Reviewing Assessment Practice in the Computing Curriculum

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Over the last year and a half our department has been involved in the project Leadership and Assessment: Strengthening the Nexus coordinated by the Learning and Teaching Centre in our University. As part of this project we conducted the first comprehensive review of assessment practice in the Computing curriculum. The outcomes of this review were twofold: firstly we now have a much better picture of what and how we asses across the whole curriculum; secondly, the review process has acted as a catalyst for change in assessment practice. This paper will provide an overview of the process we went through in carrying out the review and some reflections on fostering change in our colleagues through the discussion of assessment that the review provoked. The assessment review first tabulated the types of assessment and the learning outcomes for each unit offered in the Department during 2007. We then collected more detail on each assessment task including the way that the assessment was graded and a broad categorisation of the kind of task. This assessment matrix then provided the starting point for a discussion with some staff on their attitude towards assessment in their teaching. It is now clear that we are seeing some change in the attitudes of staff to assessment as a result of the process that we have gone through in this project. This can be characterised as a general increase in assessment literacy as a result of the discussion that has gone on through the Department and particular changes in some individuals who were part of the more detailed discussions as part of the review. Reflecting on this process, we can see indications of how effective change can be fostered in the Department by encouraging reflection by individuals.

Context

The *Leadership and Assessment: Strengthening the Nexus Project* (LEAP) is a Carrick funded project that aims to build the capacity of a group of cross-disciplinary leaders in effective assessment practice. LEAP was coordinated by the Learning and Teaching Centre at Macquarie and the Computing Department was one of those chosen to take part.

The LEAP project had the twin objectives of improving assessment practice and developing leadership within departments. As two members of a department the authors' main consideration was with assessment but as members of the LEAP project we were also called upon to reflect on the development of leadership in ourselves and our colleagues. Author Cassidy was the Director of Undergraduate Teaching and took the role of *enabler* in the project; his responsibility was to facilitate change by developing and implementing new policy or procedure where found to be appropriate or just to provide resources to staff to enable new ideas to be developed. Author Doche was a lecturer in the Department with no formal leadership position; he was involved in teaching first year and third year Computing subjects; one of the goals of the project was to help him become a leader in assessment practice within the Department.

The broad approach of the LEAP project was that of Participatory Action Research (Seymour-Rolls & Hughes, 2000) which is a somewhat foreign methodology for a group of Computer Scientists but one which has proved useful in progressing this project. Participatory Action Research in a teaching environment, in our understanding, involves implementing planned changes and interventions while observing their effects and adjusting goals and strategies based on feedback and observation. Action research projects often go through cycles of planning changes, implementing them, observing the effects and then re-planning or re-formulating goals.

The Computing Department at Macquarie consists of around 30 academic staff teaching classes ranging from twenty to six hundred students. Many of our students come from outside our own Degrees (the six hundred are largely commerce students in a service unit) but our first year classes have around three hundred students who enrol to learn programming and software design. Teaching each unit is generally shared between two lecturers who each take the class for around half of the semester; units are generally not *owned* by one academic but will often be shared between members of a research group. Most of our units have a long history but will change regularly as a result of a formal review process run by the Department to respond to feedback from students and other staff. Student numbers in Computing have been falling steadily over the past few years resulting in smaller classes.

As with most university departments, computing is motivated to improve the overall level of its teaching by both internal and external factors. The LEAP project was an excellent opportunity to focus on assessment practice which had never had the benefit of a comprehensive review. There were some indications that our assessment practice was not all that it could be, for example:

- comments from students that they did not get or did not value the feedback they got on their work
- observations from staff that students were poorly prepared for later units even though they had passed pre-requisites.

The onset of the project coincided with a rise in interest and awareness of the importance of assessment issues on the part of the authors. The importance of constructive alignment (Biggs, 1999) between the learning goals and the assessment practice in our teaching was becoming evident in the regular reviews that we were carrying out of our program. There was a lot of evidence from these reviews that the assessment being used in the department was very rigid in format and, in particular, the over-reliance on final exams was not providing us with the opportunity to provide effective feedback to students on their learning.

The Review Process

As part of the project, we undertook a review of the current assessment practice in the Department. The goal was to get a good picture of what we did as a department across our curriculum. While we all thought we knew generally what went, on we had never done a comprehensive review of this kind. We expected to find a lot of uniformity in the pattern of assessment in each unit: two or three programming assignments and a final exam. One of the goals of the project as a whole was to introduce some more diversity into our assessment practice.

Data Collection

We developed the assessment matrix (see Figure 1) as a tool to summarise the pattern of assessment in our units. This was a simple spreadsheet with weeks in the columns and units in

the rows showing when and what kind of assessment tasks were used in each unit. Different kinds of task were colour coded to give an overall picture of the semester in all of our units. In addition to the assessment matrix, we collected all of the unit outlines and as many of the assignment descriptions as we could for the entire year. The intention here was to build a resource to give a more detailed picture of individual units when talking with academic staff and to provide a historical record against which we could compare future practice. While we commonly archive our unit materials, it is generally done on a unit-by-unit basis; this collection allowed us to collate the information across all of our units to provide an archive that could be easily browsed for future reference.

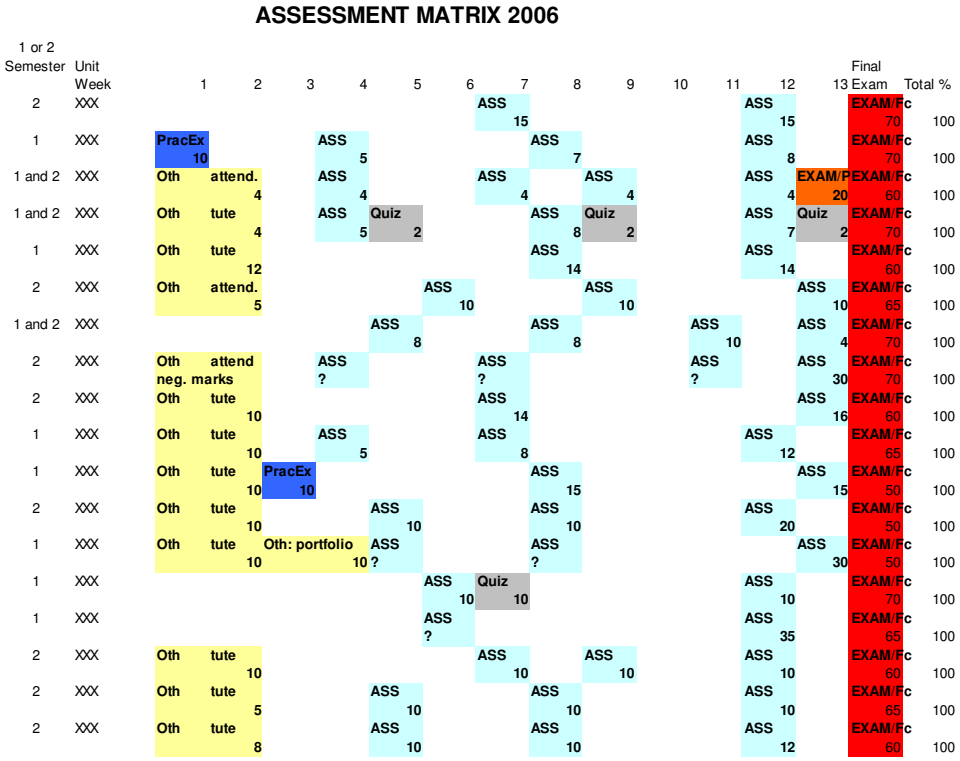

Figure 1: Assessment Matrix

The outcome of these reviews were largely as we expected: most units used two in-term assignments and a final exam worth about 70% of the marks for the course. There were however some interesting diversions from this formula where using quizzes and small practical tests. One unit (run by author Cassidy) was using a portfolio assessment task for the first time (Cassidy & Schwitter, 2007). Most units had some form of weekly assessment of tutorial or practical submissions; this is a practice that has developed in our department to encourage students to prepare for and attend these weekly sessions.

Interviews

Following the data collection, we began interviews with selected staff designed to begin a dialogue on assessment in the units that they teach. In the interview we asked about the staff member's attitude toward assessment and how and why they decided to use certain modes of assessment in their teaching. We used the assessment matrix as a prompt for talking about patterns of assessment in the Department. While we tried hard not to bias these discussions with an agenda, an item of particular interest was the reliance on final examinations and the high weight given to them in most of our units. In the interviews, we tried to find out whether

staff used these exams because they thought they were the best way to assess students or for other reasons.

While an eventual goal was to interview the majority of staff in the Department we began by targeting people who we hoped would be amenable to reflection on their assessment practice and who might give us some insight into current practice. We also targeted a few staff teaching on units we thought would benefit from some revision of assessment practice: particularly in first year where new students often have difficulty engaging with the material in the Computing curriculum. The goal here was to trigger change by starting a dialogue with and between staff teaching on these units. The interview was intentionally not confrontational or critical of existing teaching practice; instead it tried to elicit opinions from staff and bring some of their thinking about assessment into the open.

The results of the interviews were two-fold: firstly, we got some insight into why things were they way we had observed:

- issues of plagiarism, thought to be a major issue and a big motivator for the weight of examinations
- assessment as 'currency' for students – ensuring that they engage with the tasks we think they will learn from, understanding that they are time poor and will avoid things that aren't 'worth' something
- the exam as a time-constrained problem solving environment
- disappointment that students don't read the feedback they are given, different understandings of how we think they should be using the feedback.

Secondly, we found in the staff we talked with a willingness to consider their assessment practice as a major influence on the experience and attitude of their students. These staff began to talk with us and with their colleagues about changes to assessment practice in their own units.

Observing Change

Over the course of the project we have been able to observe changes in the assessment practice and also in the level of awareness of assessment issues of staff in the Department. One quantifiable observation is the change observed in the assessment matrix constructed for the first semester of 2008 compared with the 2006 matrix. A large majority of units (9/13) reduced the weight on the final exam, but most of the time the difference is small (5%). We also noted a larger diversity in the assessments tasks: more mid-term tests, quizzes, new forms of assignments.

As a result of the discussions with staff about assessment and in particular the role of the final examination, author Cassidy introduced a new element of policy into the departmental examination process for 2008. Staff were asked to submit a short rationale document along with the final exams for the semester; this was to include a discussion of how the exam was to be structured and whether certain sections or questions were to be treated as pass/fail or grade criteria. In the past much of this would have been private to the staff involved in the unit; the aim here was to prompt staff to think about these issues and have their thoughts on record for the rest of the Department. The result of this new policy was fascinating; many staff just provided a written account of how they normally structure their exam but in some cases it prompted a critical reflection on the role of the exam and the way that different parts of it would be used. One group made explicit reference to Bloom's Taxonomy (Bloom, 1956) in

constructing multi-part questions for their exam: this is the first mention of Bloom I've ever heard in an examination meeting!

Reflections on Leadership

On beginning the LEAP project, we had a fixed idea of leadership which corresponded closely to roles and levels of authority within the organisation. One of the goals of the project was to foster leadership potential in non-authoritative roles, particularly in the area of assessment; our experience so far in the project has certainly backed up the idea that effective leadership can come from anywhere.

The way that we ran this project was to establish seeds within individual staff or small groups working together that led to more discussion and openness in consideration of the role of assessment in their teaching. This led to experimentation on the part of some and, importantly, established the experimenters in a kind of leadership role within their unit or group. While we are still in the early stages of change (given that effective change can only occur year-to-year) we are seeing more discussion of assessment issues prompted by the changes that these proto-leaders have made themselves. We hope that this discussion will prompt others to become experimenters, either trying ideas similar to the original experimenters or suggesting alternatives. Importantly, none of the changes that were made to assessment practice were suggested from above, all were in response to student and other feedback and prompted in part by the increased level of discussion of assessment within the Department.

On the Experience of a Leader

Coming from France in 2003, one of the authors, Doche, had very little experience of practices in Australian universities. The first few years in Australia were therefore a steep learning curve where he got used to the strange concepts of unit outline, teaching evaluation, teaching committee, or examination meeting, since none of those seem to exist in French universities.

As a consequence, his initial approach towards teaching in the Department was, to say the least, conservative. The first units he had to teach or convene did not see any change in the way they were previously conducted and students were happily assessed following the model of a heavy weighted final exam and a few assignments along the semester. However, being involved in a large first year unit with students coming from different backgrounds and having very different capabilities meant that there was a lot to do to improve students experience, especially regarding feedback. This need, materialised by a high failure rate and poor teaching evaluations, triggered many improvements.

At first, the unit material was totally redesigned to better suit students' skills. This proved to be insufficient. The next move was to modify the assessment of the unit, as author Doche became an Action Research Enabler in the LEAP project. His initial interest in the project was clearly assessment rather than leadership and some reading and an extensive reflection on assessment practices was carried out. Starting from the desired skills that students need to demonstrate in order to pass the unit, the design of assessment tasks followed, bearing in mind the importance of formative assessment in students learning. The effective mapping between learning outcomes and assessment tasks was a particularly useful exercise and the occasion to discover that a few learning goals that we considered core in the unit were in fact never assessed. The result of this reflection was a 50% final exam, a few assignments and

weekly exercises, plus a new component called electronic portfolio, as inspired by author Cassidy's trial.

The aim of this portfolio was to record the performance of a student against the specific learning goals that were tested in every assessed task. This allowed us to give each student a broad picture regarding his or her result at any point in the semester far regarding the learning outcomes of the unit. A mark was then derived from this portfolio. The rationale being that we tried to determine what students have learned along the way and what they know in the end. This was largely explained to students and seemed to contribute to improve their reflection. They discovered they had some interest to understand why they failed a particular task, namely improve their electronic portfolio mark, and learn a few things as a side effect. This was supported by different mechanisms to provide timely and effective feedback to students. The outcomes of these changes were very encouraging: exceptional results for a large proportion of students, a reduced failure rate, much improved teaching evaluations especially regarding feedback and assessment, and finally a few comments from grateful students appreciating the difference.

These results were presented at the examination meeting of the Department with a detailed explanation of how the assessment was carried out and what are the benefits of this approach. This was instrumental in establishing some credibility, a crucial quality of a leader. As a result of this LEAP project, we have seen many changes in the behaviour of most of our colleagues. Most of them are open for a change and showcasing different approaches is certainly a very effective way to stimulate the debate and instigate changes. For instance, some colleagues are now interested in using portfolios and have asked questions about the technology involved to effectively manage them.

How change might progress in future

The Pandora's box has been opened and the possibilities seem endless. Many more changes will come. Both enablers will continue their personal reflection on teaching and assessment, experimenting new approaches, trialling new technologies. However, the leadership aspect of the LEAP project was to ensure sustainability of the changes we introduced and this implies the whole Department.

We believe these ideas and more importantly this spirit will naturally spread across the entire Department. Beyond the interest of certain colleagues, there are some mechanisms in place to ensure this diffusion will occur. Step by step, more and more units will be the subjects of such a reflection and exposed to similar improvements. In fact, it has already started; author Doche is teaching a unit with another staff member and together they have made changes to the assessment in the unit, reducing the weight of the final exam and introducing a portfolio like task providing continuous feedback to students throughout the semester. Other units are considering how they can better adapt their assessment practice given some of the new ideas that are circulating around the Department.

The diffusion of good practice is the first aspect to ensure sustainability. The other aspect is to retain the existing good practices, making sure that a new lecturer teaching a unit for the first time will be able to conveniently benefit from our collective past experience. To this end, the Department now encourages the creation of unit portfolios where lecturers record their experience of teaching a particular unit at a particular time. These unit portfolios are available to any staff in the Department and contain much useful information: unit outline,

detail of assessment, students' workload, examination rationale, and lecturers' reflections on teaching the unit.

To some extent we are following the suggestions of Price (2005) on the establishment of communities of practice in assessment within the Department. Price argues that communities of practice can be effective if they exist within a framework that helps to improve the assessment literacy of the staff involved. One view of what we are doing is to encourage the formation of these communities of practice around individuals in our department who are developing their assessment literacy. If we can support this by department-wide activities and procedures, then it may play a part in the ongoing improvement in our teaching and the experience of our students.

Summary

This paper has presented a discussion of the change process that the Computing Department has gone through over the last two years as part of the LEAP project. This project has focussed on developing leadership potential in the area of assessment and our experience has shown that an effective model of leadership can arise from within the Department as opposed to a traditional top-down model of authority. The change that we have observed through the project has been triggered by discussion between peers and observation of the actions of individuals within the Department, rather than any edicts passed down from above to try this or that new assessment method. This is clearly an effective model for leadership and change within a department which has the distinct advantage of gaining credibility through the collegial relations between staff.

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