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## Beyond 'Listening' to the Student Voice: The Undergraduate Researcher's Contribution to the Enhancement of Teaching and Learning

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### Abstract

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## Introduction

The interest surrounding undergraduate research appears to have gained momentum in the last few years to the point where it is currently regarded as an “international movement” (Jenkins and Healey, 2010). Mainstream education journals dedicate entire issues to the topic of undergraduate research (*Journal of University Teaching and Learning Practice*, Oct/Nov 2010; *Peer Review*, 8 (1), Winter 2006), specialist journals are devoted to the publication of undergraduate research (*The journal of young investigators; Reinvention: A journal of undergraduate research*), organisations exist to promote and further the movement of undergraduate research and international conferences are held annually to spread its doctrine (National Conferences on Undergraduate Research (NCUR); Council on Undergraduate Research (CUR) Posters on the Hill; Meeting of Minds (MOM); Michigan Undergraduate Research Forum (MURF)). Individual universities have articulated their dedication to the cause. Governments have pronounced their support for undergraduate research.

Rationales offered for the promotion of undergraduate research are varied. Improved student experience and related retention are government and institutional drivers in the push for increased undergraduate research (Association of American Colleges and Universities, 2006; Brew, 2010; Department for Business Innovation and Skills, 2009; Locks and Gregerman, 2008). Faculties are keen to see undergraduates develop basic research skills as an apprenticeship to postgraduate studies. Such an experience is seen as a ‘taster’ in the hope that students will be encouraged to pursue further research on completion of their undergraduate degrees. Notwithstanding the disciplinary research skills acquired, an undergraduate research experience can assist students in achieving generic graduate attributes, that is, “the core outcomes of higher education ...that every graduate of every degree will possess” (Barrie, 2007). With the proliferation of accessible information that has accompanied the technological revolution, learning how to learn (ie. process) as opposed to what to learn (content) has become a more relevant approach to learning. The attainment of generic research skills which incorporate the ability to source relevant data, analyse and evaluate it, stands citizens of the future in good stead. These competencies represent the basic attributes needed to successfully engage in life-long learning, considered by both the OECD and UNESCO as necessary in light of “changes in the world economy caused by new technology, the rate of economic globalization and rising income inequality” (Delors, 1996; OECD, 1996 cited in Watson 2003, p.7)

Student engagement is seen as an outcome of undergraduates being involved in collaborative research with academics and postgraduate students. The literature is not short of examples of different types of undergraduate



research. Overwhelmingly these cases are discipline-specific with the greatest incidence, not unexpectedly, in the sciences since these experimental disciplines lend themselves most naturally to inclusion of research practices, even at foundation and introductory levels. However, it is not difficult to discover exemplars of undergraduate research being conducted in a wide range of disciplines such as Business (Booth and Harrington, 2003), Mathematics (Brown and Yurekli, 2007), Social Science (Evans and Witkosky, 2004), the Humanities (Dean and Kaiser, 2010), Geography (Healey, Jenkins and Roberts, 2005) and Medicine (Houlden, Raja, Collier, Clark and Waugh, 2004).

Fewer examples exist in the literature of undergraduate students undertaking pedagogic research (Campbell, Eland, Rumpus and Shacklock, 2009; Burkill, Dunne, Filer and Zandstra, 2009; Healey, O'Connor and Broadfoot, 2010). The argument exists that engagement is particularly meaningful for students who undertake teaching and learning research as they take an active role in shaping their own learning experience. Students have a vested interest and see the outcomes of the investigations as personally relevant.

## **What does undergraduate research look like?**

Defining a concept is an established method of clarifying and uniting understandings, such that it can be recognised when it exists. The Council on Undergraduate Research has defined undergraduate research as “an inquiry or investigation conducted by an undergraduate student that makes an original intellectual or creative contribution to the discipline” (<http://cur.org/about.html>). As Beckman and Hensel (2009) report this apparently succinct working definition has a number of underlying contentious dimensions. The following tensions, they argue, exist:

- a) What should the purpose of the undergraduate research exercise be? Enhanced student learning or the research findings;
- b) What should the focus of the research be? Disciplinary or interdisciplinary;
- c) Where should the research experience be based? Within the curriculum or co-curriculum;
- d) Who has access to the research experience? All students or Honours students;
- e) Who designs the research project? Students or faculty;

- f) How and by whom should the research be conducted? Collaboratively or individually;
- g) What constitutes an ‘original contribution’? Original to the student or original to the discipline;
- h) Who should the audience of the research findings be? Campus audience or professional audience.

Beckman and Hensel (2009) argue that these tensions exist as continua and that far from complicating the issue, the degrees of complexity clarify the understanding around the diversity of undergraduate research by “making explicit the implicit”. Above all, the authors highlight that “a key issue in defining undergraduate research is the purpose for which it is intended” (p. 40). This framework for describing undergraduate research will be used later in this paper as a basis for discussion of the model developed in this study.

## **Undergraduate research in a research-intensive university**

Although offering a North American-based view, The Boyer Commission on Educating Undergraduates in the Research University (1998), provides a seminal basis for examining how the university context should impact on the undergraduate research experience. The report reminds us that:

*Research universities [have a] commitment to create new knowledge, they consider research capability as a primary qualification for appointment, promotion, and tenure of faculty members, and they pride themselves on having world-class scholars among their ranks...at research universities, these faculty become a defining element. Research universities also have graduate students and post-doctoral fellows in far greater numbers than other institutions, since graduate education is a major component of their mission (p. 2).*

The authors argue that it is time to ‘reinvent undergraduate education’ and that:

*Universities need to take advantage of the immense resources of their graduate and research programs to strengthen the quality of undergraduate education, rather than striving to replicate the special environment of the liberal arts colleges. There needs to be a symbiotic relationship between all the participants in university*

*learning that will provide a new kind of undergraduate experience available only at research institutions.*

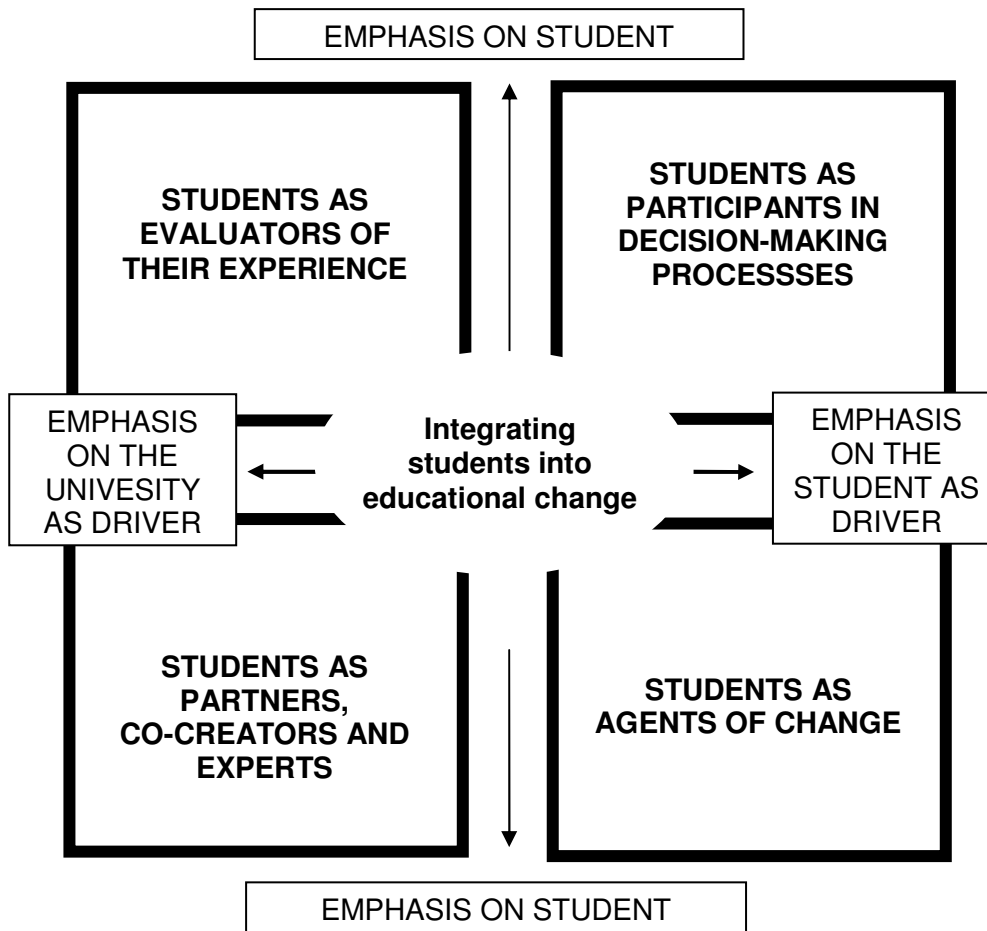
They offer a ‘blueprint’ for this reinvention which involves ten points, the first two of which relate directly to undergraduate research, namely: “Make research-based learning the standard” and “Construct an inquiry-based freshman year”.

## **Undergraduate involvement in teaching and learning research**

Teaching and learning research has been traditionally conducted by one of the groups engaged in the educational process, that is, teaching academics who have a practical or theoretical interest in the phenomenon. The past omission of undergraduates, the other partners in the process, from the ranks of researchers in higher education has inevitably resulted in a limited range of perspectives. Indeed, their absence from active participation in pedagogic research has meant that the ‘authentic voices’ (Burkill, Dunne, Filer and Zandstra, 2009) of ‘the most important clients of higher education’ (Dept. for Business Innovation and Skills, 2009) have not been fully heard.

Until recently, the student involvement in teaching and learning research has been as a source of data for academic investigators, who have ‘listened’ to, and then reported, the student voice. Burkill et al., (2009) demonstrate clearly the range of ways in which students can contribute to teaching and learning research leading to educational change. These various involvements are illustrated in Figure 1.





**Figure 1. Principles of student engagement: A framework for student engagement in educational design. Adapted from Burkhill et al., (2009)**

Most commonly, students' involvement in educational change has been as evaluators of their experience or as partners, co-creators and experts, where the university has been the driver of the change (left-hand side of Figure 1). Where students have taken a more active role as driver of the change, their participation has involved engagement in the decision-making process (upper right quadrant of Figure 1). Burkhill et al. (2009) articulate the more 'radical' role of students acting as agents of change (lower right quadrant of Figure 1) by "setting their own agenda for research on teaching and learning...engaging with research processes (data collection, collation, analysis, formal presentation) with support from experts...implementing their solutions, supported as appropriate by individual staff/subject areas/ institution"(p.87). The study of Burkhill et al. in undergraduate pedagogic research is one of only a few reported in the literature. For the most part the reports have been examples of collaborative research with faculty where the undergraduates involved assumed an important but joint role in the research.

The remainder of this paper will describe a project involving undergraduate students in conceiving and conducting their own research into teaching and learning phenomena at The University of Western Australia (UWA). Unlike the similar types of research reported, the student experience was more akin to that of a postgraduate researcher who takes greater individual responsibility for the design and conduct of the their project, under the supervision of a faculty mentor.

## **Background to ULTRIS**

The *Undergraduate Learning and Teaching Research Internship Scheme (ULTRIS)*, was established at UWA in 2008 with the first round of students in 2009. ULTRIS, focuses attention on research into aspects of teaching and learning by students enrolled in their second or third year of undergraduate study. Selection for the scheme is by application and, where possible, interns are chosen from across all faculties of the University. Students may apply as individuals or teams of researchers (up to three students/team). The applications are judged on the students' academic records, a written statement of their existing understanding of research generally and teaching and learning research specifically, and faculty recommendation. Participation in the scheme is extra-curricular with no academic credit being awarded to students who undertake the internship. However, formal acknowledgment of their participation is recorded on their academic transcript and each internship is worth \$3000, which in the case of teams is shared. The internship scheme not only provides opportunities for selected undergraduates to have a practical research experience but also promotes a greater awareness of the scholarship of teaching and learning.

The establishment of ULTRIS, with a particular focus on research into issues of teaching and learning is timely in light of the evolving perception of the relevance of teaching in a research-intensive university. The University of Western Australia identifies strongly as a research-intensive university. It is a member of the Group of Eight coalition of Australian universities and advocates that, “[r]esearch and research training remain the major factors distinguishing the university as one of Australia's leading research-intensive universities” (Group of Eight: Australia). ULTRIS addresses a number of the University's stated priorities. The University articulates one of its operational objectives as: “To further develop the links between teaching, learning and research”, and as implementation strategies to “expand opportunities for research-based learning in undergraduate courses; e.g. introduction of fully-funded research projects for undergraduate students” and to “further support the development of research skills among UWA undergraduate students” (The University of Western Australia, 2007).

At the time of writing this paper one round of the ULTRIS programme had been completed and the second round was nearing completion. A total of 25 undergraduate students from a diverse range of disciplines had undertaken 23 individual projects. The programme runs over six months and involves the students attending 24 hours of preparatory workshops, writing a research proposal, collecting and analysing their data, communicating the progress of their projects on a regular basis with their supervisors and peers, writing an academic paper, and presenting the findings of their research at an external teaching and learning conference.

The projects from each year are related under a general theme and so the collective findings of the students' projects provide a comprehensive picture of the teaching and learning issue under investigation within their institution. The focus of the research for the 2009 cohort of interns was 'staff-student communication outside the classroom' and for the 2010 cohort the general area of research was 'the first year experience'. Under these umbrella topics, students were free to choose their particular research focus.

## **Evaluation of ULTRIS**

Various aspects of ULTRIS were evaluated for the purposes of further developing the programme. The process sought to:

- 1) determine what 'original intellectual or creative contributions' undergraduates could make to teaching and learning through participation in relevant research;
- 2) determine what benefits might result for a) the individual student; b) the staff; c) the institution and; d) the higher education sector as a result of undertaking the research;
- 3) identify obstacles and risks inherent in conducting undergraduate research and determine the means by which they might be moderated;
- 4) establish a base model of undergraduate research (by identifying its key characteristics and purpose) that could be adapted for similar or related purposes.

Evaluations were conducted throughout the course of the programme through the collection and analysis of observational data, student written work and reflections, surveys and interviews.

## **Results**

The observations made in this section will mainly reflect the outcomes of the first cohort of ULTRIS interns since the second programme had not been completed at the time of writing.

### **1. 'Original intellectual or creative contributions'**

In 2009, ten individual projects related to the theme of 'staff-student interaction outside the classroom' were conducted by ULTRIS interns. The topics, the methods and the context of the projects are listed in Table 1.

Students wrote individual academic papers reporting their results and presented their findings at an external educational conference (Western Australian Institution for Educational Research, 2009). Presenting their work to professionals in the field of educational research was a challenging undertaking for the students, most of whom were in their second year of undergraduate study. Notwithstanding this, all students accomplished the task with the authority of more experienced researchers and were, in several cases, mistaken for either postgraduate students or academic staff by other conference attendees.

Collectively, the findings of the studies provided a comprehensive picture of the phenomenon at UWA. A more complete overview of the projects' outcomes have been reported elsewhere (Sandover and Partridge, 2010). In the first instance, sets of guidelines were developed to promote staff-student interactions generally, as well as tips for staff and students around the use of email as a means of communication. Wider dissemination of the projects' results within the University community was achieved through the publication and distribution to all academic staff of a special edition of the University's teaching and learning magazine, *CATLyst* (CATLyst, 2010) and the provision of online links to the students' papers. Results of individual projects were forwarded specifically to special interest groups within the University community with suggestions and recommendations of ways in which the findings might be usefully implemented. For instance, the two topics relating to international staff and students were forwarded to the University's International Office, and arrangements were made for students who conducted faculty-based projects to present their work to the respective Faculty Teaching and Learning Committees for consideration. Further, at least one of the 2009 interns, was invited to present her work at another conference and publish her paper in an international journal (Brown, 2010).

**Table 1. Projects undertaken by 2009 ULTRIS interns related to staff-student interaction outside the classroom**

<b>Project Topic</b>	<b>Research Method</b>	<b>Context/participants</b>
Beyond the office door: A study of the perceptions of undergraduates and their teachers on the evolving opportunities of interaction beyond the classroom.	Paper-based survey.	Business School Students: n=238 Staff: n=34
Student interaction with culturally and linguistically diverse staff members beyond the classroom: Attitudes and determinants.	Online survey.	Across Faculties Students: n=1280
Out of class, out of mind: Dynamics and causality of staff-student interaction	Paper-based survey.	Faculty of Arts Senior undergraduate students: n=134
Student and staff perceptions of email expectations and criteria: What are they?	Student and staff online survey	Across Faculties Students: n=649 Staff: n=48
Breaking down the classroom walls: Looking at the relationship between educators and students within the context of indigenous pedagogy	Participant observation. Focus groups. Interviews.	Indigenous and non-Indigenous Students: n=12 Indigenous Educators: n=3
The impact of commodification (aka: Academic Capitalism) on student-staff interaction outside the classroom.	Interviews.	Across Faculties Students: n=6 Staff: n=5
The dynamics of international student-staff interactions at The University of Western Australia	Online survey.	International Students: n=172
Geographic diversity: Perceptions of staff-student engagement in the Law School	Online survey. Focus groups. Interviews.	Faculty of Law Students: n=198 Staff: n=8
Perceptions of staff-student relationships from students with a disability.	Online survey.	Across Faculties, Students registered with University Disabilities Office
Qualitative student perspectives on factors influencing out-of-class interactions with teachers.	Interviews.	Faculty of Natural and Agricultural Science

## **2. Benefits for the student, the staff, the institution and the higher education sector**

The benefits that flow from undergraduate research have been extensively documented elsewhere. The focus of this section will be on those benefits observed and reported that are idiosyncratic to the teaching and learning research context reported in this paper.

The students involved in the ULTRIS programme all reported substantial degrees of satisfaction as result of undertaking their individual projects. This satisfaction stemmed from multiple sources. Table 2 summarises the areas in which they felt they had achieved most. Interns identified the transferability of the research skills they acquired as being invaluable to their other studies. All students agreed that their problem-solving skills, ability to plan, confidence in tackling unfamiliar problems had been enhanced as a result of the ULTRIS experience. This is of particular interest considering that they were engaging in research practices outside their main disciplinary study area. Observations regarding the growing acquisition of analytic thinking skills was evident in the work-in-progress meetings held with the students throughout the research period, and supported by the students agreement that they ‘tried to see... how all the ideas fitted together’.

**Table 2. 2009 Interns’ evaluations of the skills acquired as a result of undertaking ULTRIS**

<b>Statement</b>	<b>% student agreement</b>
My research has further developed my problem-solving skills	100
Doing my research has helped to develop my written communication skills	89
My research has sharpened my analytical skills	89
Doing my research has helped to develop my oral communication skills	78
Doing my research has developed my ability to plan my own work	100
As a result of my research I feel confident about tackling unfamiliar problems	100
As a result of my research I have developed the ability to learn independently	89
I see my research as contributing in some way to “big picture” issues	100
When I was working on my research, I tried to see in my own mind how all the ideas fitted together	100

Transferable skills were acquired that were not necessarily anticipated. These included time management abilities. As one student reported, a significant thing learnt from the programme was:

*How not to leave things to the last minute, and how to use my time better. Also how to keep continuously working on the project and not leave it for ages at a time as it is then harder to return to it. Also the importance of constantly re-evaluating your progress to make sure you're heading in the right direction (S1, 2009 ULTRIS intern).*

Another student summarised the benefits comprehensively and succinctly:

*Independent research; collaboration with others – discussing my ideas; public speaking – presenting to a group (on the spot!); the nature of researching – learning to think ahead, trying to cover all options, that is, looking at both the big picture and the small details and trying to integrate them. Communication was probably the biggest thing I learned – with the other interns, supervisor(s) etc. Even though independent learning was involved I learned to communicate my ideas and to ask advice (S2, 2009 ULTRIS intern).*

Students agreed that the preparatory workshops that were conducted before the projects began, as well as the on-going supervision provided, were instrumental in the programme's success. This feature of the ULTRIS programme sets it apart from other reports of undergraduate research into teaching and learning, which were mostly collaborative projects with staff. No introduction to research skills has been documented in these cases. The deliberate teaching of generic research skills and thinking allows the students to take greater informed ownership of their projects and enhances the ability of the students to make original intellectual or creative research contributions.

Some unexpected beneficial features emerged that may not have occurred in a discipline-based undergraduate research exercise. Students were forced into a position where the familiar became unfamiliar and in so doing they broadened their perspectives in a number of areas. Firstly, in recognizing the transferable skills they acquired, students became aware of the generic components of good research. Secondly, the cross-institutional involvement allowed students an opportunity to interact with and learn from students in different disciplines. Few occasions like this exist in the discrete discipline-divided university environment.

Thirdly, partly because of the nature of the research exercise generally and partly because of the focus of the projects, students reported improved relationships not only with the staff supporting them in their research but also with their teachers as a whole. One student summarised the experience in the following way:

*After liaising with and interviewing staff for the benefit of my research project, I would say that I am almost desensitized to feeling that my lecturers and tutors are figures of authority or just plain scary. I no longer view them as talking heads but as people who could potentially affect the way in which I see the world with their knowledge and experience. I really feel strongly about this. This conviction is one of the most fulfilling aspects I have taken away from the ULTRIS experience. Each of the figures that have guided me or informed my research during this experience have positively contributed to my future aspirations to partake in research and teaching after I have completed my degree (S3, 2009 ULTRIS intern).*

Finally students reported an increased understanding of how the University works, including the limitations and restrictions that staff contend with. One student put it like this:

*The lecturer-student gap really closed for me [as a result of the ULTRIS experience]. I also found out some really interesting things about institutional constraints to improving teaching and learning and some of the troubles lecturers were facing (S4, 2009 ULTRIS intern).*

In addition to the positives that staff experienced as a result of the gap-closing in their relationships and shared understandings with students, they also benefited from the increased knowledge of their own institution's learning environment provided through the students' research findings. For those willing to hear, this evidence-based input provides invaluable insight to inform individual teachers' practice.



While time will judge the impact of the ULTRIS experience on the students' inclination to pursue postgraduate research, the indications are that students felt less daunted by the prospect. One student described how ULTRIS had influenced her perceptions:

*As an undergraduate student, research seemed like an abstract concept - something that only postgraduate students and academics undertook. My attitude toward Honours and postgraduate studies has changed dramatically. No longer am I uncertain about the mere thought of 'collecting data' or presenting my ideas in a public arena—I am certain though, that I am capable of doing postgraduate studies and I am also extremely excited about embarking on that journey! (S5, 2009 ULTRIS intern).*

Beyond the potential flow-on effects to postgraduate studies as a consequence of providing undergraduates with an authentic and meaningful research experience, ULTRIS provides the University with another important asset. Through its innovative and original approach, ULTRIS is demonstrable evidence of the University's commitment to the provision of undergraduate research opportunities and training.

Finally, the unfamiliar teaching and learning context that sets ULTRIS apart from other exemplars of undergraduate research, offers a benefit for the higher education sector as a whole, namely a heightened awareness amongst a developing cohort of academics of the scholarship of teaching and learning. One intern summarised this and other advantages by commenting:

*How relevant educational research is for all disciplines. That it is useful for improving my own uni experience both through self-reflection on what is useful to me as a student and through being able to critically analyse the institution that I'm suppose to be learning through. Also having the ability to go out and find what the perceptions and experiences of other students are, and being able to get them out to a broader audience is very empowering. It has been really good having this experience with the research project and the support and workshops which were so thoughtfully organized (S6, 2009 ULTRIS intern).*

### **3. A significant obstacle/risk inherent in conducting undergraduate research**

An ever-present risk in engaging in any form of undergraduate research is the danger that the exercise can become tokenistic, that students can perceive it as being “similar to the typical ‘canned’ learning experiences that go no further than the professor and, after receiving a grade, a relegated to the ‘circular file’” (Paul, 2006, p.12). In the ULTRIS programme this risk was substantially eliminated through the specific characteristic of the internship, namely, **student preparation, student ownership of the project, a real problem that students are able to personally identify with, rigorous external assessment of the product and dissemination and implementation of the findings.**

As previously noted the preparation provided to the students prior to the commencement of their projects was identified as a defining aspect in the success of the research undertakings. The topics covered included: *Introduction to research, Research into Teaching and Learning, Reviewing the literature, Quantitative approaches to research, Qualitative approaches to research, Defining the problem and writing the research questions, and Writing a research proposal.*

The students also felt strongly about their ownership of the projects which was only made possible because of the preparation they received in the introductory workshops. In an intern’s own words: “Having this project that actually belonged to us and that we could care about and take responsibility for and which could actually be used in the real world was great” (S7, 2009 ULTRIS intern). This quote also highlights the importance of the real-world context of the research. As students of the institution where the teaching and learning research was conducted, they were able to closely indentify with, and have a personal investment in, the outcomes of the projects.

The importance and wider relevance of their projects was emphasised by the presentations of their findings at an external Teaching and Learning conference. To have their work scrutinized by external experienced researchers in the field was an affirming experience for all the interns.

The final assurance that the work undertaken is not trivial or unimportant can be provided by ensuring that targeted dissemination to relevant stakeholders within the university community occurs. The results of the students’ work need to be highlighted at different echelons of the university structure to enable informed improvement in practice and policy. Importantly, the ‘loop needs to be closed’ by ensuring that the students who undertake the research are kept informed of both the dissemination processes and any subsequent implementation of their findings that may result.

#### **4. A model of undergraduate research**

The starting point and focal consideration for any undergraduate research programme must be to articulate clearly the purpose for which it is being conducted. Beckman and Hensel (2009) suggest a series of dimensions that should be addressed in defining the purpose. The purposes might be altruistic or self-serving, be focused on student learning and development or on research product, be available to a select few or to large cohorts of undergraduate students. Once the questions are answered and the purpose determined the specific characteristics of a undergraduate research programme can take shape. Because the answers will be context specific and varied, there is no single model to represent what undergraduate research is, or should be.

In this project, a novel focus of undergraduate research has been described which, while it has demonstrated expected benefits in students' personal and academic growth, has also provided other benefits that have resulted from the characteristics peculiar to this teaching and learning focused model of undergraduate research.

Using the framework articulated by Beckman and Hensel (2009), the ULTRIS model can be described thus:

##### ***What is the purpose of the undergraduate research exercise?***

- To provide undergraduate students with a research experience that closely replicates the postgraduate experience.
- To develop generic research thinking and skills in undergraduate students.
- To discover more about issues of teaching and learning relevance within the students' own institution.
- To give students a more active voice regarding issues of teaching and learning within their own institution.

##### ***What is the focus of the research?***

- Teaching and learning issues in higher education, particularly those of interest to the institution.

##### ***Where is the research experience based?***

- The teaching and learning projects conducted by students are located within or across faculties of the university.
- With respect to the students' learning, ULTRIS is extra-curricular and is non-credit bearing towards their enrolled courses.

***Who has access to the research experience?***

- A selected group of self-nominated second and third year undergraduate students (ULTRIS is not available to first year undergraduates or Honours students).

***Who designs the research project?***

- Students take ownership of the project with supervision and guidance provided by academic staff.

***Who conducts the research?***

- In line with the intention to replicate a meaningful postgraduate research experience, students conduct their own study with supervision from academic staff.

***What ‘original contribution’ do the students make?***

- Students make ‘original contributions’ to their own understanding of teaching and learning, as demonstrated by their reflective statements about the experience.
- Students provide ‘original contribution’ to the institution’s understanding of teaching and learning issues within their university community, as demonstrated by adoption of the findings of the research to policy and practice
- Students provide ‘original contribution’ to the field of teaching and learning research generally as demonstrated by the wider dissemination of their findings at academic conferences and through academic publications.

***Who should the audience of the research findings be?***

- To ensure the research is meaningful to the student, the institution and the field of teaching and learning research, the audience should include interested stakeholders from within the university community, as well as the wider professional body beyond the institution.

This classification of the ULTRIS demonstrates how an undergraduate research programme can be multidimensional. For instance it can serve more than one purpose, have multiple outcomes, and be of interest to diverse audiences.

## Conclusion

Undergraduate students are capable and keen to actively contribute to pedagogic research, providing a valuable ‘insider’ perspective which has been previously overlooked. We argue that caution is needed to avoid tokenistic contribution, that expectations of quality of undergraduate research should be high, of a standard sufficient for publication and/or conference presentation. The focus of the research should be meaningful and relevant to both the student and a wider audience. A rigorous and structured preparation in basic research methods and ongoing supervision are essential elements to ensure successful outcomes for the individual students and the institution.

Looking forward, the challenge will be to discover ways that the ULTRIS experience, that of necessity is resource-intensive, can be adapted to allow a wider cohort of undergraduate students to participate in such meaningful and student-relevant research.

In *Reinventing Undergraduate Education* (The Boyer Commission on Educating Undergraduates in the Research University, 1998) it was noted that: “Every research university can point with pride to the able teachers within its ranks, but it is in research grants, books, articles, papers, and citations that every university defines its true worth”. (p.7). If we are to practice what we preach, perhaps it is the ULTRIS model that will demonstrate our commitment to the cause.

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