relates to the content; what material will be included; what will be omitted; what must be 'covered' and what is optional.	Local responsibility, usually structured around existing institutional disciplinary structures; potentially lacking co-ordination; deliverer (lecturer) focused.	Significant focus given to the structure and appropriateness of content; an integrated approach; a more collective responsibility with external advice and support; 'receiver' (student) focused.
When – relates to temporal aspects of a course; duration, arrangement of teaching/learning time, flexibility of teaching/learning time.	Often driven by administrative imperatives and not routinely questioned.	Questioned in the context of its suitability for optimum learning.
Where – relates to institutional physical logistics; on-line resources; remote learning opportunities.	Taken as given with new facilities assumed to improve learning opportunities.	Questioned in the context of its suitability for optimum learning
How – relates to the nature and quality of the learning opportunities provided.	Significant focus on quality teaching and learning with external advice and support.	Integrated into other aspects of the development and delivery of the learning opportunity.
Why – addresses broader ideological, philosophical and contextual aspects of the learning opportunities intended; reasons for content inclusion; inclusive and exclusive aspects of the experience offered.	May be addressed locally. Periodically reviewed at an institutional level.	Questioned in all aspects of the learning experience offered; addressed by a range of stakeholders.

Figure 4: A what, when, where, how and why reflection on approaches to student learning.

One of the most readily recognizable diagrams in teaching and learning in higher education is John Biggs's 3P model of teaching and learning (Biggs, 2003, p.19). Biggs notes (2003, p.18) his model "elaborates Dunkin and Biddle's (1974) model of teaching to include approaches to learning. Figure 5, somewhat presumptuously, takes this further to give prominence to the concept of curriculum in a 3P model of curriculum, incorporating and integrating teaching and learning into a curriculum framework. It is proposed as a possible mechanism for bringing learning and teaching development and curriculum design and development together. While not wishing to down play the significance of provision of quality learning opportunities, the diagram does give greater prominence to issues of context and content than the Biggs model. It is an attempt to give an integrating focus to the what, when, where, how and why of student learning

Conclusion

This paper has been presented as a work-in-progress. The curriculum models will require revision, refinement and reformulation. The author invites debate, support and challenge to the ideas expressed, in the hope that greater application can be made of the fine generic and discipline-based teaching and learning initiatives that have been developed in higher education in Australia in recent years, and that a more rigorous attention can be given to issues of context, content and design in what we offer to our students.

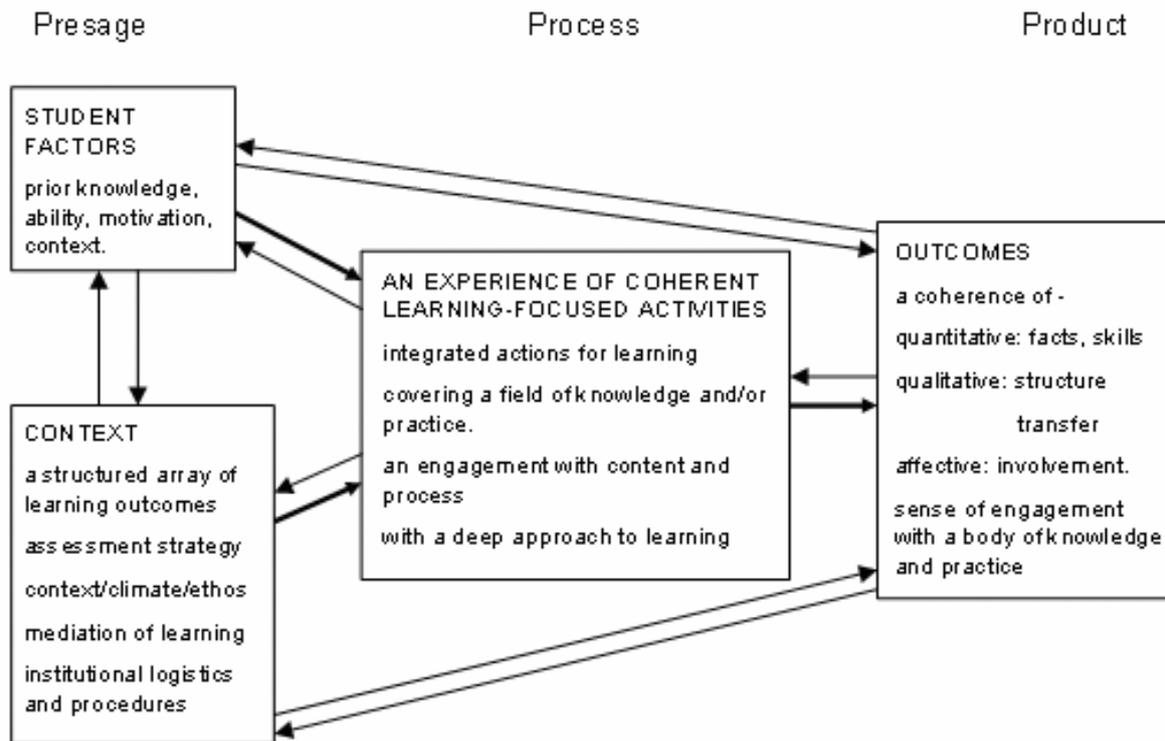


Figure 5: A 3P model of curriculum.

Acknowledgements

This paper was prepared while the author was working as a Senior Consultant at the Carrick Institute for Learning and Teaching in Higher Education. While the author is grateful for the support of the Institute, the views expressed and conceptual models generated those of the author, unless otherwise attributed, and not an endorsed Carrick Institute position.

References

- Australian-Universities.com (Retrieved 18/5/2007) <http://www.australian-universities.com/list/>
- Barnett, R. & Coate, K. (2005). *Engaging the Curriculum in Higher Education*. Maidenhead: SRHE/Open University Press.
- Biggs, J. (2003). *Teaching for Quality Learning at University*. 2nd Ed. Maidenhead: SRHE/Open University Press.
- Brady, L. (1995) *Curriculum Development*. 5th Ed. Sydney: Prentice Hall.
- Candy, C.P., Crebert, R.G. & O'Leary, J. (1994). *Developing Lifelong Learners Through Undergraduate Education*. Canberra: NBEET, AGPS.
- David's WebLog. Aims of a curriculum design group at a university. (Retrieved 20/5/2007) <http://cqp-an.cqu.edu.au/david-jones/blog/?p=102>
- DEET, Higher Education and Training Division (1993). *National Report on Australia's Higher Education Sector*. Canberra: AGPS.
- Dictionary.com Unabridged (v 1.1) (2007) (Retrieved 25/5/2007) <http://dictionary.reference.com/search?db=dictionary&q=curriculum>
- Gaff, J.G., Ratcliff, J.L. et al. (1997). *Handbook of the Undergraduate Curriculum – a Comprehensive Guide to Purposes, Structures, Practices, and Change*. San Francisco: Jossey-Bass.
- Grundy, S. (1987). *Curriculum – Product or Praxis. ?* Lewes: Falmer Press.
- Higher Education Academy. (2007) *Curriculum*. (Retrieved 23/3/2007) <http://www.heacademy.ac.uk/curriculum.htm>

- Higher Education Academy. (2007) *Curriculum Design* (Retrieved 23/3/2007)
<http://www.heacademy.ac.uk/795.htm>
- Higher Education Academy, Imaginative Curriculum Project (2007). *Information and Background*. (Retrieved 23/3/2007) <http://www.heacademy.ac.uk/853.htm>
- Hurley, L. (2005) Are we there yet? In *2nd Asia-Pacific Educational Integrity Conference Proceedings*. (Retrieved 4/5/2007)
http://www.newcastle.edu.au/conference/apeic/papers_pdf/hurley%20are%20we%20there%20yet.pdf
- Jackson, N. and Shaw, M. (2002) *Conceptions and Visual Representations of the Curriculum*. (Retrieved 2/3/2007) http://www.heacademy.ac.uk/resources.asp?process=full_record§ion=generic&id=49
- James, R. & McInnes, C. (2001) Strategically re-positioning student assessment. In DEET, Higher Education and Training Division (2001). *National Report on Australia's Higher Education Sector*. Canberra: AGPS. (Retrieved 23/3/2007)
http://www.dest.gov.au/sectors/higher_education/publications_resources/profiles/national_report_higher_education_2001.htm
- Kiley, M. (1994) *Guidelines for Curriculum Development and Review at the University of Adelaide*. (Retrieved 23/5/2007) http://www.adelaide.edu.au/dvca/curriculum/guidelines_curric.pdf
- Lovat, T.J & Smith, D.L.. (2003). *Curriculum – Action on Reflection, 4th ed*. Tuggerah: Social Science Press.
- Marsh, C.J. (1986). *Curriculum – An Analytical Introduction*. Sydney: Ian Novak Publishing.
- Marsh, C.J. & Stafford, K. (1988). *Curriculum – Practices and Issues, 2nd Ed*. Sydney: McGraw-Hill.
- Melbourne University. (2006) *The Melbourne Model: Report of the Curriculum Commission* (2006). (Retrieved 23/5/2007) http://growingesteem.unimelb.edu.au/docs/cc_report_on_the_melbourne_model.pdf
- Murdoch University, Curriculum Improvement Leaders Project (2007). The Project. (Retrieved 22/5/2007)
<http://www.tlc.murdoch.edu.au/project/cilp/project.html>
- Print, M. (1987). *Curriculum Development and Design*. Sydney: Allen & Unwin.
- Ramsden, P. (2003). *Learning to Teach in Higher Education, 2nd Ed*. London: RoutledgeFalmer.
- Swinburne Curriculum Coordination Unit. (2007). Curriculum Coordination Unit. (Retrieved 22/5/2007)
<http://www.swin.edu.au/hed/ccu/>
- West, R. (1998). *Learning for Life – Final Report. Review of Higher Education Financing and Policy*. Canberra: DEETYA.

Copyright © 2007 Hicks, O. The author assigns to HERDSA and educational non-profit institutions a non-exclusive licence to use this document for personal use and in courses of instruction provided that the article is used in full and this copyright statement is reproduced. The author also grants a non-exclusive licence to HERDSA to publish this document in full on the World Wide Web (prime sites and mirrors) on CD and in printed form within the HERDSA 2007 conference proceedings. Any other usage is prohibited without the express permission of the author.