Introducing students to ePortfolio to record generic attributes

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Abstract:

The use of a portfolio by students during their studies has the potential to enhance the development of generic graduate attributes and to provide them with a springboard into their professional careers. As part of an evaluation of their potential use first year engineering students were required to build a portfolio as part of a compulsory design unit. The portfolio was developed using an ePortfolio tool, *CareerHub Portfolio*, at the University of Tasmania (UTas) in 2004. The trial was judged a success with a set of very mature and reflective portfolios being submitted, and the students found both the reflection process required to generate the portfolio and collection of information to be a useful exercise. Based on the trial outcomes the use of portfolios will be expanded in 2006.

Introduction:

As part of its ongoing teaching and learning developments the School of Engineering at UTas has increasingly focussed on the need for graduates to develop a set of generic skills during their degree program [1]. These generic graduate attributes are skills that are required in the workplace, and that are generally considered to be attributes of professional people. The attributes required by the Engineers Australia formed a specific set of exemplars of the more general attributes desired by the University.

Teaching staff in the School of Engineering have traditionally favoured assessment in a mostly summative form, where students perform in an examination at the end of semester to demonstrate their capability. In the introduction to graduate attributes, however, the emphasis has switched to academic staff trying to find and develop methods to show development of skills relating to the graduate attributes. One of the difficulties in measuring graduate attributes is keeping track of, and being able to demonstrate improvement in a student's performance over time, particularly when the students may develop skills between and outside of the core teaching units. An additional issue is who should assume responsibility for tracking the development of the skills.

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Concept of individual accountability for career
The impact of globalization and an emerging knowledge society is providing significant challenges to Universities, employers, professional associations and individual students. Each of these stakeholders has a strong interest in student acquisition of generic attributes and capabilities.

The focus of each stakeholder indicates the centrality of the student in the process of managing, recording and reflecting on these attributes. There is clearly common ground between University graduate attributes, the generic attributes required under the Engineers Australia accreditation policy, the employability skills needed by employers and the career management skills required by individuals to effectively manage their futures.

This skills equation suggests that there is a pivotal role for assisting individual students to be able clearly articulate and reflect on their skills and abilities and specifically to understand how their learning in one setting might be useful in another[2]. A key finding of an OECD Education and Policy analysis report indicates that "less than half of earnings variations in OECD countries can be accounted for by educational qualifications and readily measurable skills … a significant part of the remainder may be explained by people's ability to build and to manage their skills"[3]

The process of managing a career can be increasingly likened to the individual as a self employed consultant or business seeking out customers and clients to make use of their skills [4]. Understanding career from this perspective involves a clear shift in the way in which students are supported in their career development to make the transition from University to work.

A portfolio approach is a useful tool because it strengthens the capacity of the student to begin to articulate and understand the skills acquired in an objective sense and subjectively in terms of whether the skills might fit particular narratives they may have begun to construct in terms of their future career.

It is now widely understood that few students will work in the one job over a lifetime. Even within the same role, skill set requirements change to meet emerging and new priorities. The Bridging the Skills Divide Senate report provides an illustration of the importance all Australians learning effective career management skills. A Victorian ITAB stated

" What a lot of industry people are telling us is that there are actually other shortages and they are not occupationally based shortages; they are actually skills shortages. They are looking for people, and it may be that they have not got a name for these people yet who are working in offices, but they want a set of skills that does not necessarily match with an occupation" [5].

The position of the ePortfolio on the global agenda
A portfolio is an organised collection of evidence that demonstrates the quality and variety of learning achievements of an individual either in or out of the classroom. It can include selected evidence from coursework, samples from extra-curricular activities and reflective annotations and commentary related to these experiences. The portfolio can be comprised of evidence in either hard copy or in an electronic format (an ePortfolio). The evidence may include end of course/unit evaluations and tasks used for instructional or clinical experience purposes such as projects, journals, videos, samples of student work and comments by academic staff. The portfolio is

privately owned and the owner has complete control over who has access to the information or parts thereof.

An ePortfolio allows a student to identify, demonstrate and reflect on their knowledge, skills and abilities for as long as they choose. As an ePortfolio owner, a student can create an unlimited number of secure, customised portfolios by storing any content item only once and sharing it through as many portfolios as they like. The contents of an ePortfolio can be shared with authorised others (e.g., faculty, peers, prospective employers) to support prior learning accreditation, complete or replace exams, reflect on one's learning or career, support continuing professional development, plan learning or find employment. The development and demonstration of an ePortfolio ensures congruence between an individual's values, skills, knowledge and experience with the aims of educational or professional organisations and employers.

An ePortfolio approach to evidence-based learning and development for students is gaining popularity in educational institutions worldwide (US, UK, Europe). In Australia, a number of tertiary education institutions are currently trialling or implementing ePortfolios (QUT, VU, UWS, UTas, ECU). The Australian federal government has recognised the importance of ePortfolios in the management of human capital and social assets. DEST has funded a number of consultancies in relation to employability skills and most recently contracted educationau to develop a portfolio capacity for Australia's national online career service, myfuture.edu.au.

Most ePortfolio trials in Universities have used the ePortfolio tool as a means to develop, measure and identify performance against the graduate generic attributes identified by each University [6, 7]. The experience of other Universities e.g. [6] was that students in vocationally orientated courses were more likely to participate and show interest in such a trial than students in generalist degrees. Their experience was that students in first year were not yet thinking about a career, but tended to be looking back on college. This was something that was also found in the present study. The ePortfolio tool used is also critical to the success of a trial. An emphasis on developing a 'user friendly' and easily accessible tool will gain more student (and academic) support than a tool which is cumbersome to apply. Important aspects of the tool development are outlined in [7], while [6] identify that software that is repetitive, and is not easily customised is more likely to deter student use.

Selection of the Unit used for the trial:

The unit *Experimental Design and Analysis* was developed in order to (amongst other objectives) give students an early appreciation of and experience in working in multidisciplinary teams [8, 9]. The unit has been well received by students who appreciate the experiential learning format. Over the three years that it has been running, the main development of the unit has focussed on obtaining a fair balance of team work and individual work in order to best assist students in developing the generic graduate attributes, whilst balancing the issue of individual assessment at the semester end requiring a traditional distribution of student marks.

Engineers Australia exemplar	UTas graduate Attribute
Ability to apply knowledge of basic science and engineering fundamentals	
Ability to communicate effectively, not only with engineers but also with the community at large	
Ability to undertake problem identification, formulation and solution	*Ability to understand problem identification, formulation and solution Ability to solve problems with minimal guidance*
Ability to function effectively as an individual and in multi-disciplinary and multi-cultural teams, with the capacity to be a leader or manager as well as an effective team member	*Ability to function effectively as an individual and in multi-disciplinary teams*

Table 1: Generic graduate attributes recognised by Engineers Australia and UTas

The unit is based around a team project, which requires input in the civil, mechanical, electrical and computer systems disciplines. The typical project in previous years has been to develop a 'counting device' based on a load cell with a strain gauge as the transducer. The output from the load cell is read at a PC, requiring students to program the data acquisition software, design the electronics and produce a mechanical design of the load cell to provide the sufficient measurement resolution without overloading the system. The project is balanced by a series of lectures and tutorials covering the background to the project components and general experimental measurement theory and a weekly laboratory session which is run as a series of workshops on the equipment and computer software.

In the first year the subject was delivered, students were allowed to choose their own groups, but it was found that a better result was achieved when students were allocated random groups, in which international students in particular were spread amongst the groups. This overcame a problem that regularly occurs where the international students form separate groups, and often have insufficient access to assumed resources. It is also a good means to introduce the international students to the local student cohort and it has been noticed that in other team project subjects following this unit the interaction of students is improved.

The performance of the teams, and development of team work skills as a graduate attribute was considered to be an important outcome of this unit, and it was considered that simply providing the students with a team work exercise without direction in team building skills would not deliver acceptable results. A formal introduction to team work skills was delivered, outlining formally the need for team skills in the workplace, how to balance the conflicting aims of team members and an introduction to personality testing using the Belbin test [10]. The teams were then required to discuss both their personality type and objectives for the unit (e.g. pass, distinction, time available) and develop a team charter which was submitted to the supervising staff. All students signed off to the charter which formalised the group's objective and a set of operating rules for the team.

The team progress was reviewed through the semester once the project was well underway and the pressure to perform was beginning to be felt by the students. The students had an opportunity to fill out an individual assessment of performance and the teams then had to meet to produce a combined assessment of performance. This process successfully identified 2-3 teams that were performing poorly, usually by a consensus of team members. Some teams were identified by a poor review by one or two members which was not reflected by the other team members. In each case these teams received counselling from academic supervisors, which meant that the project was able to be refocussed whilst there was still time in the semester to obtain a successful conclusion to the project.

In previous years the formal process recognising development of generic attributes stopped at this stage and the end of semester assessment and skills testing focussed on content and tangible outcomes. Student evaluations [8] indicated that the students felt that they had improved their team work skills verification that there had been some development of generic skills. The 2003 accreditation of the Engineering curriculum was based on academic staff assisting students to develop the graduate attributes. The emphasis however appeared to be on staff demonstrating that the attributes had been delivered, rather than students demonstrating that they had developed the attributes. With this background, the introduction of a trial of portfolio building software was considered to be a useful opportunity.

The trial of ePortfolio software, *CareerHub Portfolio:*

The ePortfolio software developed for this trial was designed as an optional component of existing CareerHub software familiar to many students at UTas. CareerHub is the University's online resource for information about career planning, student job vacancies, articles, news, events and frequently asked questions on a range of career-related topics. The ePortfolio software was set up for students as an electronic information management system to store their personal contact information, experience and skills. The emphasis for this trial was for them to complete the skills section with reference to the generic graduate attributes that were assessed for this unit (Table 1). The skills section of the portfolio comprised this list of attributes and students were required to complete 1-2 paragraphs of self assessment and reflection against each attribute. It was possible for students to complete this skills reflection against other relevant experiences that they had in addition to this unit. These experiences included casual employment and other academic units and some students took this opportunity, to quickly develop a useful portfolio.

Once students had stored information in their portfolio, they were able to select sections that an authorised user (e.g., a potential employer or in this case teaching staff) could view. The reviewer was sent an email with a web link that enabled the required sections of the portfolio to be viewed. These documents were assessed by teaching staff, and was assigned a value of 5% of total assessment for the unit. Generally students received a substantial portion of this mark simply for participating and completing the task to a reasonable level. The staff were more concerned that the students completed the exercise honestly than because of assessment.

A 90 minute workshop on using the software was run for all students in two groups in the computer laboratory and by the end of the workshop all students had practised logging in to CareerHub Portfolio and had also been able to enter some details into their own document. It was found that the computer workshop environment was not conducive to discussion of subjects other

than hands on computer work. The workshop was not able to delve into a reflection on the meaning of the graduate attributes (although team work had been discussed with students earlier in semester). This aspect has been highlighted as a useful development for future trials of the ePortfolio tool.

Students were given three weeks to complete the portfolio after all the other assessment tasks for the unit had been submitted. Most students were able to use the software adequately and only a few queries were received by staff.

Impact on student learning:

The impact of the trial in the unit was measured as a result of the use of an ePortfolio by students. The true value of the tool for students however, is in the ongoing collection of data, and as part of ongoing review of the tool the student cohort will be monitored to see if students maintain the portfolio. The value of the trial was measured in two ways; the quality of the portfolios submitted to academic staff; and the feedback provided by students in an evaluation survey.

The survey was provided to the students to gather feedback on both the software tool and the general perception of the task of portfolio building against the graduate attributes. The results of the survey are presented in Table 2 and it is apparent that students found the system to be useful and a helpful way to store information. Many students commented through the workshop sessions that completing their degree and looking for work seemed too far off to be of concern to them at this stage (second semester first year). This is perhaps part of the value of this task, to remind students of where they are heading.

It was interesting that although students generally agreed (58%) that an ePortfolio would help them to reflect on their learning and accomplishments, the response to questions 11 –13 which related to reflection, understanding and demonstration of the graduate attributes was dominantly neutral (53, 53, 51%). It was felt by staff involved in the trial that in the future the portfolio building task offered a good opportunity to deliver a workshop on graduate attributes and their meaning to the students. When this is combined with the ePortfolio building task it is expected that students will have a more positive response to these questions.

The responses that students gave in their submitted ePortfolios clearly demonstrated the value of the task. It was made clear to students that staff were interested in the development of skills during the unit, and students were encouraged to write about any problems that they overcame or skills that needed further work. For instance many students commented that being assigned a group meant that they had to work hard on their communication skills, and it was interesting to note that it was not only the international students who commented that they felt that they had improved.

The reflection on group work was a useful tool, complementing the workshops that had been held earlier in semester. In writing an individual reflection, it was found that higher achieving students who were not satisfied with their groups performance tended to suggest personal strategies for achieving the outcome that they desired from team work in the future. It was recommended to all students that they should try to continue to reflect in this manner, as the process of checking progress against reflection at the end of term will be of great value in their development of

graduate attributes. At the end of a four year study program, a portfolio that has been built in this manner would be a powerful tool for reflecting on and documenting attainment of a set of skills.

Question	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
1. This trial has increased my understanding of ePortfolio systems and how they can be used.	3		17	**72**	8
2. This tool was easy to use.		17	22	**50**	11
4. The 'Help' function in CareerHub Portfolio was useful.		14	**66.5**	16.5	3
5. I would be interested in using an ePortfolio to store samples of my work (and other artefacts) in an online repository.	8	14	31	**44**	3
7. An ePortfolio would be useful to me as a career planning tool.	5.5	14	36	**39**	5.5
8. An ePortfolio would be useful for me as part of a job application or to support an application.	3	5.5	19	**58**	14
9. An ePortfolio would be useful for academic learning and reflection.		19	**47**	33	
10. An ePorfolio can help me reflect on my learning and accomplishments.		11	30.5	**58**	
11. The UTAS ePortfolio trial helped me to understand the UTAS graduate attributes.	8	14	**53**	25	
12. The UTAS ePortfolio trial helped me to reflect on my own graduate attributes.	3	14	**53**	28	3
13. An ePortfolio is a useful tool to identify and demonstrate my own graduate attributes.	3	6	**51**	31	9

Table 2: Questions and responses from student evaluation survey (note questions 3 and 6 related to time required to complete the survey). Total number of respondents: 36 (out of class of 70)

Conclusions:

The use of an ePortfolio to record the development of skills through an individual's career has been discussed. It is internationally recognised that such portfolios are invaluable tools in the modern work environment, where an individual's skills are not solely recorded by educational qualifications and the skills desired by employers are often not documented. Universities and professional organisations have begun to recognise these skills as graduate generic attributes, but traditional assessment methods are not well designed to measure students' development of these attributes.

A trial of Career Hub Portfolio, was carried out in a first year Engineering class of 70 students. The students used the tool to track their development of skills relating to the graduate generic attributes that had been identified for that unit. The ePortfolio software was used to explore a tool to facilitate the student development being sought by the University, including the connection between skills required by the labour market (e.g. Engineers Australia) and graduate outcomes being sought within the School of Engineering.

Students generally found the software easy to use but raised the two main issues. They felt that career planning was too distant for them to be concerned about, and they responded neutrally to questions about whether the tool helped them to understand or develop the graduate attributes. The workshop planned for the next trial in 2006 will be expanded to enable more discussion of

the concept of graduate attributes and the need for career planning, which may alter this response from the next group of students.

The portfolios reviewed by staff indicated that the students achieved a greater insight into the graduate attributes than perhaps they realised. The critical style that most took (as suggested by staff), led many students to identify points that they would try to improve and develop in future units. They were also able to clearly pinpoint skills that they had improved as a result of the use of an ePortfolio in this unit.

The value of the ePortfolio tool will be able to be further explored by these students if they take the opportunity to continue to use it throughout their degree course, and their careers in general. The ability to record, display and develop their emerging workplace skills should prove a boon to their career development. In the very act of completing the ePortfolio, students take the first step to managing their own career and skill set, and develop skills in critical self assessment that are an essential part of life long learning. The value to teaching staff is that this tool facilitates the development of this skill set, and provides a means of assessing the development of graduate attributes throughout the degree program.

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