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**Research Paper**

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## Embedding Academic Skills Development in Course Delivery

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Innovative approaches need to be adopted to meet the challenge of ensuring that graduates at the end of their course of study are not only strong in their discipline, but also have the required generic skills to give them a good standing within their selected professions. This paper reports on a study that examined how well academic skills are embedded into the undergraduate Environmental Science curriculum at Deakin University in Australia. It reports on students' self evaluation of their essay writing skills, and a case study that involves a discipline specialist working with an academic skills advisor to enhance student generic skills. It discusses the patchy nature of current implementation of programs for generic skill education.

*Keywords: environmental education, graduate attributes, generic skills, student self-evaluation*

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### Introduction

Recent policy development at national and institutional levels confirms that there is significant interest in innovative approaches to teaching and learning within higher education. This applies, not only to the theories and practices of the discipline studied, but also to the generic skills required by graduates for their future professional pursuits. For some time now there has been recognition of the importance of generic skills in higher education (Clancy and Ballard, 1995; Jolly, 2001; Hager *et al.*, 2002). Most tertiary institutions have adopted a set of generic skills that are considered necessary attributes of students when they graduate. However, to ensure that these attributes are indeed developed by students during their courses, they must be implemented within the curriculum of the discipline that the students are studying.

A problem often encountered in education is that the skills and knowledge of the discipline have been the focus of teaching programs with

the generic skills being overlooked. It is the aim of this paper to present an investigation into the acquisition of generic skills by students studying Environmental Science at the tertiary level. The paper firstly presents a background discussion on the nature and scope of generic skills before presenting the results of the research. Finally some recommendations are made as to how generic skills can be embedded into the Environmental Science curriculum alongside the theory and practice of the discipline.

### Background

Environmental Science is an enormous field of study that incorporates learning knowledge and skills applicable to problems and issues that span from the global through local to ecosystem and chemical scales. Within the discipline it is recognised that just as important as the facts and concepts are the processes through which we can add to our current knowledge. With the use of the *Scientific Method*, we can

add to our current understanding through observation, hypothesis testing, experimental design and analysis, and through publication. To disseminate new knowledge, it is imperative that (along with the theory and practice of Environmental Science) we teach our students a number of important generic skills.

Quite often all the emphasis for learning is placed on the skills and knowledge of the discipline while the generic skills rather than being taught are expected to be acquired at some time during the course of study. This has much to do with the fact the teacher is trained in the discipline and not in the area of academic skill(s) development. Generic skills are defined by Hager *et al.* (2002) as

*the skills, personal attributes and values which should be acquired by all graduates, regardless of their discipline or field of study. In other words, generic skills should represent the central achievements of higher education as a process* (Higher Education Council, Australia, 2002).

Most universities in Australia have adopted in one form or another a set of graduate attributes that include a set of generic skills that all graduating students should have been taught at some time during their studies. For example, at Deakin University skills considered generic include:

- Critical analysis, problem solving and creative thinking;
- Identifying, gathering, evaluating and using information;
- Communicating effectively and appropriately in a range of contexts;
- Developing, planning and managing independent work;
- Working effectively as part of a team;
- Effectively using information and communication technologies; and
- Applying knowledge learnt in the program to new situations (Deakin University, 2008).

There are a number of reasons why generic attributes have been given so much attention by the higher education sector (Hager *et al.*, 2002) including employability and the ability to share the knowledge of the discipline. The Australian Department of Education Training and Youth Affairs (2000) found that employers are looking for communication and interpersonal skills and an ability to problem solve as key attributes in graduates seeking employment. It also found that new graduates generally were lacking in these types of skills. Thus it appears that such skills, which increase the employability of the graduates (Hager *et al.*, 2002), need to be given more attention. A good set of generic skills can help disseminate the knowledge and skills across disciplines. This is particularly important in Environmental Science, which embraces an interdisciplinary approach. Transdisciplinarity, discourse across disciplines, is an essential requirement to tackle some of the complex environmental issues faced by the world today. A set of generic skills offers graduates a starting point for bridging the gap between disciplines enhancing their ability to learn from, as well as, to teach those from other disciplines. This will also enhance their capacity to work in multidisciplinary teams.

Although it is well accepted across Australian tertiary institutions that generic attributes should be integrated with the teaching of disciplinary content, the challenge is to ensure that the generic skills are indeed embedded within the curriculum of the discipline. Sumison and Goodfellow (2004) outlined the difficulties and tensions involved in embedding skills development in course content and bringing about curriculum change. They attributed the limited success of this approach in the main to the fact that generic attribute acquisition has been a managerial-driven agenda, which has failed to bring academic staff on board. They also suggest that

in many Australian universities there has been insufficient resourcing to support curriculum change. Other constraints include the fact that the knowledge and skills of the discipline are often considered paramount by teachers, there is much knowledge to impart, and the teachers have been trained to develop curriculum content rather than teaching the required generic skills. Students also tend to think about their learning in terms of the discipline knowledge rather than skills development (Langer, 1992, pp. 83-84). Again there has been much debate about how transferable generic attributes may be across contexts, and whether or not the generic concept idea is seen as being more relevant to vocational training than higher education (Sumsion and Goodfellow, 2004; Moore & Hough, 2005). There are very few studies which provide evidence to support specific pedagogical approaches to integrating the teaching of generic skills.

With the idea of curriculum reform in mind, we set about conducting a small research project to investigate some of the assumptions outlined above. The focus was the assessment task as a construct for the development of generic skills. The following section presents the results of the project, which aimed to evaluate whether or not generic skills were adequately embedded into our Environmental Science course.

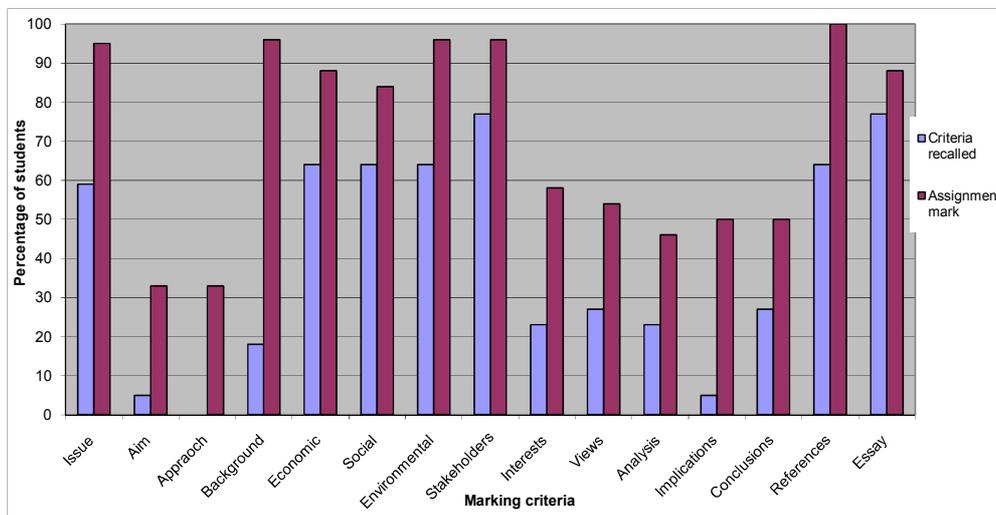
### **Evaluating generic skills**

In this investigation we set out to evaluate how well generic skills are embedded into the Environmental Science degree program at Deakin University, Warrnambool campus. We worked with a select group of students (n=25) completing their third university year and included two generic skills in our evaluation: writing and critical analysis. These two skills were selected as firstly, concern has recently been

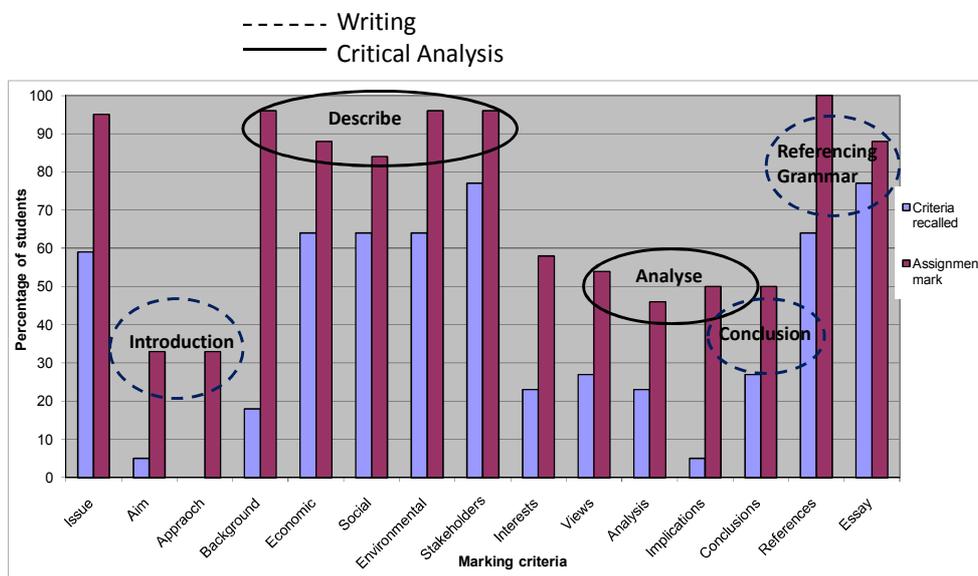
expressed in Australia that students lack basic grammar and writing skills, and that these skills are not being acquired by students during their course of study (Hart and Edwards, 2007). Secondly, critical analysis is considered not only an important generic skill but also a skill important for graduates of the Environmental Science discipline. Our hypothesis was that if these skills were well embedded into the teaching of the course then students should perform well in an assessment task that required them to demonstrate these skills.

Our approach was to set a writing task in the form of an essay that required the students to critically evaluate a current environmental issue. A two hour workshop was conducted by two teaching staff: an academic skills adviser teaching the basic rules of good essay writing and an environmental scientist to discuss the steps involved in a good critical analysis. Toward the end of the session the assessment criteria that would be used to measure how well the students had met the learning objectives was developed, using student input, providing students an opportunity to draw on their current understanding of these tasks and some clarity on what was expected of them. Students were required to record these criteria for later reference. One week prior to the assessment submission date, during class time, students were asked to recall the assessment criteria, so that these were reiterated prior to students submitting their work.

The assessment results, although pleasing demonstrated that in some areas some students had not yet acquired the necessary generic skills. All (100%) students passed the assessment task and one student received full marks. Figure 1 presents on the X-axis an abbreviated list of the marking criteria and shows that student's could recall a number of these one week prior to the submission date. It also shows the student's over-



a)



b)

**Figure 1 Assessment task marking criteria and student performance: a) compares percentage recall of marking criteria one week prior to submission and percentage of students who address each criterion, b) demonstrates where the strength and weakness are in the students' assessment tasks.**

all performance across the different criteria when the essay was marked. In Figure 1a) it can be seen that for those criteria that students could recall one week prior to the submission date their performance was higher than for those they did not recall. In Figure 1b) it can be seen that student writing skills were stronger and critical analysis skills weaker. For the assessment of writing skills all students gained full marks for referencing their work (a skill that is reinforced in every unit that they undertake), however many struggled to write good introductions and conclusions. For the critical analysis students demonstrated good skills at describing and presenting data, but poor skills in critically analysing the data (the information they had gathered). In terms of feedback the students were very positive about the whole evaluation process, and felt that they had learnt much from this exercise.

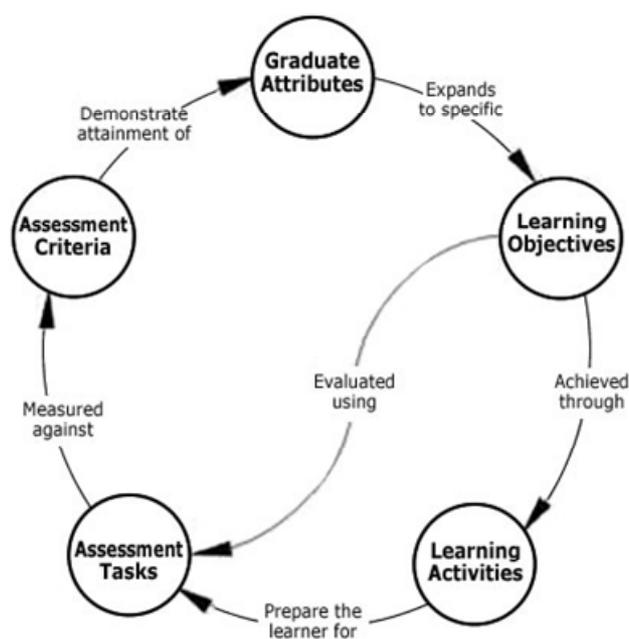
### Discussion

Writing is always included in generic skills as is critical analysis. It is evident from this evaluation project that there is still some way to go to ensure that graduates do possess the generic skills that employers and universities would like them to have as they embark upon their new careers. The evidence presented from this evaluation shows that in Environmental Science, although students demonstrated adequate writing skills, improvements can be made in teaching some of the important components of good writing, such as writing good introductions and conclusions. It also suggests that critical analysis is not a skill well developed by the students in their third year of university studies, and therefore some effort must be made to embed this into the curriculum. Academic staff, who have been trained in the discipline, may need professional development programs to assist them in developing learning activities that help with teaching the students how to critically ana-

lyse data, information and issues. Although the evaluation was conducted in a one-off situation over one teaching semester it has been an informative process that can form the basis for further trials on methods to better incorporate the teaching of generic skills in our course. The evaluation undertaken supports the view that the uptake and implementation of generic skills into higher education curriculum is patchy (Barrie and Jones, 2002).

Environmental Science as with other science disciplines is technical in nature yet environmental scientists spend much of their careers in non-technical work, as do graduates from other disciplines. The curriculum should be shaped not only by the nature of the discipline but also by professional requirements, aspirations and abilities of the students, and the needs of society (Jolly, 2001). Teaching and learning processes that embed generic skills need greater attention. A number of barriers to embedding generic skills in teaching and learning processes exist. These include differences in the understanding academics have of what generic skills are, a lack of funding directed to implementation generic skills programs (Barrie and Jones, 2002), and the lack of adequate training for teaching staff (trained in their discipline) on how to develop courses and programs that embed graduate attributes and generic skills. Jolly (2001) provides some guidance for implementing graduate attributes as shown in Figure 2, and this process includes similar steps to how one would go about preparing courses for units of study within the discipline. However, by making the learning objectives for the generic skills explicit during the course development stage there is a greater possibility that these skills will be embedded into the teaching of the course.

With this project, the assessment task provided a meaningful way of integrating the acquisition of skills with content. Rather than just set-



**Figure 2 A process for implementing graduate attributes (Jolly 2001)**

ting the assessment task, the skills involved were ‘scaffolded’ during the workshop. Students then actively placed themselves in the position of the audience and determined the criteria that would be used to evaluate the quality of the writing. Moore and Hough (2005) suggest that assessment tasks that require students to adopt identities other than that of their own, and to write for different audiences can also promote the acquisition of different generic attributes.

The development of Environmental Science courses which successfully embed skills will be enhanced by collaboration between staff from the discipline (in this case environmental science) and the language and learning staff. For this project, the lecturer in Environmental Science and the learning adviser were working together over a period of time, trialling different approaches and reflecting on how these had helped students to better understand the discipline practices of their discipline. Crosling and Wilson (2005) describe this as the staff with ex-

pertise in the discipline being able to “identify and articulate the goals of the disciplinary community,” while the learning adviser “has the resources to interpret and therefore explain these as writing practices” (p. 7). The pedagogical and professional affiliation described in this project helped to create an environment that not only improved student’s academic performance, but also promoted the development of metacognitive skills. That is students were asked to think about how they might approach an assessment task that required critical thinking. The challenge in planning courses is to integrate skills development in such a way that students develop into successful learners in their discipline, and are also able to transfer core skills into other settings.

### **Conclusion**

There is no doubt that the future prospects for graduates either moving into the work force or heading into research through post graduate

studies are much improved if, as well as a strong knowledge of the theory and practice of the discipline, they have a strong set of generic skills. To ensure this outcome learning objectives, activities and assessment tasks for generic skills must be given consideration at the earliest stages of course development. Collaboration between discipline specialists and learning skills advisers is one way of enhancing the course development. Also academics must be supported in trialling new initiatives to embed generic skills within their teaching programs, better evaluation of the acquisition of generic skills is required, and sharing of these findings will provide the feedback needed to determine the best approaches to teaching these skills.

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