

## About URNA

URNA is an occasional newsletter designed to provide information about developments, upcoming events, and resources on engaging undergraduates in research and inquiry, principally in Australasia. This issue includes information about developments and research projects that have been supported by the ALTC and by particular institutions. It is interesting to note the tremendous increase in peer reviewed publications and funded projects during 2011. These indicate a growing and lively field of study and teaching development. Please circulate widely and let us know of any other colleagues that you think would like to know of recent developments and resources in undergraduate research in Australia.

*Professor Angela Brew, Macquarie University  
November 2011*

## Research Skills for a Higher Education

*John Willison, The University of Adelaide*

What elements of higher education make it elevated above other formal education? As a project team consisting of members from five Australian universities, we have been exploring since 2007 explicit research skill development as a distinguishing feature to make university studies indeed higher (Chanock, 2004). The project team has used the Research Skill Development (RSD1) framework (Willison & O'Regan, 2007) as a conceptual model to make such development a feature of university study in standard content-rich university curricula from the first year onwards.

Emerging from the project so far have been substantial positive outcomes for students and academics involved in semester-length courses that have been guided by the RSD to explicitly develop students' research skills (Willison, Le Lievre & Lee, 2010; Willison, in press). However, the primarily positive data is potentially skewed by the fact that the academics involved are first generation innovators who chose to incorporate the RSD in courses because they were convinced it was an appropriate thing to do. What we do not yet know is how approaches informed by the RSD may role out into the complexities of entire degree programs.

In one of the final acts of the Australian Learning and Teaching Council, it recently funded an evaluation of the use of the RSD at degree program level. Five undergraduate degree programs, one of each in the Sciences, Health Sciences, Engineering, Business and Social Sciences are providing data to determine year-after-graduation perspectives of students and employers about the research skills that students bring to the workplace. Early indications are that students

perceive an array of uses, in work and social contexts, for the discipline-specific research skills they have developed in their university programs. Moreover, current project partner universities (Adelaide, Monash, Latrobe, Canberra, James Cook) along with non-partner universities are seeing deepening course-level and degree-program level interest in RSD as a guiding framework, with two universities drawing on the framework to guide developments university-wide.

Simultaneously, the extended version of the RSD, the Researcher Skill Development framework (RSD7)<sup>2</sup> is being showcased at partner universities to engage research-focused academics in the pedagogical issues around research skill development. The RSD7 has a focus on higher degree by research, through to post doctorates and onto mid career research, and raises questions for those who are research-focussed about the capacity building possibilities of undergraduate studies and masters by coursework. One major advantage of the RSD7 is that it places on the same continuum a First Year student engaging in tasks that require the skills associated with research, and a professor leading an international research team. One of the repercussions of the RSD7, which describes a continuum concerning the extent of autonomy a student has, is that a cycling between the highly directed and modelled level 1 and the open-ended level 5 may take place. This cycling means that First Year university students may be initially directed to understand discipline appropriate ways to research. However, over the course of First Year, increasing autonomy may be given so that students initiate the process, and thereby practise framing questions, determining information and data gathering techniques, evaluating products and processes, organizing and managing the research process. The move to second year is conceptually more demanding and typically requires an increase in academic rigour; in this context students may again require the structure and guidance described by the lower levels of the RSD7. In this way, cycling, or more correctly, spiralling, between low degrees of autonomy and high degrees, students will become increasingly familiar with, and receive feedback on, problematic areas of research, such as determining appropriate researchable questions. It is very different from the concept of giving students a framework of knowledge in their undergraduate degree, and then asking them to utilize this after it is constructed. The RSD7 helps teachers to focus on the development of skills contingent on content all the way through, so that content knowledge and research skills are inseparable.

Another main advantage of the RSD7 is that it succinctly conveys on one page, elements absolutely core to the research enterprise. It is visually a one-look document, and enables sensible conversation whereby people are literally on the same page. One-view visual representation is conceptually important, for all the major elements are represented in their interconnectedness. The RSD enables conversations among academics coordinating courses and degree programs, research focussed staff,



*First Year Human Biology Students engaging in open-ended field research. Photo: John Willison*

library staff, academic language and learning staff, academic development staff, professional staff engaged in recruitment and retention, and, very importantly, tutors and students themselves. When the efforts of all university staff who have a part in university education are focussed to work collaboratively with students on the development of research skills, then mutual reinforcement of effort is possible, giving a sense of 'university' rather than 'polyversity'.

As we continue to probe year after graduation outcomes, we will be able to determine if the RSD, used across degree programs, does indeed help guide university education to be 'higher', not in ethereal or ivory-tower ways, but in terms of higher order cognitive skills that employers value and that are utilised and enjoyed by graduates in the workplace.

## References

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- Further information and notes
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1. Research Skill Development Framework: [www.adelaide.edu.au/clpd/rsd](http://www.adelaide.edu.au/clpd/rsd)
  2. Researcher Skill Development Framework: [www.adelaide.edu.au/clpd/rsd/rsd7](http://www.adelaide.edu.au/clpd/rsd/rsd7)

## *'This is what university should have been like from the start'*

### Reflections on offering an undergraduate research experience in the social sciences

Denise Cuthbert (RMIT), Amy Dobson (Monash University), and Kate Cregan (Monash University)

Since 2009, the Sociology program at Monash University has offered a unit called Contemporary Issues in Sociological Research designed to provide an 'authentic' research experience for third-year undergraduate students in the social sciences. As such, this unit represents a rare offering outside the STEM disciplines (Brew, 2010, p. 16). A report on the unit in its first year of delivery, its teaching and a selection of findings from surveys of students at the commencement and conclusion of the unit and from qualitative interviews with students at the conclusion of the course is published in *Studies in Higher Education* (Cuthbert et al, 2011). In this brief update, we reflect further on some challenges faced by teachers in the delivery of the unit in 2009, 2010 and 2011. As the unit was designed to provide research experience for undergraduate students aligned to current research activities of the academic taking the unit, the 'content' of the unit is open. Thus in 2009, the content related to the experiences of young adults in post-separation and intact families (reflecting research interests of the convenor in that year, Denise Cuthbert); while in 2010, the research undertaken by students centred on young adults and social networking sites (this work related closely to the research of convenor, Amy Dobson); and, in 2011, the research undertaken by students related to various body modification practices of young adults (which extended a long-term research focus on embodiment of Kate Cregan). In 2011, the unit was opened to students outside Sociology including students completing majors in other social science disciplines. To date, one paper by students in this unit has been published (Brown et al, 2011).

As reported in *Studies in Higher Education*, there is no doubt that this unit offers a valuable and even transformative experience for the majority of students who complete it. It also offers some real challenges to staff teaching it. The major challenges in the teaching of the unit relate to the difficulties faced by students – including the most able of them – in making the transition from one mode of learning and working to another. Students inured to highly regimented coursework units, with prescribed readings and circumscribed tasks set for each week of the semester,

really struggle in the first weeks of the semester long unit to come to terms with a mode of learning and working in which the curriculum is set only in skeleton terms and in which the 'content' is largely to be generated through their own efforts. For some students, withdrawing from the unit in the first weeks, this realisation prompted their withdrawal. Several students confessed to being attracted to the unit precisely because the prescribed readings were minimal. On discovering that readings needed to be generated by them related to the specific work they were to do in the unit, their response was to walk. A high degree of self-selection in (and out) of a unit of this kind is to be expected.

For those that remained, notwithstanding their enthusiasm and excitement at doing 'real' research (as distinct, in their words, from the sort of research they had done in other units including compulsory methods units, see Cuthbert et al, 2011), the sense of being in largely uncharted waters remained for much of the semester and required constant management by teaching staff. The sense of uncertainty, even danger, generated both positive and negative responses from students surveyed and interviewed in 2009 and 2010. Managing the anxieties of students in this transition to research remains a major pedagogic challenge of this unit and prompts some reflections on the kind of student being produced in undergraduate programs in the social sciences and humanities.

The difficulties faced by the very able students who have completed this unit in the 2009, 2010 and 2011 in making the required transition to research, even in the highly controlled, supported and safe context of research in an undergraduate teaching unit, raise for us some challenging considerations regarding the level of prescription and the certainty to which undergraduate students are habituated in many coursework units in the audit- and evaluation-heavy context of Australian higher education and their educational consequences. There may be very good quality assurance reasons for the high level of prescription required at undergraduate levels (which looks set to increase under the rigours of the Australian Qualifications Framework). However, when educating to produce research outcomes and future researchers, real questions need to be asked as to whether this approach to undergraduate education fosters the capacities for risk and uncertainty entailed in good research. As is well documented in the literature on the transition to graduate research, getting good marks in coursework programs is not in all cases a predictor of success in research programs. As the major feeder for graduate research programs, undergraduate programs need to accommodate some uncertainty and risk within their highly prescribed, audit- and evaluation-conscious design and delivery so that graduates emerging from

these programs are able to make the transition to the far less certain world of research (and other uncertain worlds as well, for that matter).

While as educators with real interests in undergraduate and graduate research education, these challenges are particularly pointed for us, we contend that they need to be taken seriously by all undergraduate educators. The world of research with its uncertainties, risks and the need for resilience, creativity and inventiveness in researchers is likely far more akin to other professional domains in business, industry and the professions than any of these is to the highly controlled world of undergraduate coursework programs. We cannot but wonder, reflecting on how our talented final-year undergraduate research students struggled anxiously in making a controlled transition to research, how well their other undergraduate studies have equipped them for the range of uncertain situations to which their experiences of work will expose them.

One approach might be to introduce more experiences of the kind devised in Contemporary Issues earlier in the undergraduate program. Another approach might be to rethink how we assure the quality and standards of our undergraduate offerings without straightjacketing them into predictable formats, with predictable outcomes and predictable learning objectives. Perhaps we as educators need to be prepared to expose more of our students to uncertainty and risk earlier in their studies. As one of our students commented, once she overcame her initial fears and anxieties about what was being asked of her, the undergraduate research experience offered in this unit generated the sort of excitement that she came to university to experience but found wanting in her other undergraduate studies: 'This is what university should have been like from the start.'

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## Undergraduate awareness and experiences of research at a research intensive university in southern New Zealand

Rachel Spronken-Smith, Head of the Higher Education Development Centre, University of Otago

### Background

As part of ongoing research into undergraduate research and inquiry (e.g. see Spronken-Smith 2010 for an overview), I worked with two colleagues (Romain Miroso and Martine Darrou) to determine undergraduates' awareness and experiences of research at the University of Otago. At Otago the term 'research-informed teaching' is used broadly to encompass various ways of strengthening the research-teaching nexus including getting students engaged in research.

At this University an undergraduate degree typically takes three years for a straight Bachelors, or four years for an honours degree. Otago is a research-intensive university and in the last Performance-Based Research Funding audit in 2006, was the top-ranked university for research quality in New Zealand.

We used the survey developed by Healey et al., (2010) to explore undergraduate awareness, experiences and perceptions of research. The same survey was used by Turner et al., (2008) on final year undergraduates at two UK universities (one research-intensive (RI), and one less RI) as well as at a Canadian RI university, so there was a good basis for benchmarking internationally. We administered the survey online in 2009, sending it to 4482 undergraduate students (from a population of about 15,000 undergraduates). We had a response rate of 28.5% (1281 students), and we only selected students who were studying at a particular level to avoid students who were taking a mixture of say, second and third year papers, which is quite common practice. We were able to extract between 88 and 380 responses for each year of study, giving a total sample of 1010.

To allow comparability of results with the Turner et al., (2008) study, we also selected respondents from final year students (306 in total). This compares with study samples of 46 (UK RI), 164 (UK less RI) and 309 (Canadian RI) in the Turner et al. study. A full report of the project is currently in preparation, but some key findings are reported here.

## Monash Student finds Universe's Missing Mass

During her undergraduate research internship program, Amelia Fraser-McKelvie, a 22 year-old Aerospace Engineering/Science student at Monash University, made an important scientific discovery. Working with two astrophysicists in the School of Physics Drs Kevin Pimblet and Jasmina Lazendic-Galloway, she conducted a targeted X-ray search for the missing visible mass in the local Universe.



Photograph ©Amelia Fraser-McKelvie, Kevin Pimblet and Jasmina Lazendic-Galloway. Photographer S.Morton

Beside the commonly known problem of missing invisible (dark) matter, astrophysicists have also found that there should be more visible matter in our local Universe. This is referred to as "missing baryon problem" and astronomers have been searching for it for a couple of decades now.

Source: <http://www.monash.edu.au/news/show/monash-student-finds-universes-missing-mass>.

*Do you know of any other recent amazing discoveries by undergraduate students? Please tell us about them.*

### Key findings

Figure 1 shows how students rated their awareness of various research activities. Students at all levels are most aware of research seminars, followed by staff publications, research consultancy and postgraduate opportunities and then research posters and displays. There is less awareness of research centres and themes, the research reputation of departments and research

and consultancy reports. Overall, students at 300 and 400 level are more aware of research activity, with a noticeable trend in awareness from first to final year students. As Figure 1 shows, the level of study was significantly correlated with most of the categories for awareness of research activities. For example, the level of study was significantly correlated to the awareness of research seminars amongst the student population ( $\tau = .16, p < .00$ ).

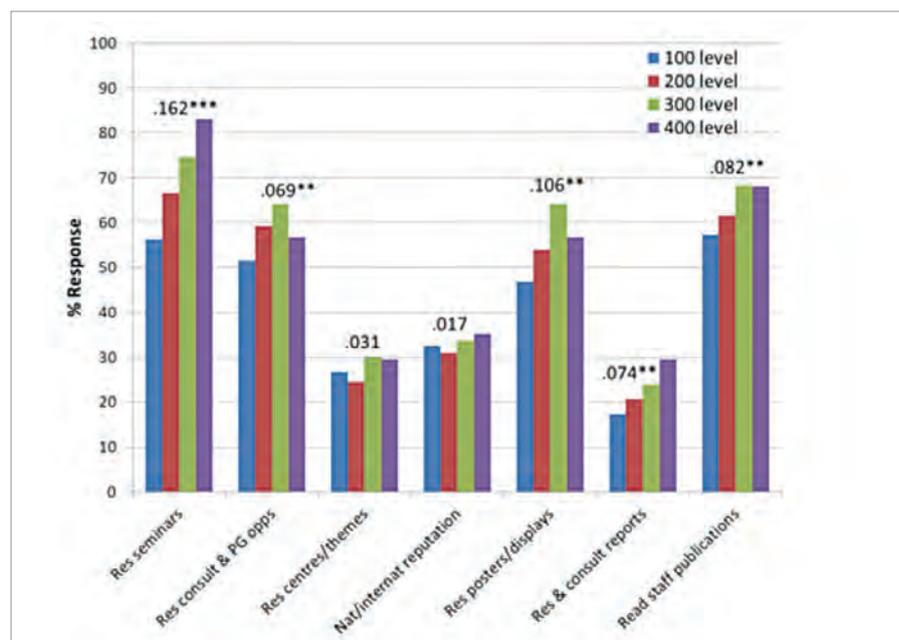
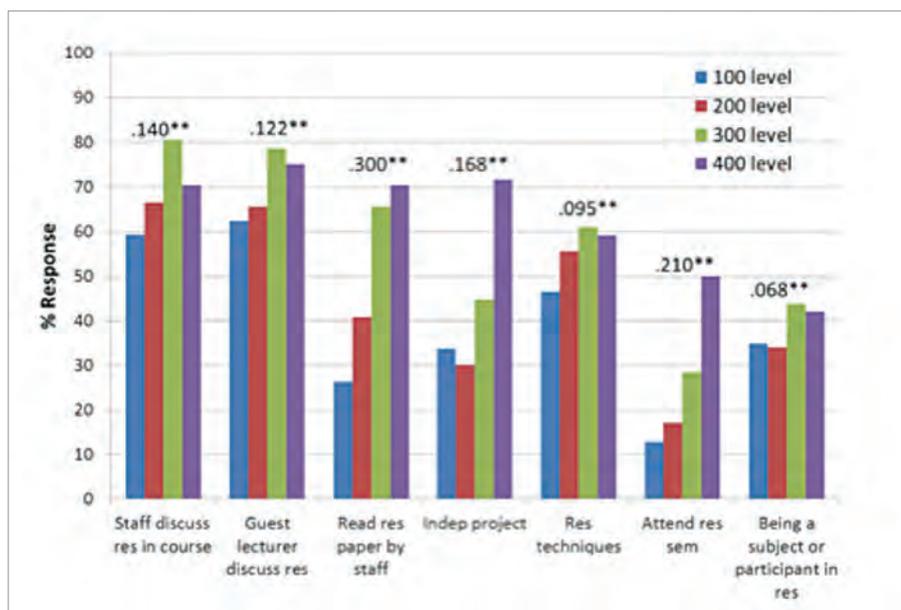


Figure 1: Undergraduate awareness of aspects of the research culture. The percentage response is graphed for each year of study and Kendall's  $\tau$  for cross-tabulating between level of study and awareness is reported (\* significant at the 0.05 level; \*\* significant at the 0.01 level; \*\*\* significant at the 0.001 level; all one-tailed tests,  $n=1010$ ).



**Figure 2:** Undergraduate experiences of aspects of the research culture. The percentage response is reported for each year of study and Kendall's  $\tau$  for cross-tabulating between level of study and awareness is reported (\* significant at the 0.05 level; \*\* significant at the 0.01 level; \*\*\* significant at the 0.001 level; all one-tailed tests,  $n=1010$ ).

The main experiences of research activity by undergraduates are shown in Figure 2. Students at all levels rated highly hearing staff discuss research in their course and having guest lecturers discuss research. Moreover 47–61% of all students reported experiencing learning about research techniques and 34–44% of all students said they had been a subject or participant in research. Very few students (5–11% from 100 to 400 level) critically examine the research of staff, few (3–10%) attend a research conference and only 5% (100 level) to 14% (400 level) have been a research assistant. As with awareness of research, there are higher levels of experience of research by 300 and 400 level students, with Figure 2 showing statistically significant positive correlations between year of study and all types of experience.

Finally, we compared our results for final year students (note both third and fourth year students constitute this group) with the findings of the study by Turner et al. (2008). Overall, Otago rated well in this analysis. Compared to the other institutions, final year undergraduates at Otago were more aware of research seminars and more had attended them, had greater experience of reading research papers by their lecturers, had far greater experience of developing research/consultancy techniques, and were more involved in practical activities/fieldwork based on research/consultancy projects. However, final year undergraduates at Otago were less aware of research centres/themes or groups than their counterparts at other research intensive universities and similarly our students had less experience of hearing staff discuss their research.

## Implications

When comparing responses across the cohorts, it was clear there was increased awareness and experience of research as students progressed through years of study. Survey results for final year students at Otago showed that undergraduate awareness and experience of research compared very favourably to UK and Canadian research intensive universities, and indeed Otago students reported higher ratings for some measures. Although encouraged by the results, there is much room for improvement. First year students have a much lower level of awareness of the research culture, and few opportunities to engage in research. Current initiatives including a special interest group on undergraduate research and inquiry, summer research studentships and a proposed colloquium for undergraduates to present their research, hope to improve student realisation of the research culture within which they study.

## References

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## Developing institutional capacity for undergraduate research

Angela Brew, Ademir Hajdarasic, Lilia, Mantai and Stefan Popenici, Macquarie University

Research is being used as an important strategy to develop institutional capacity for undergraduate research at a large research-intensive Australian university. The University's academic plan includes the desire to increase the extent to which undergraduate students engage in research experiences both within and outside the curriculum. The university aims to equip students with research skills and critical thinking, through exposure to research problems and realistic environments and increase opportunities for students to engage in research within and across the curriculum. In planning an institutional strategy to address these

issues an integrated program of research investigating staff and student experiences, campus visibility and course materials was devised. There are five resulting research projects which are now in different degrees of development. The project also includes academic development strategies to ensure that findings are embedded in practice at faculty and departmental levels.



Ademir Hajdarasic interviewing a student at Macquarie University

## Projects

### 1. The extent to which students are aware of research.

The aim of the project is to investigate the perceptions of research of the University's undergraduate students. It explores their ideas about what research is and the extent to which they are aware of research in the university. Further it examines their experiences of research and their attitudes to the benefits of university research. It also explores their views on the relevance of research to their future working lives. The investigation of undergraduate students' understandings and experiences of research and inquiry is conducted in Stage 1 by applying a version of the same questionnaire used at the University of Otago. Instead of sending a survey to all students, a targeted approach is being used. An undergraduate scholar is

interviewing students on campus. 130 students have so far been interviewed. Interim results reveal that the distribution of answers is similar to those described by Rachel Spronken-Smith above. In Stage 2 a purposive sample of students will be interviewed.

## 2. Visibility of research across campus

This project is designed to answer the question of how visible research is to students across the campus. This research will be carried out by taking photographs of "research" as it is visible on campus. This includes posters and messages on noticeboards in corridors, signs, and other indications. A semiotic analysis is then planned to determine what messages about research are given to students.

## 3. Examine barriers & challenges in relation to undergraduate research.

In order to remove barriers to the implementation of undergraduate research it is important to investigate what they are. Interviews will be carried out with heads of department and focus groups of academics.

## 4. The extent to which research is currently embedded in curricula

Reviews will be based on a content analysis of unit of study (course) outlines. This project will provide a benchmark for measuring developments. The Research Skills Development Framework (see above) will be used to map the extent to which research skills are progressively being developed in a coordinated manner across the curriculum.

## 5. Investigation of the outcomes of undergraduate research experience programs

This project is designed to investigate the views of coordinators of undergraduate research experience programs concerning the value and outcomes of such programs; and begin to investigate how undergraduate students respond to such programs, what they believe they gain and how they intend to use what they have gained. In 2009 a survey of publicly available documents regarding undergraduate research experience programs in Australian universities (Jewell & Brew, 2011) identified programs in 23 Australian universities involving approximately 1500-2000 students. In documenting this, we were able to make the case to senior personnel at our University for the need for a university-wide program. In carrying out this work, critical questions about how to support students and the costs and benefits to academics in undertaking the supervision of undergraduate researchers came to light. The new project is now exploring these.

# Further projects of note

## Design as a catalyst for engaging students in creative problem solving

Dr Denise Wood at the University of South Australia is leading a team from the UniSA, the University of Adelaide, RMIT, James Cook University (JCU), the University of New England (UNE) and Massey University, NZ to design and develop a creative problem solving (CPS) framework and associated online system to support academics in the development and redevelopment of curricula in which design is embedded and serves as a catalyst for engaging students in creative problem solving. The project is funded by the ALTC. For further information go to <http://www.altc.edu.au/project-design-catalyst-engaging-students-creative-problem-solving-2011>

## Teaching Research - Evaluation and Assessment Strategies for Undergraduate Research Experiences (TREASURE)

This ALTC funded project led by Anna Wilson and Susan Howitt at the ANU, and including partners at UWS and UC, aims to help academics effectively use immersive, assessed undergraduate research experiences (UREs) to (i) improve students' understandings of the nature and practice of research and (ii) foster the development of generic and research skills.

The project will develop reflective tools to make the objects and processes of learning in student research experiences more explicit to both the student and the supervising academic. It is anticipated that this will lead to more evidence-based methods of assessment, which better align with intended learning outcomes, and which in turn will hopefully lead to clearer strategies for evaluating URE effectiveness. For more information contact: [Anna.Wilson@anu.edu.au](mailto:Anna.Wilson@anu.edu.au)

## Student as producer

This interesting project, led by Mike Neary at The University of Lincoln, UK, is funded by the Higher Education Academy. The idea of the student as producer is described by Neary as 'a critical response to attempts by recent governments in the UK, and around the world, to create a consumerist culture among undergraduate students' (Neary, no date).

Student as producer connects teaching and research, actively involving students in the academic project of the university. Undergraduate students work alongside staff in the design and delivery of teaching and learning, and in the production of work of academic content and value.

This project is in its second year of implementation and is now being embedded in institutional structures at The University of Lincoln, for example into the course approval process. It is redefining what a degree looks like. For more information go to <http://studentasproducer.lincoln.ac.uk/>

## Funding opportunities for undergraduate research?

Go to

[http://www.mq.edu.au/lte/altc/ug\\_research/websites.php#Undergraduatescholarships](http://www.mq.edu.au/lte/altc/ug_research/websites.php#Undergraduatescholarships)

# Undergraduate Journals

For a list of other journals available for Australian undergraduates go to:

<http://www.undergraduateresearchAustralia.com>



## Reinvention: a Journal of Undergraduate Research

*Reinvention: a Journal of Undergraduate Research* is an online, peer-reviewed journal, dedicated to the publication of high-quality undergraduate student research. The journal welcomes academic articles from all disciplinary areas. All articles in this journal undergo rigorous peer review, based on initial editor screening and refereeing by two or three anonymous referees. The journal is produced, edited and managed by students and staff at the University of Warwick. It is published bi-annually and only houses papers written by undergraduate students. The journal is open to submissions from all undergraduate students in the UK and overseas.

**Volume 4, Issue 2 – Is now available online at:** [http://www2.warwick.ac.uk/fac/cross\\_fac/iatl/ejournal](http://www2.warwick.ac.uk/fac/cross_fac/iatl/ejournal). It includes papers on a wide range of topics including: Kisses under the Starlight: The Performance of Masculinities and Emo on MySpace; Understandings of testicular cancer in young adult males: A Q-methodological study; Exploring patients' perceptions of living with psoriasis in a London general practice; Expression and potential function of prion protein in the vasculature; Start-ups, Small Firms and the Industry: An Empirical Investigation of the Determinants of Small New Firm Survival.



## Macquarie Matrix

*Macquarie Matrix: Undergraduate Research Journal* is an online, open access publication that publishes peer reviewed, high quality, original undergraduate and honours student research work. Published online twice per year (May and November), all published research is subjected to a double-blind peer review process. The lead author of the work must be a current undergraduate or honours student at Macquarie University or the research must have been conducted while the lead author was a student at Macquarie University. Staff members should not be included as authors, but may be acknowledged if

appropriate. Submissions are accepted from all fields of study.

The Journal exists to promote and disseminate findings from research done by Macquarie University undergraduate and honours students. Submissions of high quality research findings from any discipline area are welcomed, including essays, data-based reports, historical research and creative works.

# Upcoming events



## CUR Dialogues 2012

Colleagues travelling to the United States will be interested in the Council on Undergraduate Research (CUR) Dialogues 2012. It will take place on Thursday, 23 February, 2012 4:00 PM - Saturday, 25 February, 2012 12:00 PM, USS Eastern Time at the Hamilton Crowne Plaza 14th & K Street N.W. Washington, DC 20005 USA. CUR

Dialogues is a conference to bring faculty and administrators to the Washington, D.C. area to interact with federal agency program officers and other grant funders.

For further information see:

<http://www.cvent.com/events/cur-dialogues-2012/event-summary-08384c3d0d604e9bb2063bc6941083a2.aspx?i=176bc6f7-1ce4-4127-9ac9-c88f8c2db3bb>

## New Journal Articles

Since there have been so many journal articles on undergraduate research and inquiry-based learning during 2011, Some of the key ones are drawn to the attention of readers of URNA who are not following this literature closely. The choice here is made in the light of what is likely to be of particular interest to Australasian readers. Some of these articles are pre-print publication online.

- Aditomo, A., Goodyear, P., Bliuc, A.-M., & Ellis, R. A. (2011). Inquiry-based learning in higher education: principal forms, educational objectives, and disciplinary variations. *Studies in Higher Education, iFIRST*, 1-20.
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