Research-Inspired Learning Revitalises the Curriculum for First-Year Science Majors

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Keywords: teaching-research nexus, curriculum innovation, physics education, communication

International Journal of Innovation in Science and Mathematics Education, *19*(1), 1-15, 2011.

Abstract

We describe a curriculum innovation designed and implemented by a multidisciplinary team that engages first-year students in large enrolment subjects in science research and improves their writing. We have devised an activity for science majors that connects them to research through audio and video interviews made with senior science researchers, early career researchers (ECRs), post doctoral fellows and PhD students. We report evaluations from students and academics on the introduction of this research-inspired communication activity and the steps taken to embed and enhance the activity. Findings over three semesters showed: students consistently judged the activity to be a positive learning experience, and; academics whose research is highlighted valued the opportunity to explain their work to those beginning their tertiary studies. Issues of sustainability of the innovation and academics' lack of comfort with assessing the activity have yet to be fully resolved.

Introduction

This paper describes: the adaptation and development of a research-inspired communication activity customised for a large enrolment first year physics service subject; its implementation over four semesters, and; reaction to the activity as revealed by responses to student and academic staff surveys.

Connecting research and teaching benefits students, academics and institutions (Murtonen & Lehtinen, 2009; Trigwell, 2009; Prince, Felder, & Brent, 2007). Benefits for students include:

> Deepening students' understanding of the knowledge bases of disciplines … including research methods and issues; developing student capacity to conduct research and enquiry (The Teaching Research Nexus, 2008).

Bringing faculty-based research into the classroom can excite students and connect them to research being undertaken within their own institutions by their own lecturers. Connecting research and teaching enhances graduate attributes and better equips students for an uncertain future and a changing world in which critical enquiry is valued (Jenkins, Healey, & Zetter 2007). Better preparing all students through research-intensive activities enhances a university's reputation for graduate employability while at the same time advancing the university's research agenda (Zubrick, Reid, & Rossiter, 2001). Efforts to connect research and teaching in first-year level, large-enrolment, classes which go further than, for example, an ad-hoc reference to research during a lecture, take a number of forms. Inquiry-oriented learning, which is an essential element of research, is being given prominence in the undergraduate science curriculum, including at first year (Kirkup, Pizzica, Waite, & Srinivasan 2008). An ambitious initiative to link first-year undergraduates with active researchers in chemistry has been described by Weaver and colleagues (Weaver, Wink, Varma-Nelson, Lytle, Morris, Fornes, Russell, & Boone 2006). The initiative allows students to contribute directly to research, giving them remote access to sophisticated research equipment. In other schemes, first-year students are invited to work with established research teams (see, as examples, University of Queensland, 2010, and Massachusetts Institute of Technology, 2011. Places are limited such that usually only a minority of students are able to benefit from these schemes.

The Excellence in Research for Australia (ERA) initiative driven by the Federal Government (Commonwealth of Australia, 2009) is focussing university policymakers on enhancing and promoting research within their institutions. A concern for policymakers and academics alike is how to grow the 'pipeline' of students in order to drive institutional research agendas (see, for example, University of Sydney, 2010). If the pipeline is fragile or inadequate, ambitious plans for expansion of research are undermined. A major issue for some universities is how to strengthen the flow of research-capable students.

Engaging undergraduates in research is an international issue as academics around the world recognise the importance of expanding their talent pool of research capable students who will be the next generation of researchers and innovators (Hartline & Poston, 2009). To engage undergraduates in research requires research and teaching to be connected in a way that has meaning for students. Links between research and teaching are often expressed in university mission statements and similar documents. The UTS strategic plan (University of Technology, Sydney, 2009) states:

> [UTS intends to be internationally renowned for] practice-oriented and research-integrated learning that develops highly valued graduates; and research which is at the cutting edge of creativity and technology.

Operationalising such a strategic plan at course or subject level is challenging. Healey (2005) argues that undergraduate students gain most benefit from research when they are actively involved. However, actively involving students in science research is a challenge, especially if class sizes number in the hundreds, as is often the case at first year. Deferring student engagement until class sizes are smaller and more manageable, risks denying students an insight into what makes a university fundamentally different from other tertiary education institutions; the generation and application of new knowledge. The importance of linking research and teaching through the curriculum is well recognised (Healey & Jenkins, 2006).

Work of Moni and colleagues and the 'personal response'

Moni and colleagues (Moni, Moni, Lluka, & Poronnik, 2007) reported an activity primarily designed to enhance the communication skills of students enrolled in a human biology subject at the University of Queensland, but which also offered the prospect of raising students' awareness of leading-edge research. This activity, which we now describe briefly, formed the starting point for the work reported in this paper.

Moni and colleagues' 'Personal Response' activity required students to listen to a short audio interview selected from a CD containing up to ten interviews. The interviews, which were first broadcast on the Australian Broadcasting Corporation's Science Show, were with researchers from various countries who discussed their recent work. Interview topics such as 'Junk DNA' and 'Stem Cells' were chosen as they had obvious links with human biology. Students used the interviews as the basis for composing their Personal Response which took the form of a short essay of 700 to 750 words. Through the essay students express their reaction to, and attitudes towards, the research. The assignment requires students to: write an introduction which described the context of the research; identify the main themes including the aim(s) of the research; and, explain their particular interest in the work discussed during the interview and what future challenges the work might present. Students are asked to adopt a reflective writing approach to the assignment where their response to the interview topic is as important as, for example, conveying information or summarising the research (Schön, 1995; Kennison & Misselwitz, 2002). Moni reported that students found the activity interesting and challenging and performed well, irrespective of their background knowledge or the discipline that most interested them.

Our intent in adapting the work of Moni and colleagues was to revitalise the undergraduate curriculum for a large cohort of first-year science students who are required to enrol in a physics subject called Physical Aspects of Nature (PAN). This was accomplished by incorporating a research-inspired communication activity (RICA) worth 10 per cent of the total assessment of PAN. The subject enrols approximately 500 students each year. These students will major in the medical, environmental or biological (MEB) sciences.

Our goals were to integrate science research at UTS from across a range of disciplines into the undergraduate curriculum in a meaningful and sustainable way and to enhance communication skills which are highly valued by graduates and employers (Fallows & Steven, 2000). We were also keen for students to examine the links between the research depicted and the physics that underpinned that research.

Method

We developed an approach to introducing students to 'cutting edge' research and enhancing their capacity to communicate and respond to scientific ideas effectively through the process shown in figure 1.

An interdisciplinary team implemented the framework, drawing on a diverse range of expertises and backgrounds: a physics academic with a background in discipline-based research and curriculum development; a media studies academic with curriculum development experience in communication skills enhancement; a radio broadcaster who is also a physics graduate; and a specialist in television reporting and video production. Two journalism and two science academics formed a reference group offering valuable advice during the pilot phase of this work.

The project advanced through an action research cycle of identifying and clarifying issues, deciding on directions and actions, creating and trialling materials, obtaining feedback from stakeholders and evaluating outcomes (Susman, 1983). Specifically, we recorded interviews with researchers then trialled the interviews and the assignment with senior students from UTS before introducing the activity into PAN. We evaluated the implementation by reviewing students' efforts and surveying students, researchers and other stakeholders who took part in the assignment's development. The development took place over four semesters.

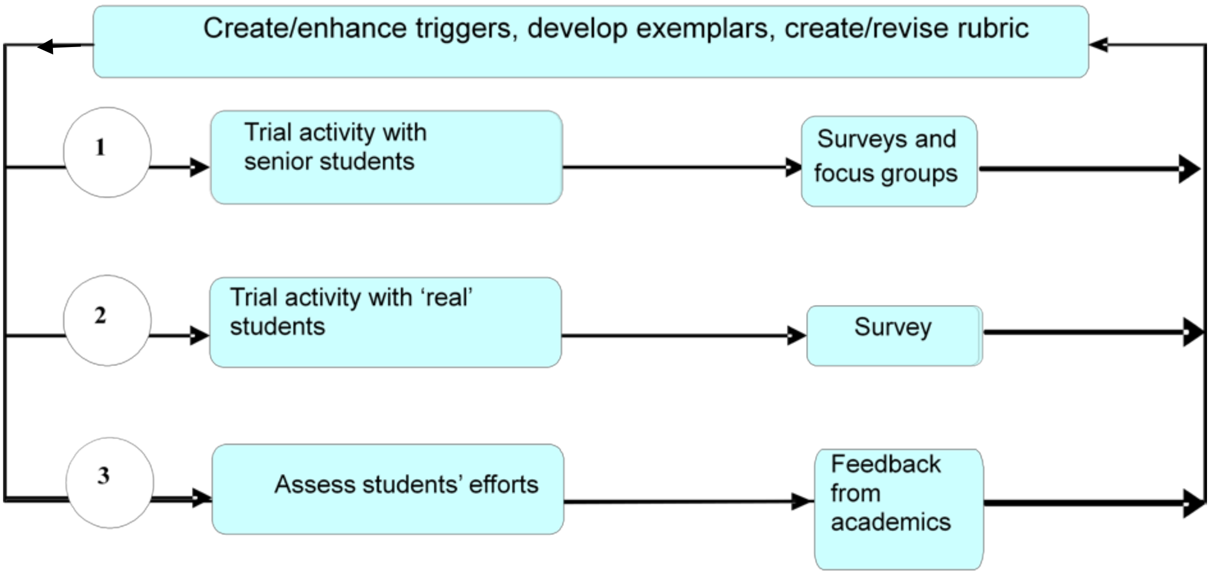

Figure 1: Framework for the development of the research-inspired communication activity.

A driver for the development of the RICA was to link students to research occurring in the major in which they had enrolled (i.e. medical, biological or environmental sciences). Senior researchers, early career researchers, post-doctoral fellows and PhD students were approached from a diversity of science disciplines at UTS with the intention that an interview with each would form a 'trigger' to which students would respond. Through the involvement of young researchers we intended to make first-year students aware that research was being done by people who were, in many cases, not much older than themselves. As an incentive to researchers to be involved, arrangements were made for the audio interviews to be presented on the science program 'Diffusion', which is broadcast by the community radio station, 2-SER. The broadcasting increased exposure of the research by allowing access to a wider audience.

Audio interviews with researchers occurred first. An audio interview is much more efficient time-wise than a video interview as the latter requires more preparation before the interview can begin. UTS has access to high quality audio recording facilities on campus, courtesy of 2-SER. The interviewer, having a physics background, was able to frame the interview questions so that they might draw out links to physics (though the interviewees were not asked explicitly to make these links). Video interviews were carried out by a television journalist. Supporting visual material (such as scenes of the researcher working in the laboratory or field) was incorporated at the production stage. All audio and video interviews were edited to be 6 to 12 minutes long to standardise length.

Before the RICA was brought into the curriculum for first-year students, it was trialled by four senior students who had completed PAN in an earlier semester. These students were paid for their participation. Each senior student viewed or listened to six interviews with UTS researchers. The purpose of involving senior students was to bring a student perspective to the development of the activity, answering our questions about: is there a strong research orientation to the interview?; can you discern a link to physics?; is this a cutting edge science story?; and, would the interview appeal to first-year students? The senior students completed the assignment, had their efforts marked, and were given feedback. Comments and suggestions that emerged from a focus group session with these students played important roles in both validating and fine-tuning the activity. For example, the senior students were impressed by the diversity of research occurring in their own university of which they had not been aware, even though they were by then third-year students. Also, they were concerned that some of the topics would be too advanced for first-year students.

Some results of the pilot phase of this work have been reported elsewhere (Bonfiglioli, Kirkup, & Woolf, 2009). Here we concentrate on the progression of the project over three semesters during which the activity has been modified in response to feedback obtained from students as well as from academics engaged in the assessment of the students' Personal Response.

Six interviews, of which at least two were video-based, were made available to students each semester. Video based interviews were employed for those topics that lent themselves naturally to a visual presentation. As an example, one video interview focussed on coral bleaching and incorporated several images of corals from the Great Barrier Reef. Interviews were not recycled in successive semesters to reduce the risk of dishonest behaviour. Care was taken that the interviews spanned a range of research areas which included planetary science, climate change, toxicology, energy efficient materials, cell biology and palaeontology.

All materials developed to support the activity, including the audio and video interviews, were made available to students through the Web-based platform, Blackboard. The Internet-based plagiarism-detection service Turnitin was used to assist in collecting assignments, giving feedback to students and discouraging behaviour relating, for example, to the copying of other students' work.

Several resources were developed to assist students to complete the assignment. These included:

- An introductory lecture/workshop given by the two academics with primary responsibility for the RICA. This allowed students the opportunity to view one of the video interviews. Students then worked in small groups to explore issues raised by the research, express their reactions to those issues, draw out the main themes presented, and familiarise themselves with the novel aspects of the assignment;
- The rubric of Moni and colleagues (Moni et al., 2007) for assessing the student assignments was used in Autumn 2009. By Autumn 2010 that rubric had been modified to bring greater emphasis to particular facets of the student assignments. For example, to address the tendency of students to overlook the links between the topic of the research discussed in the interview and the physics that underpinned it, greater credit was given for drawing out those links
- Detailed explanation of the purpose of the assignment, its key features and instructions on how to submit the assignment. An exemplar personal response (of pass/credit quality) was made available to students which assisted in clarifying 'what was required'. This scaffolding was important as we anticipated that few students had previous experience of completing such a task;
- A prominent scientist (Cathy Foley, who is a Research Program Leader, CSIRO) and a leading science communicator (Julian Cribb) were invited to give presentations to PAN students. Dr Foley and Mr Cribb emphasised science

communication as a critical graduate capability and a key component of their working lives.

The flavour of the type of research accessed by students through this activity is evident in an interview with Professor Mike Cortie, who is the Director of the Institute for Nanoscale Technology at UTS. Professor Cortie is researching a technique by which antibodies can be attached to gold nanospheres in order to target and destroy the parasite Toxoplasma Gondii (Pissuwan, Valenzuela, Millar, Killingsworth, & Cortie 2009). Once the antibodies with the nanospheres attached reach the target cells, a green laser is shone on the nanoparticles. This causes the temperature of the nanospheres to rise, killing the target cells. Such an interview has appeal for students studying molecular biology as well as those who are majoring in medical science. The role of physics in this work can be relatively easily discerned. The interview can be heard at http://www.hereswhy.tk/ scep/michael-cortie-audio.html

Results

Students who completed the activity in Autumn 2009, Spring 2009 and Autumn 2010 were asked to complete an anonymous survey consisting of eleven fixed-response statements on a Likert scale from Strongly Disagree (score = 1) to Strongly Agree (score = 5). The questions were aligned to the goals of the innovation, for example to raise student awareness of science research at UTS (Bonfiglioli, Kirkup, & Woolfe, 2009). The survey also contained three open-response questions. Fixed- and open-response statements/questions are shown in figure 2. Question 11 in figure 2 was added in Spring 2009, as building self-confidence in first year affects retention and long-term academic success (Willcoxson, 2010).

Fixed response statements	
1	I found the interview I chose interesting
2	The science in the interview was presented too superficially
3	The interview made me more aware of research happening at UTS
4	The interview made me aware of the physics underlying the featured research
5	This communication activity should not be part of a physics subject
6	Science students need to enhance their communication skills
7	The communication activity should be worth more than 10% of the assessment of PAN
8	There should be a greater choice of interviews
9	The communication activity guidelines were clear
10	Carrying out the communication activity was a positive learning experience
11	My confidence has increased in writing about science
Open ended questions	
1	Please describe the reason(s) behind your choice of interview
2	What are the strengths of the communication activity?
3	How could the communication activity be improved?

Figure 2: Survey administered to students on completion of the RICA.

Surveys were administered to students on completion of the assignment, but before the marked assignments were returned to avoid the mark for the assignment influencing student responses. Figure 3 shows the survey results obtained over three semesters. The numerical values shown are the mean scores for each statement.

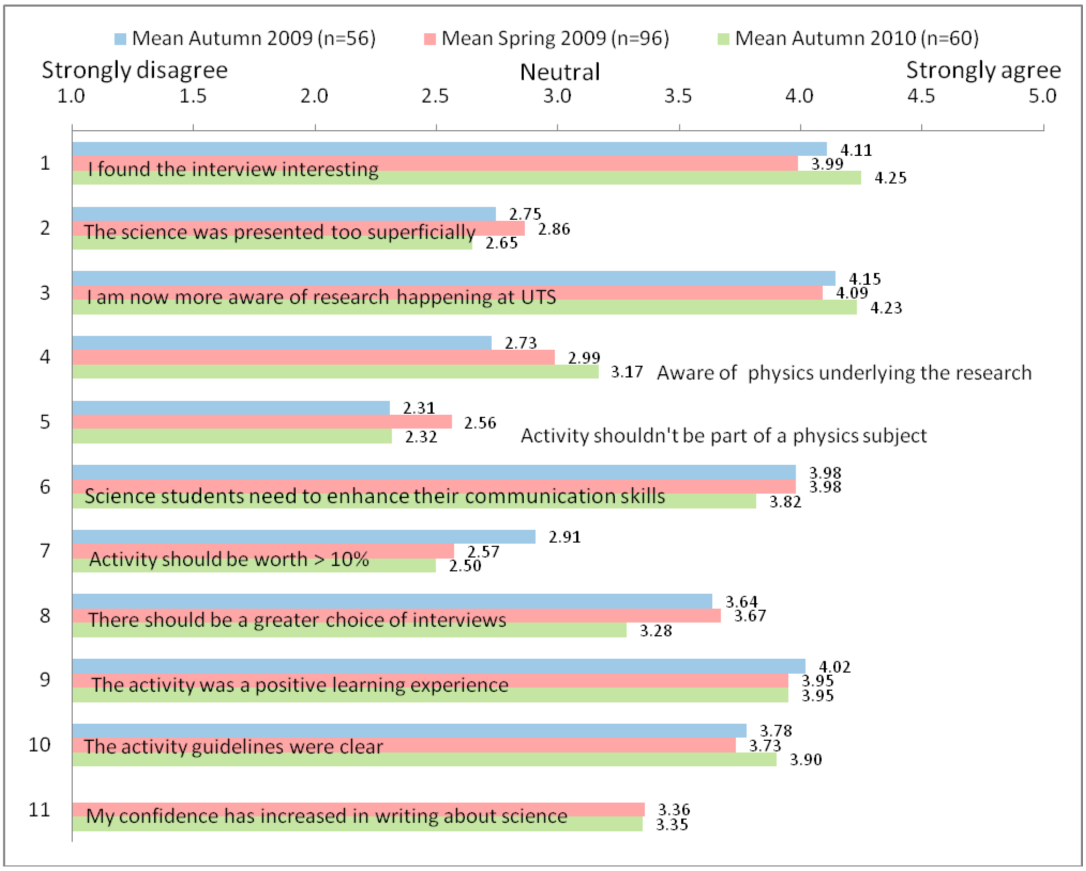

Figure 3: Student response to statements in survey. The mean response to each statement is shown.

Figure 3 shows that the pattern of responses to statements 1 to 10 was consistent over the three semesters. Good agreement (mean scores: 3.8 or better) was found for statements concerned with: interest in interview topics; increased awareness of science research at UTS; recognition that students need to enhance their communication skills; and, that the activity was a positive learning experience. Students were less likely to agree with the statements that there should be a greater choice of interviews (mean scores of 3.28 to 3.67), or that the activity guidelines were clear (mean scores of 3.73 to 3.90). Least agreement, with mean scores of 2.31 to 3.17 was with statements that: the science was presented too superficially; students were aware of the physics underlying the research; the activity shouldn't be part of a physics subject; and the activity should be worth more than 10 per cent of the total assessment of PAN.

The mean score for the statement 'The interview made me aware of the physics underlying the featured research' was 2.73 in the Autumn semester 2009. We viewed this with concern as it was a principal goal of the RICA to have students explore links between the interview topic and physics. To bring a greater attention to the underlying physics, we modified the advice to students as well as the marking scheme. Students were advised in Spring 2009: *Credit will be given for describing links between the research presented and physics principles, techniques or methods being utilised in the research. To make those links you may need to read around the topic, i.e. they may not be addressed directly during the interview.* Some students made use of additional literature, although it was not compulsory to do so. We did not advise the interviewers to attempt to draw out the role of physics during the interview, as we wished to place the onus on students to explore that issue themselves. A moderate improvement to the score for this statement occurred in Spring 2009 and again in Autumn 2010. A close to neutral response greeted statement 11 suggesting that this activity has had a modest impact on the students' self confidence in writing about science.

Student feedback to the free response questions supported data derived from the 11 fixed-response questions. Figure 4 indicates that the primary reason given by students for choosing a particular interview to respond to was their interest in that topic. An example response is: *"I am interested in medicine, so I found [the] 'Golden Bullets' [interview] interesting."*

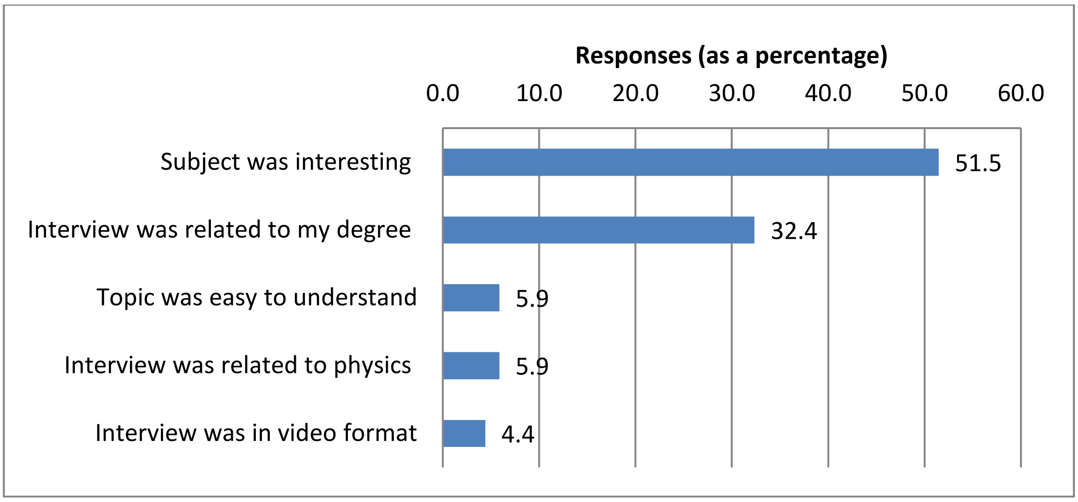

Figure 4: Response to statement: Please describe the reason(s) behind your choice of interview.

Another major reason for choice of interview was that it related to the student's choice of major: *"[I am] studying Marine Biology [so] I am interested in [coral] bleaching."*

Thirty seven percent of students indicated that the major strength of the activity was that it developed their communications skills (Figure 5). Typical comments were: *"[We are] developing the ability to communicate in a scientific way"* and *"[We're getting] experience of writing about scientific subjects"*. Twenty-six per cent asserted that the strength of the activity was its research orientation: *"You learn about research at UTS and understand communication goes hand in hand with science."*

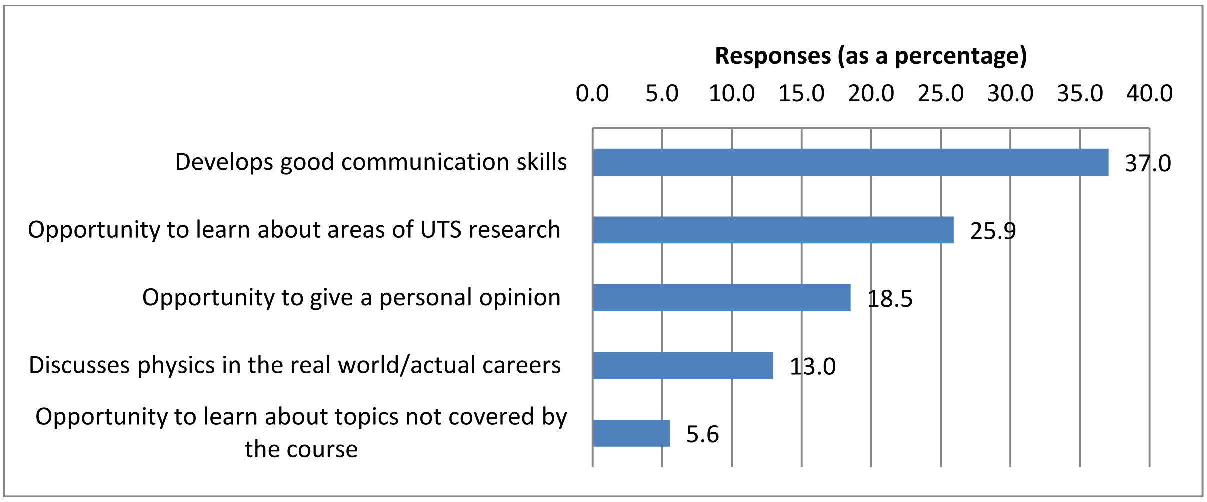

Figure 5: Response to question: What are the strengths of the communication activity?

Figure 6 shows that 33% of students responding to the request for suggestions for improving the activity asked for a greater range of interviews. By contrast, the mean response to fixed-response statement number 8 (in figure 2) 'There should be a greater choice of interviews' was 3.28 which is close to neutral. Although this was the most frequently suggested improvement, the equivocal response to this statement supports the view that the number of interviews was not a critical issue.

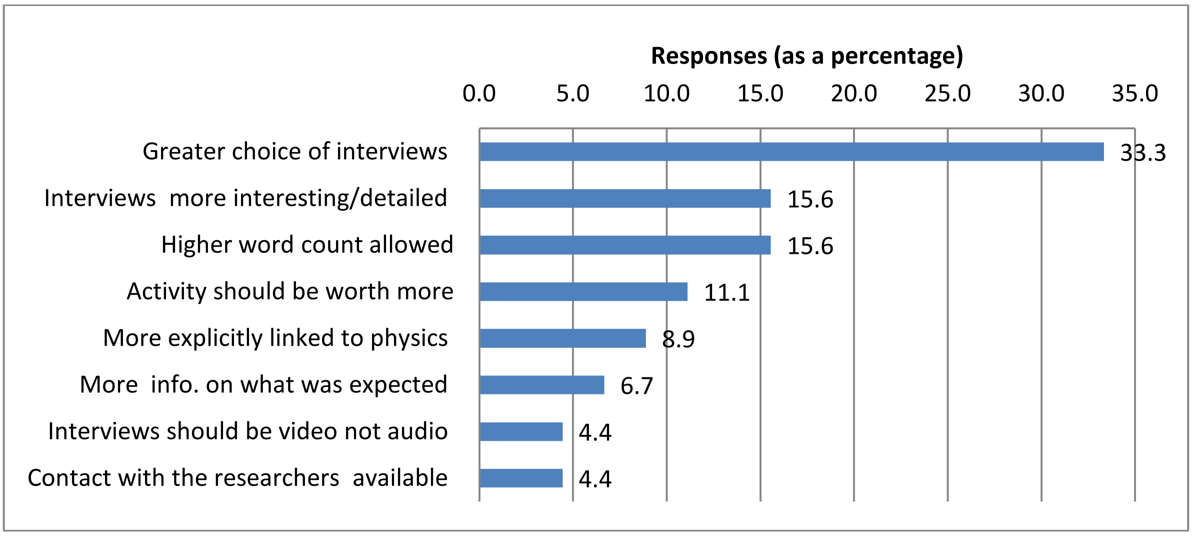

Figure 6: Response to question: How could the communication activity be improved?

Assessment of the RICA

Assessment of student assignments, which was the end point of the RICA, was carried out by four full-time physics academics in Autumn 2009 and three full-time academics in Spring 2009 and Autumn 2010. Each academic marked responses to specific interviews. Depending on the popularity of the interview, each academic could mark between 20 and 30 in the Autumn semester and between 100 and 150 in the Spring semester. Table 1 shows the mean and standard deviation of the marks for the assignment over the three semesters. Figure 7 shows a histogram of marks for Autumn 2009 and Autumn 2010. After a review of the marks allocated by each marker, no modification was made to the raw marks.

Table 1 indicates that greater than 95% of students satisfied the minimum requirement for a pass in the assessment of the RICA. Average marks were close to the distinction level (75%) or better in all three semesters indicating this activity gives most students an experience of early success as recommended by Moni and colleagues(Moni, Moni et al., 2007). Comments from the markers obtained through a brief survey in Autumn 2009 on the application of the marking scheme were mixed:

Supporting materials and marking guide were excellent – Academic 1

I don't believe the marking is 'reproducible… how reproducibly could I score them a few days later? – Academic 2

Mark scheme needs work … the current version is a guide to students, but it is not helpful to someone marking – Academic 3

Table 1: Mean marks for the RICA over three semesters. A statistical technique for identifying outliers using Chauvenet's Criterion (Kennedy and Neville 1986), was applied to the data. This indicated that one mark from Autumn 2010 was an outlier. That mark was excluded from the calculation of the mean and standard deviation.

	Autumn 2009 (%) (n=81)	Spring 2009 (%) (n=352)	Autumn (%) 2010 (n=81)
Percentage of students with mark of 50% or better	99	97	99
Mean mark	72.7	73.8	79.4
Standard deviation	12.8	12.8	9.9

The marking scheme was modified in response to the concerns expressed by the academics. By Autumn 2010 markers were more comfortable with the marking scheme. As an example, Academic 2 expressed the view: “*Marking proforma is much easier to use than last year*.”

We remark that it is possible that the revised marking scheme contributed to a significant reduction in the variance of student marks between Autumn 2009 and Autumn 2010 (F-test, P=<0.01) though we have not explored this and we speculate that other factors such as the demographics of the cohorts may have played a part.

The physics academics marking the assignment were not completely convinced about its value. The following are responses from Autumn semesters 2009 to the question ' How valuable is the Personal Response as a learning activity for PAN students?'

> *Most responses that I’ve marked were focused on the social relevance and impact but few could understand the science discussed* – Academic 1

> *I have no doubt that the skills developed from an exercise such as this are valuable to all the disciplines. I think they should be taught as a separate subject where each discipline contributes to the design of the syllabus and it is taught and assessed by staff who have the appropriate training. Being tacked-on in a physics course, students may not see the present exercise as furthering their knowledge of physics content or problem-solving skills, which I suspect are more the outcomes they may be looking for from a physics subject* – Academic 2

> *I think it is valuable, but it can only be a beginning of a longer process ... if it is not continued later in their degree (as a learning exercise), then they will not get any benefit ...* – Academic 3

These responses reflect that the purpose of the RICA may not have been well communicated to the academics teaching PAN. Following consultation and a revision of advice given to students and markers about the activity, the responses (in Autumn 2010) to the same question were more positive:

> *[it] helps engage students with something beyond ‘boring Physics’ ... the subject is more in line with a practice-oriented approach* – Academic 1

> *In terms of Physics learning, I don't think they get too much from it. However, it does give them a good insight into the research that takes place at UTS, and when the interviewees are recent students I think it gives them an idea of how their own careers in science might develop* – Academic 2

Despite initial reservations of the value of the RICA and its place within PAN, the markers became more comfortable with the activity and its assessment over time.

Views of interviewees

The sustainability of the RICA depends on the cooperation and support of researchers who are interviewed about their research. In order to gauge reaction to the activity, we administered a short survey to nine of the researchers who had taken part in the RICA between Autumn 2009 and Autumn 2010. In particular we asked:

1. Are you aware of any impact that the interview you gave for the PAN communications activity has had on students? (for example, have they approached you about your interview?). Please describe any impact you are aware of.

2. Do you think the interview you gave was of value to you (if yes, in what way(s) was it valuable, if not, why not)

3. Would you recommend other researchers be involved with this communications activity? Please explain your recommendation.

Only two out of nine researchers said that they were aware of any impact of their interview. This is not too surprising as most would not have direct contact with the PAN students until they had progressed further through their degrees. One early career researcher who was aware of an impact responded:

> *[a student said] 'Oh, you're the plant lady', indicating that they at least remember what research is being done at UTS and by whom* – Early Career Researcher

Eight researchers said the interview was of value to them; Reasons included:

> *… within the university, academics, support staff and students seem to know who I am now because they happen across the interview just by going to the [UTS] web page'* – Early Career Researcher

> *I appreciate all opportunities to communicate my enthusiasm for science to undergrads and others* – Senior Researcher

> *I feel it is important to foster the encouragement of future scientists* – PhD student

All nine researchers said they would recommend that other researchers be involved in the RICA. Reasons given included:

> *this … activity is a great way for researchers (especially ECRs) to gain experience in communicating the ideas, methods and findings of their research in general terms. It is also a good method to communicate the work done by staff within the university* – Early Career Researcher

> *Everyone should see how hard it is to get a message across to a general audience* – Senior Researcher
>
> *I like to contribute to a mode of teaching that takes students to a new realm of questioning* – Early Career Researcher
>
> *Of course! It is a useful experience to hone one's skills in communicating complex concepts simply* – Mid Career Researcher

The responses demonstrate overwhelming support for the activity at all levels of seniority of the academics who were the interviewees for the RICA.

Discussion

Our data indicate the success of the RICA but that some challenges remain.

How does a university differ from a school, or from other tertiary education institutions? One answer is that for universities the creation of new knowledge and its application for the benefit of the community are vital to their mission. First-year students routinely faced with classes containing several hundred of their peers may be forgiven for being unaware of this dimension to their university. Opportunities to connect in their first year to research happening within their own institution may be episodic and serendipitous at best. The literature argues that reflecting on, if not participating in, research brings benefits to students such as enhancing their capacity for independent learning. Significant 'hands-on' participation in real scientific research may only be possible at the later stages of a degree, which means that students' experience in early years is impoverished if opportunities to connect to research are not accessible. Research-inspired activities can be developed specifically to enhance student capabilities in a number of key areas, such as communication. Activities such as the RICA bring unity to a curriculum so that research and teaching are seen as truly complementary and mutually supporting.

A faculty intent on enhancing its research must reach its undergraduate students who are likely to be its next honours, master and doctoral students. Bringing research into the classroom in a way that integrates it into the curriculum is vital if the message about research is to be conveyed to students while many are still deciding the direction they wish their careers to take. The RICA is a starting point for exposing first-year students to research in a way that has meaning and relevance for them. Publicly available videos that describe research, such as the ones developed for this activity, act to promote science as vital and vibrant (Some of the video interviews produced as part of this work are available at: http://www.science.uts.edu.au/about/ videos.html.)

Applying the framework represented by figure 1 generates diverse and discriminating feedback which was incorporated into the development of the RICA. Of special worth were the views of later-stage students who offered perspectives of the value of the activity for first-year students. Their feedback on the quality of the video and audio interviews convinced us that the interviews with researchers could be both engaging and thought-provoking.

Developing the activity required expertise and skills not customarily found within a university science department, making a multidisciplinary approach essential to developing, trialling and embedding the activity. The development of the communications activity profited from the active involvement of a communication professional. Similarly, linking science research to communications benefitted from having a developer with contemporary science research experience. The skills possessed by radio and television specialists were critical to assuring the quality of the interviews. Notably, no students commented on the aesthetic or technical aspects of the interview. We interpret this ‘invisibility’ as a measure of the high quality of the interviews. Another possibility is that today’s students operate in an environment in which amateur video and audio recordings are common such that the production values of the interviews are of little concern to them.

As part of a science degree, students are expected to write reports, make posters of their work, present orally and critique the work of others. It is fairly rare for students to be asked to express their personal opinion of some piece of work. Through the RICA, students are able to describe the context and purpose of the research, but are also encouraged to draw on their own experience, reflect on science’s role in society and express their own views of the work (Bonfiglioli, Kirkup, & Woolf, 2009). The activity also raises student awareness of: the role of physics in a wide range of contexts and disciplines not normally encountered during an introductory physics subject; who does the science research and what that research is; and the research specialities and area of expertise at UTS.

Evidence has been accumulated over three semesters to support the proposition that the RICA is a successful innovation which engages students, provides them with an early success, makes them more aware of science research, enhances their appreciation of the importance of communication in science and develops their communication skills. Students disagreed with the suggestion that the activity should not be part of PAN and did not believe that the science in the interview was presented too superficially.

Researchers involved in the interviews are able to make their work instantly visible to first-years who one day may be their research students. Responding to interview questions requires an interviewee to translate often quite challenging concepts into a form that is comprehensible by a novice audience. Doing so enhances the researcher’s own communication skills. Through radio broadcasts and Internet availability, researchers are able to reach a wide audience with their work bringing enhanced visibility to both them and their institution.

Physics academics involved with the assessment of the RICA, in contrast to students, expressed comparative discomfort with the activity. There are several possible reasons for this: compared to assessment items normally found in a first-year physics subject, greater subjectivity must be exercised in interpreting the assessment criteria for the RICA; the topic at the centre of the activity is generally not physics-based and is likely to lie outside the specific area of expertise of the marker; and, while physics academics are accustomed to assessing physics reports, conference or research papers and student log books, the genre of reflective writing is likely to be unfamiliar to them. Evidence of increased comfort with the activity in Autumn 2010 is encouraging though we still believe we have still some way to go before the activity is as accepted as, say, the laboratory component of the subject.

Finally, it is important that research being presented is current if it is to be fairly described as ‘leading’ or ‘cutting edge’. There are costs incurred in developing audio and video interviews and so the long-term sustainability in a climate of ever-reducing resources for teaching is an issue that has yet to be resolved.

Acknowledgements

The authors gratefully acknowledge the support and contributions of Shannon Jones, Ian Woolf, Cathy Foley, Julian Cribb, Wendy Bacon, Jenna Price, Anita Piper and Cuong Ton-that. We thank the many senior students, first-year students, and fellow academics who took part in interviews and responded to our survey requests. We thank Roger Moni who is now at Griffith University for his support of our adaptation of his original work. We also acknowledge funding from the UTS Teaching and Learning Performance Fund to support this work. The authors advise that Human Ethics approval has been sought and granted for this research (UTS HREC 2008-283 clearance number UTS HREC REF NO. 2008-283A).

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