INTERNATIONAL PERSPECTIVES ON UNDERGRADUATE RESEARCH

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Introduction

I've been asked to talk about undergraduate research internationally. Let me start with a word or two about what international means in the context of today's symposium. My own experience has been mainly in Australia and the UK. In 2009 I was fortunate to go on an Australian Learning and Teaching Council National Teaching Fellowship to the USA to explore undergraduate research and I also visited the Netherlands.

Thankfully, I have been assisted in my task today by some great posters from Portugal, New Zealand, Ireland, Wales, the USA and UK, and thank you all for those. But notice that in talking about international perspectives, I'm talking here about the Western world and mostly with the exception of Australia and New Zealand the geographical North, and of course, mainly the English speaking world.

Having said that, I'm going to focus on three things:

1. I'll first talk about some trends across different countries.
2. Then I'll look at some of the threats to the development of undergraduate research and inquiry internationally
3. And finally I'll suggest some opportunities for us as a community of interested academics.

It's clear that undergraduate research experiences are becoming more widespread across the globe . Undergraduate research appears to take different forms:

- Research experience programs where individual students or small groups work with an academic faculty member typically, but not always during a vacation.
- Curriculum initiatives. Courses where students have opportunities to engage in research-based activities, develop research skills or participate in inquiry-based or problem-based learning at different levels during their undergraduate degree.
- Final year dissertations where students spend a significant amount of time working on one topic or capstone experience.

Support and drivers

Each of these forms of undergraduate research is present to varying degrees within each country. But there is considerable variation in how and whether such initiatives are supported by governments, by government research agencies, by private research funding bodies and by industry.

I want to say a little more about this because I believe that the extent to which these kinds of organisations support and fund undergraduate research is a critical factor in its growth.

In the USA undergraduate research experience programs have been supported by government research funding agencies such as the National Science Foundation for some 30 years or so. Programs have also received support for many years from private agencies such as the Research Corporation for Science Advancement and the Howard Hughes Medical Institute.

These programs tend to be separate from national initiatives in the USA to develop curricula, for example the work of the Carnegie Foundation for

Teaching and Learning in Higher Education and indeed, the Society for the Scholarship of Teaching and Learning.

In New Zealand, Rachel Spronken-Smith and colleagues report that there has been a strong government push to integrate teaching and research across tertiary education with a view to students learning how to take a research-based approach to their lives following graduation.

In the UK, where undergraduate research typically takes the form of a third or final year dissertation, the government has stressed the importance of research-based experiences for students and, as Mick and Alan report, made available funds to support research-informed teaching.

The UK government also generously funded six Centres of Excellence in Teaching and Learning focused on research and inquiry based learning within curricula.

In Australia, drives to improve teaching and learning more generally over the past twenty years or so through, for example, quality audits and performance-based funding for teaching, has resulted in numerous research-based curriculum initiatives across the system.

There has also been considerable expansion of interest and involvement in undergraduate research experience programs over the last five years due largely to concerns with the decline in doctoral student numbers and a desire to attract students to research higher degrees.

This is also the case in Ireland where, according to Bettie Higgs, postgraduate student numbers are set to double and there are concerns about research higher degree completions. In Ireland, it is the National Qualifications framework that is driving the development of research skills across the curriculum.

We learn from a second Irish poster, from colleagues in the Dublin Region, that strategic innovation resources of the Irish Higher Education Authority have funded research-enabled learning and teaching initiatives.

Funding and government support for undergraduate research thus critically affects the extent to which it is accepted and is considered acceptable. It also critically affects the kind of research experiences available to students.

In Australia when I first started my Fellowship, I found that while there were many initiatives in universities to teach students research skills and engage them in a variety of research-based activities, talk of undergraduate research was almost taboo. Indeed, two major reviews of higher education by the Australian government failed to acknowledge the existence of undergraduate research.

Yet during my Fellowship when we investigated how much of it was going, we found that two thirds of universities had one or more undergraduate research experience programs. Some universities had 8 or 9 in existence alongside of, and often unknown to each other and to the rest of their university.

In recent years, some universities have established university-wide schemes, but these are comparatively rare. We found that there were a number of private providers supporting research experience programs.

Nature of institutions

A critical issue in the development of undergraduate research is what is understood by a university. In the USA undergraduate research initially became popular within predominantly undergraduate institutions. As there was no question of involving doctoral students in their research, academics in these institutions could only call on undergraduates to work with them as in the USA.

Having been found to be successful and to attract research funding, I understand that undergraduate research subsequently grew in research-intensive institutions. Similarly, in New Zealand, the government's push

for institutions to include inquiry learning, undergraduate research has been taken up more strongly in the less research-intensive polytechnics.

Also in the UK a number of non-research intensive universities (so-called 1992 universities) have taken the opportunity to use government funds allocated to research-informed teaching to set up research experience programs. Interestingly, the funds were allocated to institutions in reverse proportion to research funding.

It will be interesting to see if research-intensive universities in New Zealand and the UK follow as research-intensive universities in the USA have done.

In Australia, by definition, a university offers post-graduate courses and research higher degrees. So there is no compelling research reason to involve undergraduates. It's postgraduates who are more likely to be included in research programs.

Yet there, paradoxically, research-intensive universities are the main providers of research-experience programs. A key challenge we face is in persuading the less research-intensive institutions, and particularly the regional universities, that there is advantage for them in developing undergraduate research experience programs.

While there is now considerable research evidence of the effectiveness of research experience programs in the USA, evidence of students' gains from studies elsewhere is sparse. In Australia we have very limited evidence of student gains and only a little evidence that research experience programs actually achieve the aim of growing PhD student numbers.

However, there is considerable evidence that integrating research into the curriculum can lead students to shift from being consumers to being producers of knowledge, that they develop important graduate capabilities.

Threats

We have to recognise that internationally, counter threats to the development of research-based learning within the curriculum are strong and growing.

They include increasing mass higher education, reduced funding, increased use of sessional/casual staff etc. There is also the perception that fee-paying students are unwilling to engage in research-based activities. Increased student employment also puts demands on students to limit the amount of time spent on study both during semester and in vacation time.

Student stipends have to compete with the amount of money that students can gain from employment. This affects the lengths of research experience programs. For example, in Portugal, government funding provides for students to engage in research for 12 months, whereas in other countries this is more likely to be limited to 6 to 10 weeks.

Further, in some countries there are trends to diversity institutions, e.g. UK's 2003 government report calling for teaching only institutions, in Australia there has been much talk and some action (e.g. The University of Queensland) around the establishment of 'teaching focused' academic positions.

Academics and institutions appear to be resisting such trends and indeed, as Alan and Mick report, the UK government softened its approach later talking of research-intensive and 'teaching-intensive institutions.

But we need to be aware of the effects on the extent to which students are able to engage with research of trends to establish differently focused institutions and positions.

One of the key issues that emerges is a disconnect between undergraduate research experience programs that are set up by researchers and undergraduate research in the curriculum which tends to be driven by people interested in improving teaching and learning. This disconnect goes further.

Many universities have separate committees for dealing with teaching and with research. undergraduate research programs fit into discussions within research committees and come under the purview of the senior administrator responsible for research (e.g. PVC Research) and the curriculum fits into discussions of teaching and learning committees and comes under the direction of the person responsible for teaching and learning in the institution (e.g. PVC Teaching and Learning).

No doubt we will hear more of this when we come to consider institutional strategies later today. But I have seen little evidence of creative ways of dealing with these issues and much evidence of the effects of this kind of separation.

I have still encountered notions of academic freedom which prevent program level approaches to curriculum design and development. Notions that the individual academic is free to decide what they teach and how they teach it are supported by institutional and individual review processes that reward departments and faculty on the basis of their individual teaching performance.

Yet if research skills are to be developed in students, a whole of program approach to curriculum planning is necessary.

This means opening up classrooms and curricula to peer scrutiny. In some countries and in individual institutions this happens routinely but in others it is almost considered taboo.

It presents a threat to the development of undergraduate research.

Opportunities

When considering research experience programs it is noticeable that the STEM (Science, technology, engineering, and mathematics) disciplines predominate in all countries. It appears easier for students to be integrated in laboratory based situations where there's frequently a hierarchy of supervision support.

In contrast, curriculum-based initiatives are more common within the humanities and social sciences. These are broad trends that derive from respective disciplinary cultures. The challenge, and indeed, an opportunity for the future is the extension of undergraduate research in all its forms across all disciplines.

Institutions and individuals need guidance as to how to do this and this group can be an important catalyst in the process.

It is important to remember that undergraduate research doesn't sit outside other curriculum initiatives. I think that it is an important way of delivering curriculum reforms such as work-based or work-integrated learning, service learning, community engagement and the achievement of various graduate capabilities, rather than an end in itself.

I believe that viewing research-based learning in this way presents a number of opportunities to be exploited.

In most countries, while there are some noticeable exceptions, students typically gain remuneration for work carried out during an undergraduate research experience program. Ways also need to be found to reward students for such efforts through the attainment of academic credit. In other words, to integrate their research into their degree.

There's variation in the extent to which supervisors are paid for their time in mentoring undergraduate researchers. In Australia, for example, we found that no supervisors received any credit, funding or recognition for

this work. However, in other countries, a stipend is frequently available for academics.

Undergraduate research journals and conferences are growing at an exponential rate. New developments such as the University of Central Lancashire Student undergraduate research society, present exciting opportunities for students.

I have long been of the opinion that the way to change higher education is to activate students to demand change and this is one example of that.

In many countries I have encountered a willingness amongst staff to change their teaching to incorporate inquiry-based approached to teaching and learning.

However, while they may be willing, they often lack the know-how. Staff development is needed to move practice from small numbers of elite students – all students and at lower levels and later years. When I was in the States I was often informed that doing research was the best way for students to learn.

But faculty stressing this appeared not to be able to translate this sentiment into changes in their courses. Clearly staff development in teaching and learning is also needed for researchers.

Conclusions

- Undergraduate research experience programs are becoming more widespread internationally
- Undergraduate research journals and conferences are growing at an exponential rate. New developments (UCLAN Student undergraduate research society).
- Counter threats to research-based learning within the curriculum are strong and growing. They include mass higher education, reduced funding, increased use of sessional/casual staff etc.

- There are trends to diversify institutions, e.g. UK's 2003 government report calling for teaching only institutions, in Australia (UQ) establishment of 'teaching focused' academic positions.
- Staff development needed to move practice from small numbers of elite students – all students and at lower levels and later years.

I'm passionate about engaging undergraduates in research and inquiry because I believe that it is key to providing a university education that is meaningful within 21st century society.

It's a society in which we need people who know how to, to cope with ambiguity and complexity, who can work with others in harmony to solve complex multi-disciplinary problems, who can take decisions in the light of the best available evidence.

Above all, we need people who can think creatively. I'm aware that today I'm talking to the converted. There's a lot of work ahead, it's up to us to provide leadership.

Thank you very much.