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Fellowship Report

TECHNOLOGY FOR NURTURE
IN LARGE CLASSES

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Executive Summary

This Fellowship has developed new technologies and practices for enhancing the interaction between learning and teaching in large classes. Over four semesters of trials I have explored different interfaces, different assessment practices, and different ways of integrating reflective writing into the overall curriculum. Key findings include:

- The primary aim of student writings is to benefit the students and lecturer within the context of a particular semester, rather than for use as a research tool.
- The use of student writings by the lecturer brings the student voice into the class, showing students that their input into the teaching and learning in the course is valued.
- The fine-scale reflections explored in this Fellowship differ from the reflections on learning incorporated into many ePortfolio frameworks.

The initial vision of providing a central text-mining service to provide a front-end to student writings for lecturers across Australia, either hosted at the University of Queensland or through ALTC, was ultimately unsuccessful. This was owing to concerns about the confidentiality of student data across institutions, particularly when students might be using their writings to reflect on personal thoughts and feelings. However our final trial has demonstrated that sophisticated technology is not necessary to make this approach successful. It is the practices that are most important.

A key outcome of the Fellowship has been a series of workshops around these themes. Four have already been held in Sydney, Adelaide and Perth. These workshops bring together a broad range of stakeholders at each institution, including teaching and learning staff and academics from a range of disciplines, as well as staff from student support and IT services. The topic of student writings has been a catalyst for broad discussions on student learning, assessment practices, student retention, electronic portfolios, and duty of care, all within the context of the particular institution. The Fellowship Report is written around the story presented in these workshops, incorporating outcomes from these discussions as well as the feedback on the Fellowship program from the participants. The final section of the report in particular presents a discussion of the outcomes and implications of the program.

Based on the combination of our experiences and the evaluative feedback obtained through the workshops and other presentations, our final recommendation is that “reflective learning” should not necessarily be the aim of student writing in large classes. While I began this program from a literature of writing for reflective practice, I would now argue that there are many other opportunities for supporting learning in this context. Student writings can instead be employed as a powerful means of improving the connection between teacher and students through a shared reflective cycle, enhancing student engagement.
Introduction and Background

This Fellowship program grew out of an interest in reflective writing for promoting student learning, and ways we might be able to draw on student writings to support nurture in large classes. However along the way I have realised that this Fellowship is really about stories. There are actually many ways of supporting student learning and perhaps reflective writing can have different and more important roles in large classes.

This report, one of the key outcomes of the program, aims to tell the story of my Fellowship and share with the reader the experiences and new understandings that have come from it, as well as engaging you with the interplay between reflective writing and other aspects of the curriculum.

Reflective Online Journals

This Fellowship program arose from two areas of existing research and teaching practice. The first of these began in 2002 when I asked students studying introductory biostatistics to keep a reflective online journal during the semester. They were told that this was to help them reflect about their learning but that it would also provide continuous feedback to the lecturer who was able to read the entries anonymously (through the use of computer-managed pseudonyms). The writings from the 94 students who maintained a journal were subsequently analysed by Bulmer and Rodd (2005). This analysis looked at the main themes in the student writings, such as the many comments on the assessment, and the audience assumed by the writings, with many students writing as if speaking to the lecturer, rather than to themselves. It also looked at several specific entries that had had an impact on the lecturer as reader and subsequently brought about pedagogic change, “disturbances” in the sense of Mason (2002). For example, following one class test a student wrote

I came out of that last test feeling ill. Knowing I could do the questions, but again, not giving myself enough time to get through them. I even screwed up the easy ones. What is wrong with my head? ... No more excuses. Just disappointment.

This single entry brought the awareness that the tests were having a physical effect on at least one student and that they could lead to a sense of hopelessness and resignation, all the more significant since the same student had started their journal by writing “I am thoroughly enjoying the course”. As a result the structure and timing of the tests were changed. In a similar way, the following entry gave some insight into possible issues with friends working together on group tasks:

I have finish the last the project last week, I feel release. I have done two projects with my friend. I did not feel very good about that. It's not that my parner and i did not know each other. Also we are good friends. The problem is that we are good friend. It's too hard work together. We have different oppions and own knowlege. Sometimes, depend each others. It's just too hard to work together, and there is not good for friendship. Anyway, we finish the projects. thanks god.

The conclusions from this study were that the online technology could be used to weave together three strands: the student views, the values and beliefs of the lecturer, and the lecturer’s belief dynamics. This braiding was seen as a valuable means for promoting professional development and growth in the lecturer.

For larger classes this approach is problematic. With 500 students we typically expect them to write around a million words of text, making it impractical for a lecturer or course coordinator to adequately engage with the writings on a regular basis. To that end one of the main goals of this program was to investigate the use of new technologies, such as text mining, to support this braiding.
Beliefs and World Views
Since 2002 we have also been looking at the identification of student beliefs about statistics through small creative works, including picture drawing and haiku writing. Here we take “beliefs” as “conceptions, personal ideologies, world views and values that shape practice and orient knowledge” (Aguirre and Speer, 2000), and we often use the term “world views” to emphasise our interest in the view that a student possesses of what “statistics” is in the world. We are thus focussed on domain-specific beliefs that describe beliefs about a particular domain, such as statistics, compared to more global beliefs about the nature of mathematics and its teaching and learning (Törner, 2002).

For the picture tasks, students were asked to “take a blank sheet of A4 paper and draw, write, paint, doodle, or whatever suits you best, to express your view of statistics”. Two of the results are shown below. The first is perhaps an ideal view, identifying the utility of statistics in the student’s career:

![Example creative work showing appreciation of the utility of statistics](image)

The second is somewhat less positive, but still represents an important view for a teacher to be aware of when trying to understand the diversity of student backgrounds, attitudes and interests:
I thoroughly recommend the use of this simple “diagnostic” task in other disciplines as well. It is useful at the start of a semester as an ice-breaker and as a way of obtaining a quick insight into what view students bring to your discipline.

Bulmer and Rolka (2005) used these student drawings about statistics to derive a classification of statistical world views. This has then been extended to other creative output from students, such as haiku writing. However, in each case the scope for determining world views has been limited by the scope of the creative work, particularly with the very brief haiku. One aim of this program was to use the large corpus of student reflective writings as a new source of data for this work that might substantially enhance research in this area.

Reliability is also an important issue in interpreting the world views present in a picture or poem (Rolka and Bulmer, 2005). Another aim of this program was to look at the reliability of determining world views from reflective writings. This was done by comparing human classifications of statistical beliefs with the automatic concept identification produced by text mining software such as Leximancer.
**Fellowship Aims**

In light of these two background themes, the overall aims of the Fellowship program (as presented in the original proposal) have been to

1. Investigate affective aspects of learning in large classes through student reflective writing.
2. Explore the relationship between discipline-specific beliefs and affective response in large classes.
3. Develop tools to gather and analyse data for this study that can then also be used by lecturers in a variety of disciplines.
4. Document and disseminate how these tools can be used to
   a. Support pastoral care in large classes through an awareness of affective responses
   b. Instigate professional development of the lecturer by promoting a pedagogic resonance between their teaching and the rich dynamic feedback of student writings

It is clear from these and the above themes that this program had its origins in a research perspective. In this report I will show how my thinking has moved to a much stronger focus on the student voice in large classes as an end in itself.
Private Blogs – Semester 2, 2007

STAT1201 Analysis of Biological Data and Experiments

I started the Fellowship program with a course that I have taught for many years, an introductory statistics course for around 500 biology students at the University of Queensland. This was a very rushed start to the program, with Phase 1 of the proposed timeline beginning only a few weeks after receiving the Fellowship and several months before the orientation program. However I felt this was an important opportunity since the course was being renewed as a compulsory component of the new Bachelor of Science program in 2008. Thus this semester was seen as our last chance to trial the use of reflective writing in a well-established course under our control.

It turned out to be a terrible decision, with a short delay in the arrival of the software required resulting in a four-month delay for Phase 1, although the basic implementation of the trial still managed to proceed. Our immediate advice to future Fellows is to always allow a suitable lead time before starting the program. This is valuable for negotiating time commitments as well as building networks within the Fellow community prior to commencement.

Student Interface

For the initial implementation I adopted a simple blog interface where a student could write an entry and then view all the entries they had written, building up a little portfolio of writings over the semester. For example, the figure below shows an entry being written.

As noted in the entry, the option to tag an entry was very powerful in letting students know what they could write. In particular the Outburst tag really gave them a license to vent on topics that they might have otherwise been reticent about, making very valuable feedback on occasion. However this in turn influenced the overall flavour of the student writings and was perhaps the start of the shift away from these writings as "reflective learning" towards a focus on the feedback aspect, a shift I have seen more sharply over subsequence iterations and will discuss further below.

In addition to the tags, there was also an 'About' page to give the students some overall indication as to what was expected of them.

Screenshot of initial interface for creating or editing an entry

As noted in the entry, the option to tag an entry was very powerful in letting students know what they could write. In particular the Outburst tag really gave them a license to vent on topics that they might have otherwise been reticent about, making very valuable feedback on occasion. However this in turn influenced the overall flavour of the student writings and was perhaps the start of the shift away from these writings as “reflective learning” towards a focus on the feedback aspect, a shift I have seen more sharply over subsequence iterations and will discuss further below.

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In this semester I also included weekly themes. These were optional but gave students a starting point for their writings if they couldn’t think of anything to say:

### Themes

#### Week 1

*I'm doing this course because*…
Start your Learning Journal with thoughts about why you are doing STAT1201, what ‘statistics’ means to you, what you are looking forward to or dreading in the course ahead, …

#### Week 2

*After one week I feel*…
With the first week behind you and all your courses underway, use your Learning Journal to summarize your feelings.

#### Week 3

*My relationship with maths*…
This week we come to our first serious maths in the course, using logarithms to transform nonlinear equations. Take this opportunity to summarize your relationship with mathematics over the years and at the moment.

#### Week 4

*Randomness*…
With a focus on probability in the course this week, use your Learning Journal to talk about randomness and probability in your life.
A brief “How To” page gave instructions for editing and deleting entries. The two menu items under “Meta” were somewhat removed from the actual writing process. The “Assessment” link provided the student with a progress report on how their writings would be counted for assessment in the course (see below for more details).

The “Mobile” link allowed the student to enter their mobile number into the system after which they could also SMS entries to their Learning Journal. (These were tagged as Mobile, as can be seen in the next screenshot below.) I thought this would be a useful feature, enabling students to send short Reflections from busses and trains, for example, either to accumulate to over 100 words or to be seeds that could then be edited online later. However not many students took advantage of this. Since there was a practical session in a computer laboratory for the course each week, many students used that opportunity to write their entries, which unfortunately meant that a lot of entries tended to focus on the practical itself, and in general there were plenty of other opportunities for students to use the easier web interface. The SMS infrastructure itself was valuable though and has been used in other settings in the course, such as providing an automated system where students could find their room for the conference (see below) or exam venue.

The home page for the online site then shows all the entries that have been written, in reverse chronological order:
### About the Categories

Students write their entries in a simple interface like this one, including some limited formatting tools. (I'm not sure if these were a good idea. The original interface only allowed text, coming from the desire to have text that would be in sentence form and so hopefully easier to process. But students started doing all sorts on convoluted things to express themselves in the way they wanted, including trying their own HTML coding, so in the end we gave them some basic options.)

A last-minute decision was to allow students to tag their entries with categories: None, Reflection, Comment, Anecdote, Opinion and Outburst. These were inspired by Richard Bartle's practice in his blog (www.youhaven'tlived.com/qblog) and had quite an effect on what students wrote.

### Untitled

**Monday, February 4th @ 16:01** [2 words]

Hello journal

### A Bit More Fancy

**Thursday, July 26th @ 11:25** [21 words]

The editor for writing your entries has been updated. You can now add

- bullet lists
- basic formatting (like **bold** and *italics*)

### Presenting at the Conference

**Wednesday, July 25th @ 08:21** [126 words]

A few students have noted apprehension in giving their presentation at the conference, with some pointing out that a presentation in front of 500 people is pretty scary! And indeed it would be. However the conference is not quite going to work like that...

With 10 minutes for each presentation there will be over 5000 minutes (around 83 hours) of presentations on the day. If everyone had to give their presentation to the whole class then we'd be there for a very long time. Instead we'll break into much smaller groups and everyone will also only have to attend a quarter of the day (though you are certainly welcome to...)

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**Screenshot of initial interface for an individual student's learning journal**

Students can click on the titles to edit or delete their entries. The menu in this screenshot is the one seen by the coordinator, with extra links for viewing all the entries by author or by date (through a simple calendar), viewing all the entries sent by mobiles, and viewing all the entries tagged with Outburst.

The following screenshot shows the list of authors who have written entries. The names given are randomly generated pseudonyms. This allows the students to remain anonymous while also allowing the coordinator to follow a particular story through the semester. (The pseudonyms were not matched to any criteria, such as gender or ethnic background.)
Design Questions
There are several design questions that users should consider with the reflective writing:

• Should writings be anonymous or identified?
• Should they be public or private?
• Should they be editable?
• Should they be assessed?

Our general approach has been to encourage students to write what they want to write, rather than what they think or believe the lecturer wants them to write. To that end I have so far always kept them anonymous and private (so that only the student and lecturer can read the writings and the lecturer does not know which student was the author). To capture “heat of the moment” entries they could also be locked after submitting. However in practice students often want to add more to their entries so I have always made them editable. The larger issue of assessment is discussed in the following section.

Assessment
Another key design question is whether the Learning Journal is weighted in the assessment for the course. In my initial trial in 2002 I had given students a bonus 3% on their final grade if they wrote at least eight substantial entries during semester and consequently most students had participated. In contrast our second trial, in 2004, had the writing as optional and participation...
was very low (around 10%). In hindsight this is likely owing to us giving students a poor explanation of the benefits the writing might bring them, and in particular seeming an unusual task in a statistics course. Student engagement in the task, and in the course overall, will be a topic I come back to later.

For this new system in Semester 2, 2007 the Learning Journal counted 5% towards the core assessment of the course (rather than adding it as a bonus). Students earned the 5% by writing at least 100 words in at least 12 different weeks out of the 17 weeks of the semester (the 13 teaching weeks plus the mid-semester break, the revision week and the two weeks of exams).

Receiving Reflections from students during the exam period was very valuable. This is a time that is usually after the traditional course and teaching evaluations but is the time that students really have to come to grips with the material from the semester and when affective aspects of learning can become very strong. Unfortunately in the last two semesters of the statistics course (Semester 2, 2008 and Semester 1, 2009) I have moved to integrate the reflective writing into the rhythm of weekly quizzes in the course, to encourage more regular reflective practice. The cost of this is that I no longer give an incentive for reflective writing during the exams (although a lot of students did still use it anyway).

Since the Learning Journal counted towards assessment most students completed it. It is worth noting that the resulting feedback also stands to be more representative than optional evaluations.

**Student Conference**

In addition to incorporating the Learning Journal into the course assessment, in this semester we also introduced a student conference in which every student in the class gave a 10-minute presentation to their peers on the use of statistics in a scientific project. As can be seen in one of the above screenshots, this added up to 83 hours of presentations, all given on one Saturday.

Of course the conference was time-consuming to organise and expensive to run (employing tutors to chair each session and ensure everything worked smoothly). The Learning Journal gave immediate feedback to us on how successful it had been. Students commented that it was the only chance they’d had to give an oral presentation in the first year of their degree. Many also noted that it was the first time they had really tried to learn the material in the course. The accountability of having to stand up in front of peers and talk about statistics was a very good motivation to learn!

Based on the Reflections in the Learning Journal we have now continued to hold the conference every semester, and in first semester this year it was expanded to include students from other faculties in three courses, rebadging it as the *Undergraduate Statistics Conference*.  

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Technology for Nurture in Large Classes
Presentations

OZCOTS 2008

Beyond the engagement of other coordinators in the Fellowship program, our first wider dissemination activity arose through the ALTC Senior Fellowship of Professor Helen MacGillivray (Queensland University of Technology). Professor MacGillivray's own activities included organising a very successful Australian Conference on Teaching Statistics (OZCOTS 2008) in Melbourne in July, 2008. Following on from the earlier work on world views, we prepared a paper for this conference using data from the reflective writings to gain insight into student beliefs about statistics in the early part of a course. Here I summarise the findings of that paper (Bulmer and Low, 2008).

This work involved using Leximancer to automatically identify concepts tied to particular themes. For example, the figures below show two concept maps produced by Leximancer from student writings. In the first week the theme of "I’m doing this course because..." had been given, asking students to reflect on what “statistics” meant to them among other things. A total of 301 entries were made, around 42000 words of text. As mentioned earlier, these themes were optional and many students used their first entry to reflect on their initial impressions of the course in general and the first lecture in particular. The first concept map shows the results from the analysis of all these entries. Each dot with a label is a concept that has been identified, with bigger and brighter dots and labels indicating more frequent occurrence. The distance between the dots in the map is rough indication of the distance between the concepts in the text. The named circles are then themes of concepts that are near each other. (The number of concepts and themes displayed can be controlled.)

Automated concept map from all entries in the first week
The largest concept theme shown here relates to the lectures and includes “lecturer”, “book”, “time” and (pleasingly) “interesting”. These come from students describing their first week in the course, rather than addressing the specific theme that was given. Similarly another large concept theme, “data”, arises from the topics discussed in the second lecture of the course, with students using their journal to simply summarise what they had “learned” in the lecture. (For many students it took several weeks of guidance before they engaged more deeply with the reflective aim of the journal.)

Neither of these concept themes is directly linked with the suggested journal theme. Of course this is fine, since students didn’t have to write to the theme, but for the purposes of this paper we had wanted to analyse the entries specifically related to the theme. We skimmed the 301 entries and identified 181 (around 28000 words) that seemed to do this, at least in part. The figure below shows the concept map for this subset of entries. Concept themes around lectures and variability are still present but there is now a much larger theme around “statistics”. This theme appears away from the “lecture” theme, suggesting that the two are appearing separately in the student writings and so entries contributing to the ‘statistics’ concept theme may be addressing the topic of why the students are doing the course and what statistics means to them. It also includes concept entities such as “school”, “maths”, and “science”, which might be expected in writings on this topic.

*Automated concept map from themed entries in the first week*

*Leximancer* provides a valuable front-end to the writings through these concept maps, clicking on a concept or a link between concepts to display the evidence *Leximancer* used to establish the concept. For example, looking at the text underlying the “statistics” concept, most entries focusing on why the student is doing the course but some did also link it with their previous experiences, as in the following example:
I've never really studied statistics as a science/subject unto itself before. Like most people I learnt a little about statistics in maths and science during highschool. However the importance of stats and data analysis always seemed to be dwarfed by the actual collection of data or experimentation.

A few students did show a broader appreciation of the role of statistics in science. The course was mainly taken by biology students, such as this one:

I've always realised that statistics is important in biology to filter out significant data from “background” variations in data. I've come across scientific papers before but I've never really understood the many statistical terminology used in those papers and the deductions drawn from the many statistical tests used.

Of course the choice of these samples is rather subjective and it may be quite misleading to imply we are representing 42000 words of student reflections with just two samples. An interesting benefit of using text-mining software is that it may help “make the analyst aware of the global context and significance of concepts and to help avoid fixation on particular anecdotal evidence, which may be atypical or erroneous.” (Smith and Humphreys, 2006). The interplay between the automated concept generation and the subjective analysis of the underlying text seems particularly valuable in this context.

This paper also looked at student views on randomness and probability. The following figure shows the resulting concept map for the entries from the fourth week where this had been given as the theme. It was not so surprising to find the many colloquial usages of “random” that appeared in the writings, often taken as synonymous with “haphazard” or “accidental”, and this has clear implications for practice in terms of how to help students thinking about randomness in the more precise manner required by sampling distributions and statistical inference.

Automated concept map from all entries concerning randomness and probability
ISSOTL 2008

Our second major presentation for 2008 was an interactive session at the conference of the International Society for the Scholarship of Teaching and Learning in Edmonton, Alberta in October, 2008. In response to the conference theme of “Celebrating Connections”, our session looked at “Connecting with Learners in Large Classes Through Technology”, joint work with Dr Mia O’Brien and Miss Sarah Price.

The overall aim of this session was to engage the participants with some examples of writings and look at different approaches to analysis. On the one hand a research assistant (Price) used a grounded theory approach to analyse the qualitative data (Denzin & Lincoln, 2005). She read through all of the responses the students have made and created preliminary categories based on common themes (e.g. teaching style, lecture material, statistical techniques etc). She then read through the responses again and attempted to place each of the responses into one of the preliminary categories. The audience was invited to try the same approach, getting experience with the complexity and messiness of the text. For example, one entry shown was:

*Today’s lecture was fun. A little bit confusing though. The lecturer talked a bit too fast. But then again maybe I didn’t eat enough breakfast this morning. I liked the whole biology applications in statistics lecture we had. Didn’t like the subject though - genetics. I am completely not interested in that, but if it was about neuroscience that would’ve been more my cup of tea. All in all the lecturer was humorous and that was very pleasant considering I had to get up at 4.30 am to leave home at 6 am and get to an 8 am lecture. See how dedicated we are, especially to statistics. I learned today that people, and most surprisingly scientists can conduct very significant research but report it with many errors. Also they can correlate it to very insignificant thing - size of index finger and aggression...So from now on when I read journals, even if they are the most prestigious ones, I shall be careful and very very suspicious. Good lecture today! (but I didn’t like the lecture theatre, however the funny lecturer and things I learned today cancel that out)*

We then compared this manual approach with the kinds of analyses produced through text mining, as with the OZCOTS examples given above. Again Leximancer provided a useful and efficient starting point for understanding the text. Throughout this Fellowship we have tried to use Leximancer in a fully automatic concept identification mode, so that we could integrate it into an online interface for coordinators to approach their students’ writings. This is a rather limited use of the software of course - as a research tool Leximancer brings many more features for deeper text analysis, such as being able to build a thesaurus of concepts to improve concept learning, which brings it closer to a manual grounded analysis but with useful tools for managing and exploring the text.

Australian Mathematical Society Conference 2009

A short presentation on the outcomes of the Fellowship was made in the discipline-specific context of the annual Maths Society meeting, held at the University of South Australia in September 2009.
Expansion – Semester 1, 2008

Phase 4 of the Fellowship involved expanding this use of reflective practice to courses in other disciplines and other institutions. In particular, prior to the semester I revised the online system itself to allow login by students from outside UQ, as well as setting up a dedicated server for automatically generating online Leximancer analyses from a database of student writings coming from multiple courses. I will discuss the implications of this design decision further below.

STAT1201 Analysis of Scientific Data

A similar approach was maintained for the statistics course. One difference was that the course itself moved to a “grade matrix”, where overall performance in the course was determined by meeting prescribed standards across all assessment items. The Reflections were included as a pass/fail item. This meant that they no longer counted for a percentage towards the final mark but instead were compulsory!

In this semester I employed an assistant, Emma Low, to skim through the entries each week and provide a summary for the coordinator, including important entries that needed to be addressed as well as dubious entries that may have been trying to take advantage of the automated assessment system.

On a minor note, I dropped the title “Learning Journal” from the system based on student feedback. The feeling was that this terminology brought negative connotations from experiences with ‘learning journals’ at secondary school. Instead I adopted a new nomenclature around the idea of “Reflection”, specifically that the online system was a student’s “reflection”, which might reflect a variety of aspects of their learning experience.

I also allowed students to change their pseudonyms to help them further engage with their writings. This was actually not a good idea since it meant I couldn’t follow a story so easily, since the author’s name might change from week to week. However it did give some amusing pseudonyms...

Scientific Ethics

As part of the Bachelor of Science renewal, the statistics course now included three lectures on ethics in science by a colleague from our School of History, Philosophy, Religion and Classics, Dr Julian Lamont.

Reflections provided immediate feedback for him to develop his material and presentation

thanks again for sending over the reflections. I have got some ideas from them and they helped confirm my plans to change the content of the second lecture and to reconfigure the second and third lectures

The role of student Reflections as a catalyst for professional development of lecturers is again evident here.

We Feel Fine

So far in this report I have said little about the affective aspects of learning. The practical issues involved with developing interfaces and managing the student writings has dominated, along with integration of Leximancer into online analysis.

In 2005 Jonathan Harris and Sep Kamvar launched an online art project called We Feel Fine:

Since August 2005, We Feel Fine has been harvesting human feelings from a large number of weblogs. Every few minutes, the system searches the world’s newly posted blog entries for occurrences of the phrases "I feel" and "I am feeling". When it finds such a phrase, it records the full sentence, up to the period, and identifies the "feeling" expressed in that sentence (e.g. sad, happy, depressed, etc.). (Harris and Kamvar, 2005)

In this semester I added a new interface tool for the coordinator, allowing extraction of sentences from the student writings in a similar way to this art project. The interface looks for
the word “feel” (or any other word chosen by the coordinator) and then lists the sentences that include that word, providing links to the entries where they occurred so that the reader can get the broader context of the “feeling”. This has proved an invaluable means of monitoring the mood of the class and will be discussed further below.

MECH3600 Engineering Management & Communication

With the expanded implementation in place, Associate Professor Lydia Kavanagh adopted the use of Reflections in her third year engineering course with 140 students, placing a link to the system from within *Blackboard*. In contrast to the statistics course it was not counted for assessment, but in every other respect the experience for the students was identical.

Lydia provided the following feedback and evaluation of the system. Three positive aspects given were that:

- I felt that i was more in touch with the students using your system. It was an added channel of communication and strengthened my connection with the cohort. For me, this is very important/valuable.
- The students could give me an immediate response to a lecture, workshop, or assessment and i sometimes used the system to check if something that i thought may be contentious had ‘passed muster’.
- I used the feedback at the beginning of the next lecture session (prepared a slide for it) to let them know that i was reading the feedback, encourage them to continue using the Reflection site, and to change my teaching practice, delivery method and/ or system to better fit with their requirements. This practice was actually commented on by a couple of students and further strengthened my bond with the cohort as i was seen as someone who ‘actually cared’.

Three negative aspects were that:

- I take things personally and so one reflection, which was particularly damning of me, upset me greatly. However, i talked about it with my teaching team (as i do) and they made me see that this was 1 student out of 140 and that no other reflections or feedback supported this single reflection. I therefore fed back to the cohort that i was learning to be an elephant (i.e have a tougher skin).
- I didn’t get many students using the system.
- One student used the system when they really should have come and seen me (or their mentor) about the issue - they identified themselves in the ‘reflection’ however, so it was an easy thing to fix/address.

Overall it was seen as very useful and its use has been continued in 2009.

MAT1102 Algebra & Calculus 1

The original proposal included a trial of the system in a first year mathematics course at the University of Southern Queensland. In addition to being an important test of the technology across institutions, this seemed an ideal opportunity since the course involved a large class of 230 students on campus but also had another 120 external students.

However although I implemented the system for deployment at USQ it was ultimately not used. This was partly because of internal issues at USQ at the time but it was mainly owing to a realisation of what the implementation would actually involve. The architecture of the system had been designed so that a single copy of *Leximancer* could reside on a central server and process all the student writings, delivering an interactive concept map for the coordinator of each course to work with on a regular basis. The fundamental issue that only become apparent when setting this up was that the server at UQ would have access to the writings of students at USQ. Moreover we were expecting students potentially would write very personal reflections with the system. This was felt to be inappropriate by the staff involved at both ends, and subsequent advice from local IT staff and workshop participants from other institutions has confirmed that such student data is indeed expected to be kept private within an institution.
This was initially a major stumbling point for the whole program since one of the original deliverables was to be this technology infrastructure to support lecturers in supporting their students through reflective writing. However in the subsequent semesters it has become clear that the technology is somewhat incidental to the outcomes of the program. As will be discussed further below, the significant benefit of this program has come through bringing the student voice into the curriculum and practice of large classes and I will give suggestions for achieving this with common infrastructure, such as Blackboard.

However, this situation did highlight a more significant question as to what are the ethical issues involved with student reflective writing. Joint ALTC Fellows Professor Jenny Edwards and Dr Raymond Lister have faced similar cross-institutional concerns when trying to access student results to compare outcomes of novice programmers. Yet in our case I do not actually want to use the student writings as data for cross-institutional research. The main use of the student writings is within the relationship between the lecturer and the students and I suggest that this relationship is particular to the lecturer and the current group of students.

This was a turning point in my conceptualisation of this Fellowship program. Whereas the presentations discussed above had actually used writings as data, from here on I have adopted a new policy whereby the student writings are for the benefit of students and lecturer within a semester and not beyond.

Note that this does not mean that student writings would not be useful for research. I could certainly conceive of a new project where I wanted to use reflective journals to study some aspect of curriculum change, for example. I would treat this as any other research project, seeking consent for participation, analysing and publishing the results. But that is getting beyond the aims of “nurture” and I suggest that the first two of our original aims given on page 6, (1) and (2), are actually not in the spirit of what I am trying to achieve in the second two aims, (3) and (4).
Weekly Reflections – Semester 2, 2008

STAT1201 Analysis of Scientific Data

With the course now compulsory and most plans having it in Semester 2, the number of students climbed to 820 this semester.

I modified both the interface and assessment structure this semester. While it was useful that the Reflections become compulsory in Semester 1, it was rather tough that they were counted as a separate line in the grade criteria, effectively making them equal to each of the other three assessment tasks (online quizzes, project work and final examination). To improve this I added the Reflections to the online quizzes, also a weekly activity. A quiz involved a number of questions and tasks that each had to be completed in order to complete the overall quiz, as shown in the interface below. The Reflections were one of these tasks and so a student still had to write an entry to receive their marks for that week. However if they didn’t do it one week then they would only miss out on the marks for that one quiz, rather than potentially failing the whole course.

![Screenshot showing incorporation of Reflection task into weekly quiz. Clicking on the “Reflection 10” link takes the student to the interface shown in the figure on the next page.](image-url)
Overall the result is that the Reflections were less like a blog and more like a weekly short-answer question. For example, students could revisit their Reflections and even edit them but only through the above interface tied to each quiz. There was no interface where they could see their whole story over the semester as there had been previously.
Reflections from the Island – Semester 1, 2009

While I had moved away from sharing the technology to sharing the principles and experiences, the Reflections were again used in MECH3600 Engineering Management & Communication as well as in the STAT1201 course.

In the statistics course I introduced a new virtual environment, the *Island*. The backstory for this Island is that it was settled by survivors of a shipwreck in 1779 and has since grown to a population of around eight thousand Islanders spread across 38 villages. For example, Ian Lopez and Summer Quinn are two of the inhabitants of the Island:

This environment was originally developed to support learning in epidemiology, providing family histories of disease as well as some environmental factors. However in this semester I asked students to propose experiments they would like to conduct with the Islanders as subjects and then expanded the virtual environment to capture the necessary physiological processes.

At the start of semester, when making their first Reflection, the students were asked to choose one of the Islanders to be their “islander identity”, replacing the randomly allocated pseudonyms I had used previously. The interface was then otherwise the same as the previous semester:
Each Reflection was linked to a weekly quiz again. Moving further away from addressing any particular questions, this semester I did not give any suggested topic for the Reflections. The use of the Islander identity had two aims. First, it was to engage the students visually in the Reflections, as well as engaging the lecturer reading them. At the same time it also helped students become familiar with the Island in preparation for its use in the statistical project work. The figure below shows the identities chosen by the 317 students in the class:
Interfaces

In this semester I also moved away from using Leximancer as a front-end to the data and worked with two simple interfaces instead. The first of these was the usual calendar that gave an overview of entries for each day. The screenshot below shows an example of this, with the main revision being the inclusion of the Islander identity as a further tag for each entry.

Each entry also includes a “Comment” link, allowing the lecturer to send feedback to the student via the Islander identity, maintaining the anonymity of the student if the student desired.
The other main interface is titled “How do we feel”, inspired by the online art project of Harris and Kamvar (2005), as discussed earlier. This essentially provides a simple feed from the student writings that picks out sentences with ‘feel’ in them. These then link to the full entries, making a good starting place to stay connected with the overall ‘feelings’ of the class.
This feed is where one of the great advantages of having a large class comes into play. With sufficient students there is always someone writing an entry at most times of the day, so this feed is continually changing with the collective mood of the authors.

Note that other keywords can be used in place of “feel”, such as “think”, “love” and “hate”, to obtain other perspectives on the course.

Wednesday Mornings

Although the Islanders have helped make the interface very pretty, the key reason for success this semester was that I devoted lecture time to the Reflections. Each Wednesday morning the lecture included 10 minutes (often more) discussing the last seven days of Reflections. This involved sharing some of the Reflections that I had found interesting or that prompted discussion. Some examples together with a summary of the discussion points are given below:

- *I’ve found the difficulty of the stat1201 course to have increased dramatically as of late, which unfortunately I have not been able to keep up with. Despite this, my resolve has not been damaged, rather increased!*

  The nature of this introductory statistics course is that it tells a single story over the semester, rather than having a collection of distinct modules as the students are often familiar with from their science courses. This example Reflection was a useful opportunity to remind students that the course does get more challenging in the second half but also to show them a good role model of how to respond to the challenge.

- *I am very thankful this week for the PASS tutorials. I was feeling as though I was getting further and further behind with the course work since I missed just a few lectures, and gradually understanding less and less. But this week in our tutorial sessions I had a lot explained to me which made a few things make sense.*
As with the above Reflection, this served to remind students of the support available to them, in this case the Peer-Assisted Study Sessions (Miller et al., 2004).

- I would like it if we were given one or two questions for us to do after each lecture so we can get a feel for what we understand and what we don't.

Although this was only once voice of many, I adopted this suggestion and included one or two questions from each lecture for students to think about before the following lecture. Each lecture then started with a discussion of the question, building on the relationship already started with the the discussion of these Reflections on the Wednesday mornings.

- I also feel in the lectures the use of R commands is not explained but rather just used and we are meant to try and understand it by just looking at it.

R is an open-source software environment for statistical computing and since 2008 we have introduced it into the first-year course (instead of using Excel or commercial statistics software). This Reflection prompted a discussion of the role of R in the course overall, as well as the particular issue of how statistical software is used in the lectures. It led to a more careful and consistent approach to examples based on R in subsequent lectures.

- What does a ! mean in an equation?

This basic question came quite late in the course. In one respect it is really not the kind of "reflection" we'd like to encourage students to make - they should really be asking such questions in PASS. However I used it in the lecture as a starting point to revise some basic topics that were important at the time.

- Is there any dressing code for the conference? I mean do we need to wear formal clothes? Is there any answer for the EX in the end of each chapter in the textbook?

As with the previous point, this was more of a specific question rather than a Reflection. However I had never thought about the dress code for the conference so this was a good opportunity to discuss it with the class while again using the particular question to lead on to a broader discussion of the conference and how it would be run.

- I can't believe we are up to the sixth practical already. Only three more to go.

This was included as a simple reminder about where we were at in the course, but also an opportunity for the lecturer to empathise with the Reflection's author as to how quickly the course had gone.

It was made clear that I would be doing this and nobody complained about their work being quoted on the big screen. (Indeed many students were very pleased to have had their Reflection used!) Again an advantage of a large class is that these quotes are quite anonymous.

Here the Reflections bring the student voice into the lectures, making it a core part of the course. Many of the points in the above examples could have been made in the lectures anyway but I suggest there are two reasons why it is preferable to base these on student input. Firstly and obviously, there may well be issues that the lecturer hasn’t thought of at all or hasn’t thought needed mention. However, the more substantial benefit is that the students can see that their input to the teaching and learning in the course is valued. In a large class I believe this is particularly important to help engage students who might otherwise feel unconnected with the course.

On a practical note, this weekly discussion of Reflections and adopting the suggestion of having questions to work through for each lecture was only possible because I always plan our lecture content to leave one week free at the end. I highly recommend this practice where possible, providing the flexibility to take advantage of opportunities in this way, as well as relieving some of the stress for both staff and students when there is no room to slow down lectures if needed.
Discussion

This report has been a story of our journey and what I have learned along the way, in exactly the same way I might like students to use reflective writing on their own learning journeys. It is also essentially a transcript of the workshops for those who could not make one of them or as extra notes for those who could. In this final section I conclude with some of the issues raised by participants in the workshops.

Closing the Loop

First of all I believe there are two key features of the final iteration of our development that made it successful. It took us a surprisingly long time to realise it in this context, but the well-known maxim of “closing the feedback loop” was vital here. However, giving feedback on the Reflections in the lectures was not just good practice. The Reflections held the voices of the students and so by bringing them into the lectures I gave centre stage to the student voice in the large class setting.

In hindsight I already had a similar practice in place. Each semester I begin the course with a survey, asking students for their gender, age, height, weight, favourite pizza topping, and so on. I then use this (de-identified) data in the lectures, as well as in practicals and quizzes. This puts the statistics in context for the student but it also means that each student in the lecture can see themselves as a data point on the screen, giving identity and simple ownership in the large class.

Integration

I believe that the other feature that made the final semester successful was the integration of reflective writing with other aspects of the curriculum, such as the simple link between the Islanders and the Reflections. In our initial trials the writing was seen as an add-on to the course but here students had a common “identity” that was used both in Reflections and in their experimental project work, as well as coming through in the lectures.

Blackboard/Moodle

One aim of not using Leximancer in the last semester (Semester 1, 2009) was to get some experience in how other systems, such as Blackboard and Moodle, could be used by other institutions to achieve similar goals. It seems the basic functionality of having students keep reflective journals can be achieved by setting up a private blog in such systems, one that can only be read by the student and coordinator. (Some goals could be achieved in a regular discussion board as well.) However the feed interface I have developed cannot easily be embedded in these systems and feedback from workshops has been that this is the crucial component. (A crude option would be to export the text from the blogs for processing in external software, but there seems no simple way to automate this.)

I am currently investigating writing a plugin to interact with the blogging tool in Moodle to produce the feed interface.

Creative Works

As noted earlier, in the later semesters of the Fellowship program I have moved away from a research-based framework for our approach to one much more grounded in practice. Rather than treating the student writings as data for research I recommend that the common use is for supporting a purely internal relationship between teacher and students within the course.

As I have done previously with the student pictures shown in the Introduction, I suggest that the “stories” written by students in their reflective journals should be treated as creative works. Permission should be obtained from individual students to reproduce their pictures or stories.

Reflective Learning?

Our initial framework for this program was the underlying work on the role of reflective writing in promoting student learning (Boud et al., 1988; Beveridge, 1997). Indeed each one of our interface designs has included a motivational sentence at the beginning saying that “there’s lots
of research to show that thinking (and writing) about your learning can help you to learn more effectively.”

However I have now claimed that the real success of the Reflections in this semester has been to provide a student voice in the course. Does this feedback role of the Reflections diminish their role as actual reflections?

Our aims were never to collect data on the effects of reflective writing on student learning since there is already an extensive literature on that. However the discussion on this question in the workshops has been very rich. At one extreme there was the view that the Reflections are purely for the benefit of the lecturer. Indeed the professional development of the lecturer was one of our original aims but of course I would strongly argue that the aim of improving the lecturer’s understanding of student learning is to benefit the students themselves. Even if the reflective writings had no direct effect on student learning then this would not necessary be a bad outcome.

In a similar vein, I see student engagement in the course experience as important for facilitating learning. Using the Reflections to bring the student voice into the lectures is another valuable end in itself. There are already many other resources and interactions to support student learning in the course. While I certainly hope that some students are improving their learning through reflective writing, I feel there are fewer opportunities in place for these other outcomes without the Reflections.

Examinations

One negative of tying the Reflections to the weekly quizzes is that I no longer obtain the dynamic feedback from students once these quizzes are completed for the semester (typically by the last teaching week). The approach used in Semester 2, 2007 where Reflections could be made in any of the weeks during the course, including the mid-semester break, the revision week and the two weeks of exams, was preferable in this regard since it gave feedback at times that are usually missed by institutional evaluation instruments. In particular, the examination period is when many students will be thinking most intensely about their learning in the course and when emotions will be running high, so this seems a crucial time to be engaging with students. Similarly, it is often difficult to obtain broad feedback on the exam itself and allowing Reflections to continue after the exam has been very useful in obtaining thoughts and feelings about the exam as well as a final overview of the whole course with all assessment tasks completed.

The Role of Portfolios

While I am excited about the outcomes of this Fellowship, an obvious question is to ask what would happen if every course asked their students to keep reflective journals? For a start this would potentially become a tedious exercise for students, having to write four or so different Reflections each week. It also ignores the reality that students already use the current Reflection system to discuss their learning in other courses and how it relates to the statistics course. I have certainly encouraged this practice since it is extremely useful as teachers of a service course to understand how students are thinking about the material in the context of their broader program.

Based on this it would seem more appropriate for students to keep a single reflective journal at the program level. Course coordinators could then access the reflective writings of students in their courses, providing valuable insight into student learning across the program.

The natural extension of this idea leads to the reflections on learning suggested for ePortfolios (see, for example, Australian ePortfolio Project, 2008; Sanders, 2009). These can provide centralised systems for students to reflect on their learning throughout their program, both horizontally and vertically, and emphasise reflective practice as a valuable graduate outcome. While this might seem ideal in our context, I note an important distinction in the following section.
Duty of Care

An interesting issue raised at one of the workshops was to what extent a course coordinator had a duty of care to the authors of the online Reflections. I have certainly placed an emphasis on “feelings” in the above discussion and our previous work has considered the affective aspects of student learning. However the interfaces I have proposed, from the automated concept maps of Leximancer to the dynamic feed of “How do we feel?”, all aim to deal with the volume of writings from a large class by providing summaries of the writings. In each case it is possible to drill down to particular stories but in practice there will always be stories that go unread.

There are then two issues related to duty of care. If the coordinator reads a student story that suggests depression, anxiety or other serious personal problem then it might be appropriate to refer that student to whatever support services exist for counselling or other assistance. The first issue is that I have made the student writings anonymous. This is not such a problem – in the most recent interface discussed above I added the ability to send messages to students that preserve anonymity (through the use of the Islander identities). In an extreme case an author could be identified through the backend of the system.

The more serious issue is that a student could write something that they expected the coordinator would read and then provide personal support but that the coordinator never actually reads because they only see the concept maps or summary feed. In the current framework I can’t see any reliable solution to this issue. I do want students to share personal thoughts and feelings about their experience but in a large class I cannot guarantee individual pastoral care through online writing. Our current recommendation is to make it clear that the coordinator will only read a selection of stories and provide clear links to support services.

That this question of duty of care arises seems a key point where reflections on learning in an ePortfolio differ from the more fine-scale reflections I have explored in this program. I have approached this Fellowship from a perspective of providing pastoral care for students in large classes. A core component of the approach has been to give the lecturer insight into student learning, as a means of thus improving student learning, but it does so on a fairly small timescale. Whereas a reflection on learning in an ePortfolio is often retrospective, here I seek to be prospective in understanding the rhythms and variations of the student experience with the aim of revising the learning environment if needed.
Workshops

The key component of our dissemination and evaluation has been a series of two-hour workshops held at various institutions. While the initial proposal included the hosting of a one-day forum on “Nurturing in Higher Education”, it was ultimately felt that this would attract only a narrow group of participants who were already interested in the area and motivated enough to travel to a particular location. By hosting workshops within institutions I have successfully engaged a much broader audience, both in terms of numbers and backgrounds. Participants have included teaching and learning staff and academics from a range of disciplines, as well as IT staff and staff from student support services.

The network of ALTC Fellows has been instrumental in arranging these workshops by connecting us with the appropriate staff in each institution. I thank Associate Professor Les Kirkup (UTS), Professor Mark Israel (Flinders), Associate Professor Matthew Allen and Professor Beverley Oliver (Curtin) and Professor Geoff Crisp (Adelaide) in this regard, as well as the staff who hosted us for each workshop.

The four workshops held so far were

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<thead>
<tr>
<th>Date</th>
<th>Venue</th>
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<tbody>
<tr>
<td>May 11, 2009</td>
<td>University of Technology Sydney</td>
</tr>
<tr>
<td>July 21, 2009</td>
<td>Flinders University, Adelaide</td>
</tr>
<tr>
<td>July 22, 2009</td>
<td>Curtin University of Technology, Perth</td>
</tr>
<tr>
<td>August 12, 2009</td>
<td>The University of Adelaide</td>
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</tbody>
</table>

Between 15 and 30 participants attended each session. This report is an expanded transcript of these workshops with feedback from them woven throughout.

The workshop series will continue in the capital cities (through the network of ALTC Fellows), as well as visiting more regional universities.
References


Appendix – Technical Details

All technical development work involved in the Fellowship program was carried out by the Fellow. The majority of this was the development of databases to house the student writings and web-based PHP scripts to provide the various interfaces to these writings, as shown in the various figures in this report. This appendix includes specific details about each version and the associated components.

Learning Journal

The initial interface involved the development of a simple blogging tool, as illustrated earlier in this report. Of course there are already various blogging tools available. For example, standalone software packages like WordPress (www.wordpress.org) can be installed on existing web servers for free, while most Learning Management Systems, such as Blackboard and Moodle, have integrated blogging tools. There are three main reasons for developing a new tool:

• It was vital to have direct access to the databases used to store the student writings as well as having some control over their structure. This was necessary for integration with Leximancer, as discussed below. It was also necessary for linking in with student authentication, so that a student’s writings were identified by their student number, since the writings were counted for course assessment.

• Using our own interface also gave control over the format of student writings. For example, in the early versions we included an interface whereby students could add formatting to their text. This formatting then had to be removed prior to text analysis in Leximancer (see below) and this procedure was never perfect. Ultimately we dropped the formatting options from future interfaces to improve the effectiveness of the analysis used by the lecturer.

• Having control over the interface meant I could better integrate the Reflection tools with other aspects of the course, such as linking them to the online quizzes in the later versions. It also allowed for new developments, such as the inclusion of SMS functionality, that would not have been possible in an existing system.

This version of the tools is the one still being used by other courses, such as the MECH3600 at the University of Queensland. Anyone interested in using these scripts and database structures for their own context should contact the Fellow. The main issue with implementation at another institution is the authentication of staff and students and how they are identified (such as by username or staff/student number). In my context I have used an LDAP-based system to authenticate usernames with the university's central authentication system.

Leximancer

The key interface for the lecturer in the initial implementation was the automated concept map produced by Leximancer (Version 2.25). The script I developed to do this used the following steps:

1. The writings of interest were extracted from the database used by the web interface. I usually worked with the most recent seven days of student writings but this could easily be modified by changing the database query.

2. In the early versions of the web interface I allowed students to format their writings, since many wanted to use emphasis and bullet points, for example. Any formatting was stored as HTML tags in the database and these had to be stripped from the text before processing.

3. The cleaned text was then stored in a temporary tab-delimited text file, reflections.txt, with a row for each entry and four columns: the date/time stamp, the week number, the student’s pseudonym and the text.

4. While Leximancer is typically used through its simple graphical user interface, the underlying routines are implemented as scripts in Perl and I made direct use of two of these. The first, table2tagged.pl, takes a text file and creates a tagged text file structure that is needed by the main Leximancer process. Here I used
The options indicate that the input text file has four tab-separated columns but that we want to ignore columns 1, 2 and 3 in the text analysis. (These columns are still present and their tags can be seen when exploring the writings through the concept map interface.) The output is a new file, `reflections-lex.txt`, that can then be used by the text analysis routine.

5. The analysis is then performed by

```
master.pl -src Reflections -dst Reflections
```

Here `Reflections` is the directory containing the text file `reflections-lex.txt` created above. This routine can take several minutes for large volumes of text. Once finished the directory contains the mini web site that can then be accessed to view the concept map and explore the writings further. For each course this script was run once a day with the results copied to a live web server for access by the coordinator.

Note that steps 1-3 above could be replaced by exporting writings from the Blackboard blog tool, for example. The Leximancer pre-processing and analysis can then be applied to those writings instead. The main disadvantage with this is that I am not aware of any way to automate the process of exporting Blackboard data.

**Reflections**
The second major interface development was the incorporation of the reflective writing task into weekly online quizzes. The underlying database structures were unchanged from the original system described above. However, the new interface let students work on a particular Reflection, tied to a particular week, rather than allowing them to create arbitrary entries as before. A second interface element then fed information back to the online quiz system to confirm when the Reflection task had been completed.

This approach will be more difficult to adapt to a different context since it is intimately tied to the novel quiz system. However anyone interested in using this approach is welcome to contact the Fellow to discuss possibilities for integration.

**Island Simulation**
The final version of the Reflections linked the online writings with a virtual identity from the Island simulation. While not a core part of the Fellowship outcomes, this Island environment is available for use by other institutions through

```
www.maths.uq.edu.au/island
```

We acknowledge support from a 2009 Apple University Consortium (AUC) Innovation Grant for helping make this resource more widely available.