Introduction

In seeking to accommodate new demands and reinterpret their purpose over the past decade, universities in many countries have attempted to clarify the nature of the education they offer to their students and their contribution to society through a description of the generic qualities and skills their graduates possess (Barnett 2000). Even though claims of graduate attributes sit at a vital intersection of many of the forces shaping higher education today, they by and large lack the support of a conceptual framework or theoretical underpinning (Clanchy & Ballard 1995, Holmes 2000). Universities' endeavors to describe and foster the development of generic attributes of graduates are characterised by a plurality of viewpoints and approaches and, despite extensive funding in some quarters, have met with limited success (Kemp & Seagraves 1995, Drummond et al 1998, Coaldrake 1998).

Recent research (Barrie 2002) that has revisited the rhetoric of institutional claims of 'generic graduate attributes' from the perspective of phenomenography (Marton & Booth 1997) has shown that Australian university teachers charged with the responsibility of developing students' generic graduate attributes, do not share a common understanding of either the nature of these outcomes, or the teaching and learning processes that might facilitate the development of these outcomes. Instead academics hold qualitatively different conceptions of the phenomenon of graduate attributes. In these conceptions particular understandings of graduate attribute outcomes are associated with particular approaches to the teaching and learning of such outcomes.

These findings shed a new light on universities' claims of a certain set of 'generic attributes' on the part of all graduates, regardless of the particular degree studied. Such claims are currently being critically re-examined in some Australian universities in the context of attempts to implement more systematic and widespread curriculum reform to address the efficient development of graduate attributes through university education. Such curriculum reform and development poses a considerable challenge for academic development units charged with supporting the process.

This paper considers the implications of the interactions between conceptions of graduate attributes and approaches to teaching and learning identified in the research, in the context of a research-led academic development strategy based on the student centred perspective (Prosser & Trigwell 1999) on learning. In doing so the paper considers how the qualitatively different conceptions of graduate attributes identified in previous research might be applied to the challenge of revising a university's statement of graduate attributes and developing a coherent approach to the development of these attributes in the context of students' experiences of university education.

Context

Universities' claims of generic graduate attributes are not new. However, in the past decade there has been a renewed interest in defining the qualities of graduates on the part of universities and government. This has been fuelled by many factors.

- The changing nature of society and work is being articulated in the demand for a university education to equip graduates to deal with uncertain futures. In defining their purpose and outcomes the traditional conceptual base of universities as solely 'knowledge' providers has been challenged to the extent that it may no longer be tenable (Barnett 2000). Universities are...
searching for alternative ideas upon which to base a conception of the place the university in contemporary society.

- The number of students participating in university has increased. The massification of the higher education system has brought increasingly diverse students with correspondingly diverse needs and motivations and an increased 'stake' in higher education on the part of society. The increased 'stake' in the form of increased participation and funding has brought universities more into the public sphere with associated demands for accountability for society's investment in such public institutions.

- The demands for public accountability have been operationalised in quality assurance exercises, which have challenged universities to articulate their purpose and outcomes and demonstrate that they are achieving these effectively as a condition of ongoing public support.

- Coupled with this, the emergence of alternative education providers has challenged universities’ monopoly as providers of higher education and lent added urgency to the need for universities to define the unique qualities of a university education.

These factors have contributed to many recent changes in university teaching and curricula, including the proliferation of university policy statements claiming particular qualities on behalf of graduates.

**Key features of definitions of graduate attributes**

In Australia, most definitions of these generic graduate outcomes derive from the definition in the Higher Education Council (HEC) report *Achieving Quality*:

> These are the skills, personal attributes and values which should be acquired by all graduates regardless of their discipline or field of study. In other words, they should represent the central achievements of higher education as a process (HEC, 1992 p 20).

More recent Australian definitions (Bowden et al 2000, Hager et al 2002) emphasize the relevance of these graduate outcomes to both the world of work (employability) and other aspects of life. In particular the role of such qualities in equipping graduates as global citizens and effective members of modern day society who can act as 'agents of social good' has been emphasized in the Australian context.

Graduate attributes are the qualities, skills and understandings a university community agrees its students should develop during their time with the institution and consequently shape the contribution they are able to make to their profession and society. …. They are qualities that also prepare graduates as agents of social good in an unknown future. (Bowden et al., 2000)

Broadly speaking, generic graduate attributes in Australia have come to be accepted as being the skills, knowledge and abilities of university graduates, beyond disciplinary content knowledge, which are applicable in a range of contexts. University students are intended to acquire these qualities as one of the outcomes of successfully completing any undergraduate degree at university.

There are several key features to this definition of generic graduate attributes:

- These outcomes are referred to as **generic** in that they are claimed to be developed regardless of the field of study or domain of knowledge. That is not to say that they are necessarily independent of disciplinary knowledge. Rather that these qualities may be developed in various disciplinary contexts and are outcomes that in some way transcend disciplinary outcomes.

- They are abilities that are to be looked for in a **graduate** of any undergraduate degree. They are not entry level skills. Rather they are considered to be an important outcome of university level learning experiences.

- They are referred to as generic **attributes** rather than generic skills in recognition that as outcomes they encompass more than skills. An attribute is a more global term for outcomes that might encompass knowledge, skills, and attitudes.
• These outcomes are outcomes of the usual process of higher education. That is, they are not a set of additional outcomes requiring an additional curriculum. Rather they are outcomes that can be reasonably expected from the usual higher education experience.

However, while an expected product of usual university curricula, it may be that the efficient and effective achievement of such outcomes necessitates the review and improvement of existing curricula. This review and improvement of usual curricula should not necessarily focus on adding new ‘generic’ content to courses, rather it might involve teaching the same things differently. However, such enhanced curricula may also benefit from the provision of additional supporting curriculum strategies, more explicitly targeting generic attributes. The review of existing course curricula in particular represents a considerable challenge for the University.

The endeavour by universities to foster the development of generic capabilities in their students constitutes both a serious commitment to a broader notion of graduate quality in higher education and a significant challenge to conventional teaching and learning arrangements. (Bowden et al 2000 p 10)

**Current Status of GGA in Australian Universities: Initiating Change**

Australian universities have claimed such outcomes in policy statements for over a decade. Currently the inclusion of a statement of such outcomes in university plans is a requirement of funding however the current climate of accountability is likely to bring additional scrutiny to bear on such claims. It seems reasonable to expect that universities will be asked to provide evidence that they have appropriate strategies in place to ensure such claims are realised and even to provide evidence of the actual achievement of such outcomes.

Two recent significant national reports on generic attributes in higher education in Australia (The B/HERT discussion paper, Hager et al 2002, and the EIP report on Generic Attributes of ATN graduates, Bowden et al 2000) have pointed to the need for additional curriculum reform to fulfill universities current claims of such outcomes. A recent national survey of Australian employers also suggests that university graduates may not possess the claimed attributes to the level desired by this group (see Hager et al 2002, Bowden et al 2000, DETYA 2000).

Internationally, reviews of university initiatives in the UK found that despite the existence of excellent isolated initiatives the overall picture is one of patchy uptake and implementation of graduate attributes curricula. Somewhat surprisingly this is the case despite a decade of extensive government funding through the HEFCE scheme.

The overall picture of personal and transferable skills in the UK higher education sector is not very encouraging. Certainly there is little evidence of effective practice on any large scale. There is however considerable evidence to suggest that, sometimes major, development programs have had only limited success. (Drummond et al 1998 p.23).

Interestingly these initiatives have rarely focussed on systemic change of existing teaching approaches.

Generic capabilities might also be ‘built on’ to the curriculum content without any alteration to the learning environment. Such approaches deny the holistic nature of capability and inhibit the integration of personal qualities, skills and knowledge….. (Bowden et al 2000)

Numerous universities have recently initiated projects focussing on generic graduate attributes. Chief amongst these has been the ATN universities and in particular the University of South Australia. These initiatives while marking a serious attempt at systemic reform do not address the underlying lack of a research-based theoretical or conceptual model of graduate attributes. It was proposed that the review of the University of Sydney’s Graduate attributes be research-based and academic led.

**A framework for a shared vision**

Understanding the difference in opinion held by members of the university community as to the place of such outcomes amongst the more familiar university learning outcomes and teaching strategies is a necessary precursor to any review of existing policy and meaningful and effective lasting curriculum development.
Using conceptions of graduate attributes for research-led systematic curriculum reform

Simon Barrie

Paper presented at ISL 2003, Hinckley, UK.

(Graduate attributes initiatives in the United Kingdom) Have had little impact so far, in part because of teachers’ scepticism of the message, the messenger and its vocabulary and in part because the skills demanded lack clarity, consistency and a recognisable theoretical base. Any attempt to acquire enhanced understandings of practice through which to inform staff and course development initiatives thus requires the conceptualisation and development of models of generic skills. (Bennett et al 1999 p 90)

Recent research (Barrie 2002) into University of Sydney academics’ understandings of the place of graduate attributes in the usual university curriculum has highlighted the reality of these disparate views. This research focussed on the activities of university teachers charged with developing graduate attributes as part of the usual undergraduate experience.

It identified a hierarchy of four increasingly complex understandings of the nature of graduate attributes as outcomes (See First Phenomenographic outcome space - Appendix A). Related to these understandings of outcomes were six different understandings of the process of teaching and learning such attributes and certain outcomes were associated with certain processes (Barrie 2003). This paper is concerned with reporting the academic development strategies based on the first phenomenographic outcome space. These findings provide a way of understanding how the range of existing excellent initiatives within the university, (stand-alone as well as embedded), might be combined and integrated in an overall strategy.

These initiatives target graduate attributes in terms of:

A. **Precursor Attributes**: There is a group of strategies that reflect the perception that graduate attributes are undifferentiated foundation skills (like English language proficiency or basic numeracy). These skills are separate to discipline knowledge and learning however they are vital precursors to such learning. From the perspective offered by this understanding of graduate attributes, most students are expected to have these skills on entry. For those that do not, the development of such skills is best addressed by the provision of an additional remedial curriculum for those student who need it. This additional curriculum might take the form of an additional course on these skills or a series of remedial workshops or similar support provided by non-disciplinary teachers.

B. **Complementary Attributes**: There is a second group of strategies that address graduate attributes as higher (university) level, additional generic outcomes that usefully complement or round out discipline knowledge. In these strategies, graduate attributes are understood to be functional, atomistic, personal skills that, while an important addition to disciplinary learning, are quite distinct from other university learning outcomes. They might be addressed by the inclusion of an additional unit (or units) of study in a course, an additional series of lectures or workshops within an existing unit, or through the inclusion of a particular learning task to address the development of these attributes. This additional graduate attributes curriculum is part of the usual course curriculum for all students. From the perspective of these strategies, graduate attributes do not interact with discipline knowledge and the attributes are essentially generic, although different attributes might be more or less important in the context of different disciplines.

C. **Translating Attributes**: Other strategies at the University address graduate attributes as important university learning outcomes that allow students to make use of and apply discipline knowledge. These strategies position graduate attributes as clusters of personal attributes, cognitive abilities and skills of application. While still separate to discipline knowledge, graduate attributes are no longer seen as independent of this knowledge. Instead, the graduate attributes interact with, and shape, discipline knowledge (for instance through the application of abstract or context specific discipline knowledge to the world of work and society), and are in turn shaped by this disciplinary knowledge. Because of the relationship between graduate attributes and knowledge in the different disciplines, in these strategies attributes are differentiated by the discipline context. Rather than being generic, graduate attributes are specialised and differentiated forms of underlying generic abilities which are developed to meet the needs of a specific discipline or field of knowledge. Because of the intimate relation to discipline knowledge these attributes are usually developed within the context of usual classes, either as part of the usual course content, through the usual teaching processes of that content or (from a student centred perspective), through the students’ engagement in the course.

D. **Enabling Attributes**: Other strategies at the University address graduate attributes, not as parallel learning outcomes to discipline knowledge, but as abilities that sit at very heart of...
Using conceptions of graduate attributes for research-led systematic curriculum reform
Simon Barrie
Paper presented at ISL 2003, Hinckley, UK.

Discipline knowledge and learning. Rather than clusters of attributes, graduate attributes are understood as interwoven networks of these clusters. These interwoven attitudes and capabilities give graduates a particular perspective or world-view (i.e. a way of relating to the world, or to knowledge, or to themselves). In these strategies, graduate attributes provide the skeleton to discipline knowledge and are learnt as an integral part of that knowledge. They might be learnt in the context of discipline knowledge as an integral element of students’ experience of courses, or through students’ engagement in the broader experience of participation in the university community. From this perspective, graduate attributes have the potential to outlast the knowledge and contexts in which they were originally acquired. Moreover they provide a framework for ongoing learning of new knowledge. As such the generic attributes transcend the disciplinary contexts in which they were originally acquired.

This research provides a framework for making sense of the diversity of graduate attributes initiatives at the university as well as the framework for the revision of the current policy statement of graduate attributes.

A hierarchy of complementary approaches: Policy

The different understandings represent a hierarchy of approaches, with Enabling strategies subsuming and being supported by Translating strategies, which in turn are supported by Complementary and Precursory approaches.

As with most dimensions of human capability and knowledge, graduate attributes do not spring into being fully fledged. Such outcomes are more likely to be the result of staged process of development and achievement with the increasingly complex outcomes benefiting from different strategies at different stages in the process of acquisition.

Policy statements listing graduate attributes might also reflect a layered or staged development of such attributes, (particularly given the hierarchical nature of understandings of graduate attribute outcomes held by the academic community). For instance, while a policy may ultimately aim to specify graduate attributes in terms of Enabling approaches (incorporating outcomes of a particular type and the related processes by which these outcomes might be developed), it might also incorporate the specification of Translating approaches, as steps towards the achievement of the higher level outcomes. Such a layered policy can also incorporate the specification of the Complementary & Precursor strategies as providing valuable non-discipline based support for all students and specialised support for students who lack the basic entry level skills.

In this way, it is possible for the existing conglomerate lists of different types of generic skills to be re-organised, rather than redeveloped from scratch and the role of the different types of initiatives already in place to be recognised.

An example of such a layered approach to the organisation of graduate attributes representing different conceptions is provided as Appendix B. In this example the nature of the graduate attribute outcome - as interwoven networks of abilities, clusters of specialised skills, atomistic undifferentiated personal and functional skills and low level atomistic skills is shown on the left hand side of the table. The relationship between the exemplar skills at each level is indicated by the lines linking the cells at each level of the table. This represents the way in which lower level atomistic conceptions of the exemplar skills might support and contribute to the linked clusters of skills and ultimately to the interwoven networks of abilities which characterise higher level conceptions of graduate attributes. The associated curricula approaches to the teaching and learning of such attributes in disciplinarily contexts are indicated in the right hand column of the table.

In the example an understanding of generic attributes in terms of outcomes such as scholarship and global citizenship (Level D) can be seen to subsume the discipline specific, level (Level C) understandings of generic attributes as including disciplinary writing conventions and research methodologies and ethics protocols. These contextual (in terms of the discipline) linked clusters of abilities are in turn supported by an understanding of generic attributes as useful general abilities such as essay writing skills or an understanding of the principles of academic honesty or plagiarism. Such a layered policy statement even provides scope for conceptions of graduate attributes as pre-entry skills such as English language competence requiring remedial intervention for some students.
Inherent in such a hierarchical or layered policy statement of graduate attribute outcomes is the accommodation of the related range of processes by which such outcomes might be fostered in students.

Policy Revision

The project adopted a research based approach to the revision of the policy - which aimed at making sense of the diversity of existing practice while providing some coherence across the institution and permitting realistic implementation.

From the research and investigations of practice at other universities, two key factors stood out in terms of approaches to graduate attributes and possible reasons why the implementation of curricula and teaching to develop graduate attributes was so patchy.

The existing list of graduate attributes was a conglomerate of different level skills and abilities. Its description of graduate attributes was as piecemeal and atomistic skills. The list of skills was organised as if ‘thinking skills’ had nothing to do with cognitive abilities or communication skills, and as if generic attributes had nothing to do with discipline knowledge. More importantly the list did not bear much resemblance to the sorts of holistic and integrated human capabilities that university’s rhetoric espoused for its graduates. There was a problem with the nature of the list.

In terms of practice, the variety of different approaches – ranging from doing nothing – to different add-on curriculum strategies, or embedded approaches, to strategies where such attributes formed the very core of the curriculum, reflected fundamental differences in what academics understood graduate attributes to be.

When we had understood this variation we had a tool that would allow us to organize the rather chaotic mix of strategies we already had in place, as well as a tool to highlight some of the gaps and to help those who might be resistant to the idea of graduate attributes understand the different perspectives their colleagues held.

The policy was revised in the following ways:

- The existing statement listing attributes of graduates of the University of Sydney was revised to reflect the hierarchical nature of these outcomes.
- In identifying the over-arching graduate attributes (and component skills and abilities), the distinctive nature and outcomes of a research intensive undergraduate experience be articulated and the university mission was embodied.
- The policy was revised to include a statement that more clearly identifies graduate attributes as university level outcomes related to, and developed in the context of, discipline knowledge.
- The revised policy statement, while recognising that stand-alone initiatives provide valuable support, clearly identify that the University is adopting as its main strategy, an embedded approach to the development of graduate attributes through incorporation in existing disciplinarily curricula.
- The revision of the university’s current statement of graduate attributes ensures the new statement, while academic-led, is relevant outside the university community through appropriate consultation with employers, government, past graduates and current students.
- Recognise that the effective achievement of such outcomes will require the fostering of a student centred approach in these embedded curricula strategies which is aligned with the University’s general teaching and learning policies, and will be supported by the adoption of research led teaching strategies.
What was developed?

The revised policy identified three overarching attributes:

**Scholarship: An attitude or stance towards knowledge:** Graduates of the University will have a scholarly attitude to knowledge and understanding. As Scholars, the University's graduates will be leaders in the production of new knowledge and understanding through inquiry, critique and synthesis. They will be able to apply their knowledge to solve consequential problems and communicate their knowledge confidently and effectively.

**Global Citizenship: An attitude or stance towards the world:** Graduates of the University will be Global Citizens, who will aspire to contribute to society in a full and meaningful way through their roles as members of local, national and global communities.

**Lifelong Learning: An attitude or stance towards themselves:** Graduates of the University will be Lifelong Learners committed to and capable of continuous learning and reflection for the purpose of furthering their understanding of the world and their place in it.

Each of these overarching attributes can be understood as a combination of five overlapping clusters of skills and abilities.

1. **Research and Inquiry:** Graduates of the University will be able to create new knowledge and understanding through the process of research and inquiry.

2. **Information Literacy:** Graduates of the University will be able to use information effectively in a range of contexts.

3. **Personal and Intellectual Autonomy:** Graduates of the University will be able to work independently and sustainably, in a way that is informed by openness, curiosity and a desire to meet new challenges.

4. **Ethical, Social and Professional Understanding:** Graduates of the University will hold personal values and beliefs consistent with their role as responsible members of local, national, international and professional communities.

5. **Communication:** Graduates of the University will recognise and value communication as a tool for negotiating and creating new understanding, interacting with others, and furthering their own learning.

The particular abilities and skills that comprise each of these five clusters of abilities are likely to be different in different disciplines. That is, these attribute clusters can be interpreted differently in different disciplines or domains. This reflects the strong disciplinary focus of the level three "translation" conception of graduate attributes identified in the research.

In recognition of this each of the 17 faculties of the university are developing their own statement of the abilities that comprise these clusters based on an indicative list (See Appendix C). In some cases this contextualised list is also based in part on professional associations' statements - for example the Australian Institute for Engineers - which accredits all engineering degrees in Australia - has a statement of attributes of Engineers. (See Appendix D)

In this contextualisation of the attributes faculties are using the framework to stimulate debate and discussion within the faculty as to the different understandings held by academics of graduate attributes. These discussion also have an external dimension in the discussions of the contextualised statements of attributes with professional associations and employer groups.

To support these discussions the project is gathering examples from the disciplines if how each of the 5 clusters and 3 top level attributes are taught in universities and understood in both professional and broader social setting after graduation.

At the same time non-faculty units such as the university Library and Learning Center, Careers Centre Koori Centre etc are documenting the across institution strategies they have in place. For instance foundation programs in academic writing and library research skills which represent some of the Associated and Remedial strategies which support teaching of graduate attributes in the disciplines.
The next stage of the project

Following the development of the contextualised statements an initial audit will be undertaken in each faculty to identify where in the degree structure (ie which subjects) each of the 5 and top 3 attributes is addressed. This will identify obvious weaknesses and strengths in the degree programs in relation to each of the attributes. It will also identify groups of academics who might collaborate to review degree strategies in relation to graduate attributes - for instance the academics who report teaching ‘communication’ may profit from meeting to consider how their individual efforts integrate and articulate into a coherent degree experience to develop this attribute. It seems likely that some attributes are over-taught and some under-taught and that others lack any sort of staged development. For example many subjects may target the development and assessment of the same level of communication skills through essay writing. This seems inefficient particularly given the resources required to properly mark essays in increasing large classes.

Next year the project will turn to the curriculum development and implementation phase. This will involve the development of ongoing support processes, monitoring systems and reward incentives to encourage effective (demonstrable and explicit) incorporation of graduate attributes in unit of study and degree program curricula. This stage will draw on the research findings related to the conceptions of teaching and learning of graduate attributes identified in the research (Barrie 2002) and link with the work of the University’s evaluation and quality assurance strategy discussed elsewhere in this conference (Prosser & Barrie 2003).

Conclusions

This revision of the University’s policy statement of graduate attributes is based upon research which has identified the variation in how academics understand graduate attributes as outcomes. This is different to the previous strategy used by the university (and many other universities) of identifying popular or desired skills and combining these into a statement, though the current revision does build upon this strategy. The research framework also provides a rationale for the disciplinary contextualisation of the clusters of component attributes (level 3 Translation conceptions) in the various faculties of the university while still ensuring a coherence across the institution. It also recognises the complementary role of foundation skills programs and other university-wide strategies - particularly those that address Associated and Precursor conceptions of graduate attributes.

References

All references available at http://www.itl.usyd.edu.au/GraduateAttributes/
Appendix A: Academics’ understandings of Generic Graduate Attributes as Outcomes
First Phenomenographic Outcome Space

<table>
<thead>
<tr>
<th>Referential (what is meant)</th>
<th>Additive:</th>
<th>Transformative:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GGA are discrete from other university learning outcomes</td>
<td>GGA are integral to university learning outcomes</td>
</tr>
<tr>
<td>Structural (internal and external horizon)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Irrelevant:</td>
<td>No aspect of GGA in the foreground, they are ignored at university level. The relationship to other learning outcomes is as low level skills that permit acquisition of content</td>
<td>A: Necessary basic PRECURSOR skills but irrelevant as they are a prerequisite for university entry</td>
</tr>
<tr>
<td>Unrelated:</td>
<td>What is in the foreground are functional atomistic personal skills that are not related to discipline knowledge</td>
<td>B: Useful skills that COMPLEMENT or round out disciplinary learning</td>
</tr>
<tr>
<td>Application:</td>
<td>What are in the foreground are clusters of linked abilities and skills of application. These abilities are relevant to discipline knowledge</td>
<td>C: These are the abilities that let students TRANSLATE make use of or apply disciplinary knowledge in the world</td>
</tr>
<tr>
<td>Integral substrate:</td>
<td>What are in the foreground are networks of inter-woven abilities and aptitudes for learning. These aptitudes shape disciplinary and other knowledge</td>
<td>D: They are the scholarly abilities that infuse and ENABLE university learning and knowledge</td>
</tr>
</tbody>
</table>

Categories of Description

A - PRECURSOR: Some academics understand generic attributes as necessary basic precursor skills and abilities. However, the expectation is that students will already possess these and that any teaching of such skills at a university level would be remedial only. As such, these skills are seen as largely irrelevant in the context of the courses these academics teach. While the generic skills might be a necessary precursor to the learning of subsequently taught discipline content, no relationship between the attributes and the resultant discipline knowledge acquired through a university education is apparent in this conception.

B - COMPLEMENT: Some academics have a conception of generic attributes as useful additional skills that complement or round out discipline knowledge. What are in the foreground are functional atomistic personal skills that are quite discrete from other university learning outcomes. They are generic skills acquired as the result of a university education and are therefore understood to be outcomes that are part of the university syllabus but separate and secondary to the learning of disciplinary knowledge.

C - TRANSLATE: Some academics have a conception of generic attributes as clustered personal attributes, cognitive abilities and skills of application that let students make use of or apply disciplinary knowledge, thus potentially changing and transforming disciplinary knowledge through its application. The attributes are learning outcomes which graduates possess in partnership with discipline knowledge. The graduate attributes are closely connected with, and parallel, discipline learning outcomes.

D - ENABLE: Some academics expressed a conception of generic attributes, not as separate learning outcomes, but rather as inter-woven abilities and aptitudes for learning that infuse and enable all scholarly learning and knowledge. These abilities are seen as integral to disciplinary knowledge rather than being learning outcomes that were separate, (either as independent or linked outcomes) to discipline knowledge, as in the previous three categories of description. In this conception, graduate attributes are an integral substrate of discipline knowledge and are the core of all scholarly knowledge and learning.
<table>
<thead>
<tr>
<th></th>
<th>What graduate attributes are</th>
<th>How learnt</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>Lower level atomistic skills unrelated to university</td>
<td>1: Taught in remedial classes</td>
</tr>
<tr>
<td>B2</td>
<td>Higher level Atomistic, undifferentiated personal and functional skills unrelated to discipline content</td>
<td>2: Taught as adjunct to course</td>
</tr>
<tr>
<td>C3</td>
<td>C: Linked clusters of specialised skills and abilities related to discipline content</td>
<td>3: Taught as part of course content</td>
</tr>
<tr>
<td>C4</td>
<td>C: Interwoven networks of higher level learning abilities and aptitudes that provide a framework for discipline knowledge</td>
<td>4: Taught by course teaching process</td>
</tr>
<tr>
<td>C5</td>
<td>C: Interwoven networks of higher level learning abilities and aptitudes that provide a framework for discipline knowledge</td>
<td>5: Learnt through course experience</td>
</tr>
<tr>
<td>D6</td>
<td>D: Interwoven networks of higher level learning abilities and aptitudes that provide a framework for discipline knowledge</td>
<td>6: Learnt through whole university experience</td>
</tr>
</tbody>
</table>

**APPENDIX B: Example of Layered policy and practice:** An example of interaction across different conceptions of graduate attributes outcomes & processes

**Mission statement:** Graduates of the university will be scholarly citizens able to contribute to humanity through their work and participation in society.

**How learnt**

- 1: Taught in remedial classes
- 2: Taught as adjunct to course
- 3: Taught as part of course content
- 4: Taught by course teaching process
- 5: Learnt through course experience
- 6: Learnt through whole university experience
Appendix C: Indicative Statement: Five Clusters of Abilities

1. **Research and Inquiry:** Graduates of the University will be able to create new knowledge and understanding through the process of research and inquiry.

This might be understood in terms of the following:
- be able to identify, define and analyse problems and identify or create processes to solve them
- be able to exercise critical judgement and critical thinking in creating new understanding
- be creative and imaginative thinkers
- have an informed respect for the principles, methods, standards, values and boundaries of their discipline and the capacity to question these
- be able to critically evaluate existing understandings and recognise the limitations of their own knowledge

2. **Information Literacy:** Graduates of the University will be able to use information effectively in a range of contexts.

This might be understood as:
- recognise the extent of information needed
- locate needed information efficiently and effectively
- evaluate information and its sources
- use information in critical thinking and problem solving contexts to construct knowledge
- understand economic, legal, social and cultural issues in the use of information
- use contemporary media and technology to access and manage information

3. **Personal and Intellectual Autonomy:** Graduates of the University will be able to work independently and sustainably, in a way that is informed by openness, curiosity and a desire to meet new challenges.

This might be understood in terms of the following:
- be intellectually curious and able to sustain intellectual interest
- be capable of rigorous and independent thinking
- be open to new ideas, methods and ways of thinking
- be able to respond effectively to unfamiliar problems in unfamiliar contexts
- be able to identify processes and strategies to learn and meet new challenges
- be independent learners who take responsibility for their own learning, and are committed to continuous reflection, self-evaluation and self-improvement
- have a personal vision and goals and be able to work towards these in a sustainable way

4. **Ethical, Social and Professional Understanding:** Graduates of the University will hold personal values and beliefs consistent with their role as responsible members of local, national, international and professional communities.

For example:
- strive for truth, honesty, integrity, open-mindedness, fairness and generosity
- acknowledge their personal responsibility for their own value judgements and behaviour
- understand and accept social, cultural, global and environmental responsibilities
- be committed to social justice and principles of sustainability
- have an appreciation of and respect for diversity
- hold a perspective that acknowledges local, national and international concerns
- work with, manage, and lead others in ways that value their diversity and equality and that facilitate their contribution to the organisation and the wider community

5. **Communication:** Graduates of the University will recognise and value communication as a tool for negotiating and creating new understanding, interacting with others, and furthering their own learning.

For example:
- use oral, written, and visual communication to further their own learning
- make effective use of oral, written and visual means to critique, negotiate, create and communicate understanding
- use communication as a tool for interacting and relating to others
Appendix D: Example of a Faculty contextualisation

The Institution of Engineers Australia (IEAust) requires undergraduate degree courses in engineering to support the development of graduate attributes that have been identified by IEAust as central to undergraduate engineering education. Here is an attempt at showing how these attributes might fit into the wider University framework.

- Those statements marked with a round bullet are the IEAust attributes
- Those statements marked with a square bullet are the University indicative list attributes
- Those statements ruled through are university attributes clearly covered by the IEAust list.

Research and Inquiry  Graduates of the University will be able to create new knowledge and understanding through the process of research and inquiry.

- ability to apply knowledge of basic science and engineering fundamentals
- ability to undertake problem identification, formulation and solution
- ability to utilise a systems approach to design and operational performance
- identify, define and analyse problems, and identify or create processes to solve them
- exercise critical judgement and critical thinking in creating new understanding
- creative and imaginative thinkers
- have an informed respect for the principles, methods, standards, values and boundaries of their discipline and the capacity to question these
- critically evaluate existing understandings and recognise the limitations of their own knowledge

Ethical, Social and Professional Understanding  Graduates of the University will hold personal values and beliefs consistent with their role as responsible members of local, national, international and professional communities.

- understanding of the social, cultural, global and environmental responsibilities of the professional engineer, and for the need for sustainable development
- understanding of the principles of sustainable design and development
- understanding of and commitment to professional and ethical responsibilities
- ability to function effectively as an individual and in multi-disciplinary and multi-cultural teams, with the capacity to be a team leader or manager as well as an effective team member
- strive for truth, honesty, integrity, open-mindedness, fairness and generosity
- acknowledge their personal responsibility for their own value judgements and behaviour
- understand and accept social, cultural, global and environmental responsibilities
- be committed to social justice and principles of sustainability
- have an appreciation of and respect for diversity
- hold a perspective that acknowledges local, national and international concerns
- work with, manage, and lead others in ways that value their diversity and equality and that facilitate their contribution to the organisation and the wider community

Information Literacy  Graduates of the University will be able to use information effectively in a range of contexts.

- expectation and capacity to undertake life-long learning
- recognise the extent of information needed
- locate needed information efficiently and effectively
- evaluate information and its sources
- use information in critical thinking and problem solving contexts to construct knowledge
- understand economic, legal, social and cultural issues in the use of information
- use contemporary media and technology to access and manage information

Personal and Intellectual Autonomy  Graduates of the University will be able to work independently and sustainably, in a way that is informed by openness, curiosity and a desire to meet new challenges.

- expectation and capacity to undertake life-long learning
- ability to function effectively as an individual
- intellectually curious and able to sustain intellectual interest
- capable of rigorous and independent thinking
- open to new ideas, methods and ways of thinking
- respond effectively to unfamiliar problems in unfamiliar contexts
- identify processes and strategies to learn and meet new challenges
- independent learners who take responsibility for their own learning, and are committed to continuous reflection, self-evaluation and self-improvement
- have a personal vision and goals and be able to work towards these in a sustainable way

Communication  Graduates of the University will recognise and value communication as a tool for negotiating and creating new understanding, interacting with others, and furthering their own learning.

- ability to communicate effectively, not only with engineers, but also with the community at large
- ability to function effectively as an individual and in multi-disciplinary and multi-cultural teams, with the capacity to be a team leader or manager as well as an effective team member
- use oral, written, and visual communication to further their own learning
- make effective use of oral, written and visual means to critique, negotiate, create and communicate understanding
- use communication as a tool for interacting and relating to others

Using conceptions of graduate attributes for research-led systematic curriculum reform