A generic approach for Science

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Introduction

Along with most other universities in Australia, our university and our faculty have developed policies relating to the teaching of generic attributes. Recently a team of us (Brian Yates – School of Chemistry, Julian Dermoudy – School of Computing, Christine Evans – Science Library, Greg Hannan – School of Psychology, Sue Jones – School of Zoology, Kristen Karsh – Centre for Advancement of Learning and Teaching, and Jon Osborn – School of Geography and Environmental Studies) received a UTAS Teaching Development Grant to design a generic attributes curriculum for a range of disciplines across the Faculty of Science, Engineering and Technology (SET). The objectives of this project are:

1. Develop Faculty of SET and discipline-specific statements of generic graduate attributes
2. Develop a generic attributes curriculum for each discipline
3. Map current teaching against that curriculum, and
4. Develop a Faculty-wide approach for coordinating the incorporation of generic attributes into the degrees offered by the Faculty.

This project has brought together staff from across a number of science departments together with support staff from two key areas that feed into the teaching and learning at our university. An example of how the project has been applied for the discipline of chemistry is described in this poster.

Methodology

Objective 1: The University of Tasmania has published a set of generic graduate attributes (knowledge, communication skills, problem-solving skills, global perspective, and social responsibility) together with a detailed list of generic exemplars for each attribute. From this list of exemplars the project team developed a briefer set of statements which were more specific for science by detailed discussion with representatives of various disciplines and consideration of existing learning outcomes. Each discipline further refined these statements through internal discussion and consideration of accreditation or professional requirements of the discipline.

Objective 2: The discipline-specific exemplars were then cross-referenced to three levels of attainment and matched up to the progression through the degrees.

Objective 3: Mapping of current teaching in each discipline against the generic attributes curriculum was carried out with standard tools and won't be further discussed here.

Objective 4: Finally several disciplines are currently working together to bring the curricula together and ensure a consistent approach across the Faculty.

Results and discussion

Objective 1: An abbreviated set of exemplars is shown in Table 1. Although the detailed wording in column four may be varied on a discipline-by-discipline basis, the idea is that the number of statements and the intent of each statement will remain common across the Faculty. Objective 2: The

generic attributes curriculum for chemistry is shown in Table 2. This displays at a glance the level of achievement expected in each of the Faculty's generic attribute exemplars for a student who majors in chemistry. Objective 4: As the discipline specific curricula and mappings are completed they are being discussed by a cross-faculty group to ensure that the descriptions are consistent and that there are no conflicts between different disciplines. Furthermore these cross-faculty meetings are being used to reduce duplication of generic attributes teaching where possible, and to identify gaps where, as a Faculty, certain attribute exemplars need more attention.

Summary

This paper has discussed some preliminary results arising out of a project to develop a whole-of-faculty approach to the teaching of generic graduate attributes in science. The main outcome has been the discussion amongst the science disciplines of a set of common statements exemplifying the University of Tasmania generic attributes. This in turn has led to the design of a generic attributes curriculum for each discipline and a mapping at both the discipline and individual unit level. As the project continues to develop, a variety of teaching and assessment strategies across the faculty is being investigated with a view to ensuring that students experience the graduate attributes in a range of situations. Aspects of this project will continue to be implemented and an evaluation is planned for 2007.

Table 1. Statement of Generic Graduate Attributes

Attribute	University of Tasmania Exemplars	SET Faculty Exemplars	Chemistry Exemplars
1. Knowledge *Graduates will have an in-depth knowledge in their chosen field of study and the ability to apply that knowledge in practice. They will be prepared for life-long learning in pursuit of personal and professional development*	▪ Apply technical and information skills appropriate to their discipline or professional area; ▪ Use a wide range of academic skills (research, analysis, synthesis etc); ▪ Understand the limitation of, and have the capacity to evaluate, their current knowledge; ▪ Develop a broad knowledge base and respect the contribution of other disciplines or professional areas; ▪ Identify, evaluate and implement personal learning strategies; ▪ Learn both independently and cooperatively; ▪ Learn new skills and apply learning to new and unexpected situations; ▪ Recognise opportunities.	1.1 Develop a broad knowledge base 1.2 Appropriately apply knowledge to the discipline or professional area 1.3 Have the capacity to evaluate current knowledge 1.4 Demonstrate academic skills such as research, analysis & synthesis 1.5 Identify, evaluate and implement personal learning strategies	1.1 Develop a broad knowledge of chemistry and understand its relationship with other disciplines 1.2 Apply theoretical and practical skills appropriate to chemistry 1.3 Have the capacity to evaluate current knowledge 1.4 Demonstrate research, analysis & synthesis of information in chemistry 1.5 Identify, evaluate and implement personal learning strategies
2. Communication Skills	...	...	...
3. Problem-solving Skills *Graduates will be effective problem-solvers, capable of applying logical, critical and creative thinking to a range of problems.*	▪ Identify critical issues in the discipline or professional area; ▪ Conceptualise problems and formulate a range of solutions; ▪ Work effectively with others; ▪ Find, acquire, evaluate, manage and use relevant information in a range of media.	3.1 Identify critical issues in the discipline or professional area 3.2 Conceptualise problems and formulate a range of solutions 3.3 Work effectively with others 3.4 Find, acquire, evaluate, manage and use relevant information in a range of media	3.1 Identify critical issues in chemistry 3.2 Conceptualise problems and formulate a range of solutions 3.3 Work effectively with others 3.4 Find, acquire, evaluate, manage and use chemical information and data in a range of media
4. Global Perspective	...	...	...
5. Social Responsibility *Graduates will act ethically, with integrity and social responsibility*	▪ Acknowledge the social and ethical implications of their actions; ▪ Appreciate the impact of social change; ▪ Be committed to access and equity principles in their discipline or professional area, and society in general; ▪ Demonstrate responsibility to the local community, and society generally.	5.1 Acknowledge the social and ethical implications of their actions 5.2 Appreciate the impact of social change 5.3 Be committed to access and equity principles in their discipline or professional area, and society in general 5.4 Demonstrate responsibility to the local community, and society generally	5.1 Maintain high professional standards in the workplace 5.2 Appreciate society's attitude to science and chemistry 5.3 Be committed to access and equity principles in chemistry, and society in general 5.4 Understand the environmental and social impacts of chemistry 5.5 Demonstrate awareness of occupational health and safety issues surrounding chemical laboratory work

Table 2. Discipline-Level Curriculum: Graduate attribute exemplars and expected levels of attainment

Degree: BSc

Major: Chemistry

	1. Knowledge					**2. Communication skills**			**3. Problem solving**				**4. Global perspec-tive**		**5. Social responsibility**				
Attribute	**1.1**	**1.2**	**1.3**	**1.4**	**1.5**	**2.1**	**2.2**	**2.3**	**3.1**	**3.2**	**3.3**	**3.4**	**4.1**	**4.2**	**5.1**	**5.2**	**5.3**	**5.4**	**5.5**
Year 1	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Year 2	A	B	A	A	B	B	B	A	A	B	A	B	A	A	B	A	A	B	B
Year 3	B	C	B	B	C	C	C	B	B	C	B	C	B	B	C	B	A	C	C
Honours	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	B	C	C

Levels of attainment

A Elementary = taught explicitly = knowledge and comprehension
B Proficient = developmental = application and analysis
C Advanced = attitudinal = synthesis and evaluation