

## Teaching and Learning Collaboration Between the ATN Universities: A Case Study

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***Abstract:** This paper describes an undergraduate teaching collaboration between two academics at two different ATN universities. This collaboration has been assisted by increasing attitudes of collaboration within the ATN network and by improving multi-media technology. While the collaboration has not been in place long, early feedback indicates that it is providing significant benefits.*

***Keywords:** videos, multi-media, collaboration*

### Introduction

Collaboration in the realm of research is comparatively well established in Australia. It has grown substantially in the past decade because of the large financial rewards available through such things as “Collaborative Research Centers (CRCs)”. In the area of teaching and learning (T&L), however, the financial rewards for collaboration have been far less apparent.

Recently, it has recognized been by the ATN universities that collaborations in *all* areas could have significant benefits [1]. This has borne fruit in new open-ness to co-operation and to the sharing of resources, particularly in the area of teaching and learning. This paper reports on one T&L collaboration between staff members at two ATN universities. These universities are RMIT and QUT, and the collaboration is in the teaching of Signal Processing subjects.

### The Collaboration

Teaching and Learning collaboration between universities is often complicated by difficulties with intellectual property issues. In the Engineering Faculties of RMIT and QUT, however, in principle agreement has been obtained for the sharing of educational resources. While this has not been formalized in a written agreement yet, the verbal agreement has made collaboration smoother.

Sections 2.1-2.3 below report on a collaboration in the teaching of undergraduate signal processing subjects. It is important to point out, however, that this is only one of a number of such collaborations. There is also, for example, some joint effort at RMIT and QUT in the area of electrical and electronic circuits for first year.

### **Key attributes for quality course delivery**

Based on student surveys conducted at RMIT, there are a number of key attributes of course units which are sought by undergraduates [2]. These are:

- a) Comprehensive, well presented notes.
- b) Lecture presentations which are easy to follow and which make appropriate use of technology.
- c) Clear explanations in the lectures of how the theory is used in applications.
- d) Permanent records of the course content in a variety of media.
- e) Helpful and accessible lecturing staff.
- f) Humorous lectures.
- g) Good subject organization.

To truly develop all of these attributes for a course is very difficult. A wide range of skills is required and it is very unusual for one person to be in possession of all these skills. Collaboration is an obvious way to build up all these required facets.

This paper reports on a collaboration between Peter O'Shea (Collaborator 1, from QUT) and Zahir Hussain (Collaborator 2, from RMIT) for the teaching of signal processing subjects. The collaboration was a natural one, since O'Shea and Hussain were already working on joint research projects and shared post-graduate students. They had also worked together for a brief time at RMIT. O'Shea taught the signal processing subjects at RMIT prior to 2001, while Hussain has been teaching these subjects since 2001. The two therefore already had well established lines of communication. It was also a natural collaboration in that the two participants had complementary gifts and dispositions. O'Shea had experience with multi-media production and a natural disposition towards conceptual explanations, while Hussain had un-suppressable humour and a focus on rigor and detail.

### **Contributions by Collaborator 1**

The particular focus of Collaborator 1's efforts was on attributes b), c) and d) from Section 2.1. He developed an extensive suite of multi-media materials to assist with comprehension of important signal processing subjects. These are described below.

VHS Videos of lectures and tutorial sessions were placed in the library where students could watch them "in-situ". VHS videos were also placed in the design store so that students could borrow them over-night and make their own copies. The videos were found to be very effective in helping students to learn, a fact which was in line with the research findings in [3] and [4]. Some, but not all of these videos were also digitized, compressed and burned to CDs. Some were also placed on the library's Video on Demand system. Videos were also created to help students review the necessary background theory before they undertook laboratories. These videos were digitized and placed on the local area network; students were required to watch them as part of the preparation for the laboratories. A number of computer based animations were also developed so that students could visualise important signal processing functions.

The emphasis on all these materials was on explaining concepts and on the link between theory and practice. The rationale for this approach was that Signal Processing is a difficult subject area and many students need good conceptual explanations to maintain their motivation. Many of the video lectures began with a practical example to illustrate how

signal processing is used in important practical applications such as radar, sonar, surround sound, speech recognition, digital video cameras, etc.

These materials were thoroughly tested and refined until student feedback indicated that they were effective in teaching the basics of signal processing. While it was pleasing to know that all students could use these materials to grasp the basics, it was of some concern that the materials were not in sufficient depth to be able to prepare the students for tackling very difficult tasks. This deeper probing was facilitated by the efforts of Collaborator 2, as described in the following sub-section.

### **Contributions by Collaborator 2**

The particular emphasis of Collaborator 2's efforts was on the attributes not covered by his collaborator. He developed much more comprehensive and detailed notes than were created by Collaborator 1. These notes were designed to take students to a deeper level. Extensive tutorials were also developed to support these materials. The tutorial and lecture material were tested on students and initial feedback was used to bring some refinement to them.

Motivated by student feedback, several topics were developed around applications. These topics included phase locked loops, mobile communications, etc. Collaborator 2 also injected a substantial component of humour into his delivery.

### **Evaluation**

This year (2003) is the first in which students have had access to the range of collaborative components detailed in Section 2. The signal processing subjects at RMIT are currently being taught by Collaborator 2, but students are advised that they can also access the multi-media materials developed by Collaborator 1. The latter is not currently teaching the signal processing subjects at QUT, but moves are under way to make the resources available at QUT in the same way that they are at RMIT.

Early evaluations have been mostly positive. An independent survey was conducted by the Director of Teaching and Learning at RMIT, and in this survey students were asked to rank various facets of the DSP unit, with the ranking being 1, 2, 3, 4 or 5. A ranking of 5 corresponds to a very positive ranking, while 1 corresponds to a very negative one. 70 students responded. For 4 of these 15 different facets, the modal (i.e. most common) ranking was 5. For 10 of the facets the modal ranking was 4. The only facet which scored a low ranking (of 2) was "adequate provision of facilities (i.e. rooms, equipment, labs, computers, etc)".

Additionally, the students were asked in the survey to provide their own additional comments on the subject. It was of interest to see how many of these comments related to the seven attributes targeted in Section 2.1. Six positive comments were recorded about the lecture notes – c.f. attribute (a) in Section 2.1. Seven positive comments were made about the lecturing being helpful to student understanding (c.f. attribute (b)). There were eight positive comments about the effective way that theory was related to practical applications (c.f. attribute (c)). There were no comments about the usefulness of the multi-media resources (c.f. attribute (d)). There were eleven positive comments about the lecturing staff being friendly, helpful or approachable (c.f. attribute (e)). There were sixteen appreciative comments about the humour of the lecturer (c.f. attribute (f)). There were 3 favourable comments on the organisation of the course unit (c.f. attribute (g)).

There were also several negative comments made, which will provide some motivation for future improvement. Many of these negative comments related either to the fact that too much work was covered (9 comments) or to problems with room facilities (9 comments). While there was little comment in the survey on the availability of the multi-media resources, Collaborator 1 received an email at QUT from an RMIT student stating that the flexible resources had been extremely helpful. Other students commented informally that having the flexible resources available on CDs would greatly increase their usage and effectiveness. This is planned for next year.

### **Benefits of the collaboration and conclusions**

Theory indicates that collaborations benefit the participants through synergies. i.e. through the efficient groupings of ideas and resources [5]. This has occurred in the case study at hand. The collaboration has “fast tracked” the creation of extra resources, and conveniently, the cost for these resources has been shared across institutions. The fact that these resources have to be used in two different environments has also meant that they have been compiled in a comparatively “user friendly” format. The cross-fertilisation of ideas has been effective as well. Collaborator 2 employed independent survey mechanisms for the first time, and cross university surveys are being organised for next year. Encouraged by the extraordinary student response about humour in lectures, Collaborator 1 is also aiming to introduce more humour into his teaching.

### **References**

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