Embedding Information Literacy in Commencing Student Assessment Tasks as a Foundation for Generic Skills.

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Abstract

A number of studies have addressed issues relating to the role of institutions in the development of graduate outcomes including generic skills (Crebert, Bates, Bell, Patrick & Cragnolini 2004; Barrie 2004; Bath, Smith, Stein & Swann 2004; Barrie 2007) and how such skills may be effectively embedded into university curricula (Treleaven 2008; Bath et al., 2004; Crebert et al., 2004).

This study reinforces and extends the discourse. It aims to evaluate the embedding of specific generic skills into the curriculum of first year marketing courses in a Business School, and via pre and post– tests, identify students' views on their own skills development, checking the changes with multiple choice questions. The overall findings confirm much of the literature based on the successful outcomes of embedding generic skills into course curricula simultaneously however the study generates some interesting contradictions relevant to academics endeavouring to establish strong foundations during first year.

Introduction

The higher education sector is placing increasing value on its role in the development and embedding of generic skills into the learning experiences of students (Crebert, Bates, Bell, Patrick & Cragnolini 2004; Barrie 2004; Bath, Smith, Stein & Swann 2004). For example, Bath et al. (2004) indicate that the government, industry and institutions themselves are showing increased interest in the development of generic attributes. The university community in Australia has come to accept generic graduate attributes as being the knowledge, abilities and skills graduates should develop during their time with the university, beyond disciplinary content knowledge, that can be applied to a variety of contexts (Barrie 2007; Bowden, Hart, King, Trigwell, & Watts 2000). Bowden et al. (2000) noted that when students possess these qualities, by successfully completing their undergraduate degrees, they are better equipped for employment, and better prepared as 'agents of social good' for the future. Thus, generic skills have important consequences at a number of levels and to a variety of stakeholders.

The paper is structured as follows. First, we review the relevant literature, commencing with the definition of generic skills and the views of different stakeholders. Next we focus on information literacy and develop two hypotheses to guide the study. Methodology is then discussed, followed by the findings, their interpretation, and practical implications. The paper concludes with the limitations of the study and possible directions for future research.

Definition of generic skills

The Higher Education Council (HEC) defines generic skills 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, they should represent central achievements of higher education as a process" (HEC 1992, p. 20).
>
> "Fundamentally, generic skills encompass critical thinking, intellectual curiosity, problem solving, logical and independent thought, effective communication and related skills in identifying, accessing and managing information: personal attributes such as intellectual rigour, creativity and imagination and values such as ethical practice, integrity and tolerance" (HEC 1992, p. 22).

Arguably, some of these skills are 'higher order' and require prior development of others. In this study, we have selected and targeted information literacy as a key skill that should be evident in first year students' work.

Different stakeholders

A number of stakeholders, namely, academics, employers and students are attuned to different conceptions of generic skills due to their diverse circumstances and expectations (Lizzio & Wilson 2004). There is a plurality of viewpoints within as well as between stakeholder groups in relation to the desirable generic outcomes of an undergraduate degree; with different emphases placed on certain skill domains and the perceptions of those acquiring such graduate attributes.

Academics

Despite the extensive level of support for generic outcomes, recent studies at an institutional level have shown that Australian university teachers hold qualitatively different understandings of the methods of learning and teaching of graduate skills (Barrie 2004; Barrie 2007). The literature highlights a fundamental debate about whether generic skills should be embedded into the curriculum or be taught as a separate course.

Most research indicates however, that there should be a balance between the emphasis placed on disciplinary knowledge in university curriculum and an approach that considers generic skills development as integral to learning and teaching processes (Assister 1995). Bowden et al, (2000) and Barrie (2007) argue that the teaching, development and assessment of generic attributes are most effectively achieved within the context of disciplinary knowledge.

Therefore, while some academics may express a view that the development of generic graduate attributes is outside their teaching responsibility and that such skills are best developed through distinct additional courses (Gash & Reardon, 1988), the literature on generic skills presumes that graduate attribute development is most effectively achieved within a disciplinary context, integrated and embedded into a curriculum, and not incorporated using a 'bolt-on' or checklist approach (Bowden et al., 2000). For these reasons, we adopted an 'embedding' approach, discussed in more detail later.

Employers

Those academics that support the integration of generic skills into usual university curriculum highlight general scholarship and research skills as most important, while interpersonal skills and teamwork are identified as more general attributes. However, Hager, Holland & Beckett (2002) noted that employers point to a perspective that elaborates more on personal attributes (self organization) and interpersonal skills (leadership skills and teamwork). Employers desire employees who are confident communicators, critical thinkers and problem solvers; have basic skills in IT and numeracy as well as being able to initiate and adapt to change (Holmes 2001; Bridges 2002). The contemporary workplace appears to have a greater focus on the location, management and dissemination of knowledge, and the ability to effectively apply this knowledge to new situations (Johnston & Webber 2003), therefore, information literacy is a foundation generic skill that needs to be established in first year and subsequently refined to a higher level.

Students

In a similar vein, students also share a common understanding of the importance of developing generic skills at university with the goal of improving their employability (Hager et al. 2002). Crebert et al. (2004) found that students would prefer teaching staff to place more emphasis on generic skills in assessment tasks, and to make the links in the curriculum to workplace scenarios more explicit (Crebert et al. 2004). The student view and its perspective in relation to employability, reinforces the important role of generic skills and the benefits of embedding them into the university curriculum.

Overall, the perspectives of different stakeholders namely academics, employers and students all point to the argument that higher education is one of the most important means of preparing individuals for the demanding world of work and to enhance their employability. Universities have a role at the forefront in emphasizing the importance of generic skills to students (Hager et al. 2002). The increasing value placed on the graduate's ability to apply and transfer generic skills and knowledge from university into the workplace demands institutional efforts to encourage such skills to be developed by students as early as possible during their time with their university (Crebert et al. 2004).

In embedding generic skills, the literature shows general consensus on the need to align generic learning outcomes with assessment criteria so that the value of graduate attributes is emphasized to students and the importance for their future careers is highlighted (Treleaven 2008; Bath et al. 2004; Crebert et al. 2004). The study by Bath et al. (2004) is one of many that elaborate on the process of embedding generic skills into learning activities at university. This process requires the institution to plan (express graduate attributes into discipline-specific learning outcomes); act (embed and implement the curriculum), review (compare experiences of teachers and students to validate the curriculum) and most importantly reflect (reconcile and redesign the curriculum). In the current study, we address and report the first three of these steps.

The specific aims of the project were to determine: (1) whether students' self-reported skills in accessing and using information, and their understanding of academic integrity improve during a semester of tertiary study in business; and (2) to check the self-reported changes.

We now discuss the reasons underlying the two contexts selected, and develop the hypotheses that guided the study.

Information literacy

As noted above, the emergence of the knowledge-based economy, commonly known as the information society, has deemed the creation, dissemination and manipulation of information crucial in the globalised marketplace (Johnston & Webber 2003) The importance placed on the creation and transfer of knowledge and skills necessitate an educational response that focuses on effective information use (Hager et al. 2002).

Information literacy has traditionally resided with libraries and librarians. Despite the increased importance of information, Johnston & Webber (2003) found that students seem to lack interest and awareness about the importance of library services, while others perceived the use of libraries as a simple task when they in fact needed support. De Arenas, Rodriguez, Gomez and Arenas (2004) suggest certain students lack respect for information specialists/librarians and perceive them as peripheral. The influence of librarians/experts in courses is often limited, which may explain the marginalisation of information literacy by students and academic staff (Johnston & Webber 2003).

A number of studies (Gutierrez and Wang 2001; Johnston & Webber 2003; Hauxwell 2008) have emphasised the essential role of academic staff in integrating information literacy into the curriculum by setting assessments to develop these skills. Gutierrez and Wang (2001) note that a one-off library research class and snippets of information literacy training provided over-the counter in the library are not adequate to significantly improve information literacy skills. Hauxwell (2008) states that the teaching of information skills within the context of students' point of need (e.g. locating a journal article, use of library catalogue) may offer more tailored and relevant information literacy training for students. Therefore we propose two hypotheses with respect to the effectiveness of embedding information literacy skills into the curriculum:

H1-There will be a significant improvement in students' ratings of their ability to access information and understand sources of information before and after these generic skills are embedded into the curriculum.

H2- There will be a significant improvement in students' understanding of the most efficient way to locate journal articles and compare the validity of different sources of information before and after embedding these generic skills into the curriculum.

Method

Design

A pre-test post-test design was adopted. A large sample of business students in specific classes was asked to complete a survey questionnaire during the first tutorial of a semester and then the same classes were invited to complete it again at the end of the semester. Data were collected by tutors who had no involvement in the study.

Specific interventions were used in the participating classes in order to develop information literacy. These interventions included informing students of specific learning outcomes with respect to information literacy and highlighting its importance; incorporating learning outcomes consistent with the skill into course outlines, providing instruction and opportunity to practice in tutorials, ensuring assessment items were authentic in the skill area, and requiring all work to be submitted via text matching software to emphasise integrity and to encourage independence and self-development.

We identified a specific course where basic information literacy would be taught and assessed. However, the underlying design of the project emphasises sequential development of skills over the three levels of the program. This development meant that skills highlighted and emphasized in courses at first and second levels would be used, reinforced and further developed, as students' progress through the program. Thus, the current study did not include essay writing or case study analysis (predominantly required at third level). Rather, it aimed to provide early building blocks for excellent higher level work. The building blocks for skills included referencing (and an understanding of plagiarism), critical thinking (evaluating information, synthesizing ideas, developing convincing arguments), and presenting ideas logically and cohesively.

Sample

Sample 1 (pre-test at beginning of the semester) consisted of 519 students while Sample 2 (post-test, at the end of the semester) generated 303 useable responses. These samples provided an overall snapshot from a wide range of students.

Participating students were identified by their student number to enable the two data sets to be further categorised into responses from the same students i.e. those students who completed survey questions both at the beginning of the semester and at the end of semester. This sample (n=209), representing a longitudinal study, provides a more rigorous test of changes and is the focus of the current article.

The longitudinal sample consisted of slightly more females (56%) than males (44%). While we targeted first year courses and, to a lesser extent, second year, we found that the final sample was spread across year levels because students can do the nominated marketing courses at any time, and many have to complete at least one sometime during their degrees. More specifically, there was a relatively even spread across the number of years at university: 1st year (35%), 2nd year (23%), year 3 (32%) and more than three years (10%). Students were predominantly in Business and Commerce programs (79%) with about one-fifth (21%) represented by students from other faculties who were studying a marketing course.

Measures

The survey was divided into three parts. Part A consisted of 26 items on a scale of 1 (strongly disagree) to 5 (strongly agree) in which students self-reported their skills in relation to accessing and using information, and academic integrity. A typical item read "I know what to look for when deciding whether an article is scholarly". Full details of the items are shown in Tables A1-A5.

Part B was designed to test students' understanding in 10 areas, including evaluation of sources, referencing and critical thinking. This part consisted of 10 multiple choice questions, each with five possible answers, and students were instructed to select "the best response". Tables B1-B10 provide each question and its five responses.

Part C collected demographic data, student number, gender, year of university study, number of years since completing high school, program and course details.

All questions in Parts A, B and C were specifically developed for the study.

Method of analysis

Data were entered into SPSS and descriptive statistics used to generate tables of results for each item. Pre- and post-test means and standard deviations are reported for each item. The *t*-test procedure was used to check for differences between means on each item in Parts A and C. Changes were considered to be significant if the *t*-value demonstrated $p<.05$, that is, at 95% confidence level. Analysis and interpretation of responses to Part B was based on inspection of absolute frequencies and percentages.

Results

This section discusses the overall findings for the two cohorts represented by Sample 1 (February) and Sample 2 (June). It presents findings in two sections, namely, skills in information literacy and academic integrity. These sections report findings for hypotheses 1and 2.

Skills in Information Literacy

Hypothesis 1 was concerned with students' self reported skills in accessing and using information. Strong support was found for this hypothesis because the absolute value of all items increased during the semester, and t-values for the differences between means were all significant. The improvement between Sample 1 and Sample 2 was demonstrated in all facets of accessing information, including the ability to use the library's catalogue system and online databases, to construct information searches, as well as knowing the difference between the reference for a book and a journal article. The biggest change was with regard to the ability to access a research journal in the library catalogue (an absolute increase of 1.12). Table 1 provides the results.

Table 1: Self-reported skills in accessing information

		Pre-test		Post-test		*t*-test	
		Mean	SD	Mean	SD	*t* value	Sig
1	Know how to use library's catalogue system	3.15	1.24	4.05	1.04	-9.35	.000
2	Know how to use online databases	3.48	1.19	4.36	.85	-9.41	.000
3	Know how to find a research journal in the catalogue	3.06	1.28	4.18	.99	-11.49	.000
4	Know how the difference between the reference for a book and a journal article	3.44	1.27	4.28	1.06	-8.91	.000
5	Know how to use Boolean "and" and "or" to construct information searches	2.70	1.47	3.37	1.34	-6.44	.000

Similarly to accessing information, the findings in relation to understanding sources of information also provide support for the first hypothesis. Improvement was evident over the semester in all aspects, especially students acquiring a better understanding of the "meaning of a scholarly article" and better knowledge in "what to look for when deciding whether an article is scholarly". Table 2 shows the findings.

Table 2: Self-reported skills in understanding sources of information

		Pre-test		Post-test		t-test	
		Mean	SD	Mean	SD	t value	Sig
6	Understand meaning of a "scholarly" article	3.21	1.31	4.49	.82	-12.80	.000
7	Know what to look for when deciding whether an article is scholarly	2.93	1.39	4.30	.93	-12.60	.000
8	Know how to distinguish between fact and opinion in written work	4.02	.87	4.22	.85	-2.83	.005
9	Know how to decide if an internet source is academically sound	3.53	1.17	3.92	1.01	-4.13	.000

As well as seeking students' self-reported skill levels, we decided to test their understanding of a number of salient elements using four multiple choice questions (Hypothesis 2). This extra dimension enabled us to better gauge whether the self-reported measures were a true indication of students' knowledge in information literacy. The multiple choice questions were used to test students' understanding of how best to locate journal articles and validity of different sources of information. Tables 3 to 6 provide the results, and indicate that Hypothesis 2 was supported and, further, that students' self-reported skills (Hypothesis 1) were generally reliable.

Students' understanding of the most efficient way to find a journal article on a topic (Table 3) provides interesting results. At the beginning of the semester, about two-thirds (63%) of students said that the most efficient way to find a journal article on a topic was to "search a journal database", and this cohort had increased to 77% by the end of semester but option c, "run a keyword search" had decreased as a percentage. Our tutors were seeking to assist students to use key word searches in the library catalogue and hence these data suggest that we need to place more emphasis on understanding the role of library searches, especially within journal databases.

Table 3: Journal articles

1	The most efficient way to find a journal article on a topic is to –	Pre-test		Post-test	
		Freq	Percent	Freq	Percent
a	Find a bibliography on topic	4	1.9	3	1.4
b	Search a journal database	131	62.7	160	76.9
c	Run a keyword search in the library catalogue	64	30.6	41	19.7
d	Browse the journals on the library shelves	3	1.4	2	1.0
e	Discuss with the tutor	5	2.4	1	.5

Students consistently responded as expected in relation to scholarly articles (Table 4); demonstrating their understanding of the need for scholarly articles to have an "expert" foundation, and the features that are likely to reflect this difference to popular literature. Similarly, they demonstrated strong pre- and post-test skills in recognizing scholarly writing (Table 5).

Table 4: Scholarly articles

2	When compared to a magazine, a scholarly article usually provides more valuable information for a university assignment because it -	Pre-test		Post-test	
		Freq	Percent	Freq	Percent
a	Is easier to read	1	.5	2	1.0
b	Is intended for a wide audience	5	2.4	1	0.5
c	Is written by an expert in field	178	85.2	193	92.8
d	Usually contains figures and tables	4	1.9	11	5.3
e	None of the above	18	8.6	1	.5

Table 5: Scholarly writing

3	Scholarly writing can be recognized because it	Pre-test		Post-test	
		Freq	Percent	Freq	Percent
a	Has in-text citations	11	5.3	7	3.4
b	Has a reference list at the end	4	1.9	4	1.0
c	Discusses theory	3	1.4	4	1.9
d	Provides evidence (data or statistics) for an argument	25	12.0	12	5.8
e	All of the above	164	78.5	180	96.5

Table 6 shows that students were generally wary about internet sources with most selecting options d and e. The vast majority gave these two preferred responses, with 31% of students claiming that internet information should be used with care because "the accuracy of its content cannot be verified" and 57% of students selecting "the quality of its content is variable and may not have undergone a review process". However, the latter was in fact the desired response as we tried to reinforce the role of independent reviewing of articles (both online and offline) from reputable journals, and the proportion of students selecting the correct answer only indicated a marginal increase (48.3% vs 57.2%). Therefore, we suggest that training students in the use of internet sources still warrants considerable attention.

Table 6: Internet information

4	Information from the internet should be used with caution because	Pre-test		Post-test	
		Freq	Percent	Freq	Percent
a	It will never have been reviewed by another person	1	.5	2	1.0
b	Many internet sites are ".com" meaning they are commercial enterprises	3	1.4	4	2.9
c	It cannot be reliably evaluated	8	3.8	17	8.2
d	The accuracy of its content cannot be verified	93	44.5	64	30.8
e	The quality of its content is variable and may not have undergone a review process	101	48.3	119	57.2

Discussion

This study has demonstrated improvements in students' self-reported skills in most areas of information literacy, thereby indicating that specific instruction and embedding of these skills in first year courses is worthwhile. The overall outcome of this study confirms the present literature in which embedding specific generic skills into university curriculum via the formulation of

learning outcomes and alignment to assignments have indicated improvement in students' understanding of targeted skills (Bath et al., 2004; Treleaven 2008). Evidence from the current study suggests that where skills were specifically targeted in tutorials, a significant difference in students' levels of self-reported achievement occurred. A number of papers suggest the effectiveness of assessments in providing a stimulus for further learning amongst students. Boden and Holloway (2005) and Lizzio and Wilson (2004) noted assessments provide a good instrument particularly in motivating students to develop information literacy skills. Our study supports the view that when information literacy skills are embedded into the course curriculum and successfully linked to assessments, significant improvement is evidenced due to students' motivation to perform and learn such complex skills.

Limitations and future research

Several limitations were present in this study. The focus in this study is on students' self reported skill development in information literacy, therefore, students' self-assessment was the key measurement of the success of embedding generic skills into program curricula. Certain issues emerged in relation to social desirability bias in which students' desire to project a more socially accepted answer lead them to overestimate their generic skills development. Yet, Lizzio and Wilson (2004) seem to support the use of students' self-evaluations as they believe it nurtures independent learners. It is suggested that in future studies, more objective approaches should be used in conjunction with students' self-assessments, including feedback and observations (Murphy 1988). Further, the common sample represented by 209 students, provides the basis of a longitudinal study and more rigorous examination of change, however, the sample size is still relatively small and careful consideration must be taken before generalizing findings to a population. This study only focused on a snapshot of students' self-reported skills in information literacy over one semester, future studies in assessing the same students' development of generic skills over their time spent at the university would provide invaluable information pertaining to the institution's success in mapping and embedding these graduate attributes into course programs.

Conclusion:

The findings of this study present a number of issues and challenges to the ongoing discourse in generic skills development. This current study supports the integration of generic skills into academic courses and setting assessment tasks to address information literacy and academic integrity. It is confirmed that the integration of information literacy and referencing skills into course curriculum has demonstrated improvement from students in most facets. Where skills were specifically targeted in tutorials, a significant difference in students' levels of self-reported achievement occurs. While students seem to have met the term "Plagiarism" and understand the need to reference; a significant proportion do not appear to understand the mechanisms or techniques of doing so. This provides a contradiction to existing literature in that even when skills pertaining to the promotion of academic integrity were embedded within university curriculum, no significant improvement was evidenced. Rather there still appears to be a level of confusion and uncertainty in relation to citation techniques. It is proposed that such a discrepancy from current literature may be explained by insufficient cooperation between academic colleagues and information experts when designing such programmes; and heavy reliance on independent learning through web based tutorials and course resources which limits the necessary

engagement required to reinforce and address more complex problems that students are experiencing, especially referencing. It is suggested that the apparent confusion amongst students in relation to referencing procedures, warrants more interactive teaching and materials that explicitly address the process of using secondary resources, rather than solely focusing on definition of terms or difference between good academic practice and academic dishonesty.

This project has enabled us to connect generic attributes with our discipline. Using interventions via objectives and compulsory assessment items gains the attention and commitment of students, and provides an opportunity to direct their attention to the processes and skills on which high quality learning and outcomes are built.

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