Developing students as researchers.

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Abstract

Our intellectual starting point is Humboldt’s vision for higher education which arguably recently finds its strongest current manifestation in the US undergraduate research programmes which are frequently for selected students. We argue the task now is to ‘reinvent’ the curriculum to ensure that all undergraduate students in all higher education institutions learn through some form of research or inquiry. This argument follows from the international research evidence of the student experience of research and inquiry. We illustrate the argument with initiatives by curricula teams, departments and institutions who have attempted to ‘mainstream’ undergraduate research and inquiry for most or all students.

“We want all students to access the benefits exposure to teaching informed by research can bring. ... We believe an understanding of the research process – asking the right questions in the right way; conducting experiments; and collating and evaluating information – must be a key part of any undergraduate curriculum.” (Bill Rammell, UK Minister for Higher Education, 2006, p. 3).

Introduction

Our argument can be simply stated: all undergraduate students in all higher education institutions should experience learning through and about research. This applies to all students in higher education, including those taking higher education courses in Further Education Colleges. While recognising that there are other goals the curriculum should support (e.g. student employability, civic engagement), students learning in ‘research mode’ should be central to the curriculum. Unfortunately, the Research Assessment Exercise (RAE) has both devalued the importance of teaching and effectively moved many undergraduate students and academic staff out of the worlds of research.

Our interest in developing students as researchers originated through our explorations over the last few years into ways to enhance the linkage between teaching and discipline-based research. Our conclusion is that one of the most effective ways to do this is to engage our students in research and inquiry; in other words, to see them as producers not just consumers of knowledge.

In attempting to do this we feel that there is a lot we may learn from the undergraduate research programmes in the US, which started by providing research opportunities for selected students in selected institutions and were often outside the formal curriculum e.g. in summer enrichment programmes. However, for us the key to mainstreaming undergraduate research is to integrate it into the curriculum.
**Is Undergraduate Research for all Students?**

Your answer to this depends on how you define undergraduate research. If you restrict it to the creation of new knowledge, often through working with staff, such as part of a laboratory research team, then the experience is likely to be limited to a few select students. However, if you conceive undergraduate research as students learning through courses which are designed to be as close as possible to the research processes in their discipline then it can be for all students. The focus then is on student learning and on being assessed in ways that mimic how research is conducted in the discipline, for example, through undergraduate research journals and student research conferences and exhibitions. In these cases, what is produced and learned may not be new knowledge *per se*; but it is new to the student and, perhaps more significantly, transforms their understanding of knowledge and research. In terms of Figure 1 the emphasis is on the student learning in ‘research-based’ and ‘research-orientated’ modes.

The argument as to whether undergraduate research is for all or selected students is in part a political question - to whom and for what, do national systems and institutions allocate resources, in particular staff time? But for us it is largely an educational and/or philosophical question as to the nature of higher education. We are persuaded by the arguments of those, such as Ron Barnett, that what distinguishes higher education is the emphasis on helping students to live in a supercomplex world and that the curricula task is for “lecturers (to) adopt teaching approaches that are likely to foster student experiences that mirror the lecturers’ experiences as researchers” (Barnett, 2000, p. 163).

**STUDENTS ARE PARTICIPANTS**

<table>
<thead>
<tr>
<th>Research-tutored</th>
<th>Research-based</th>
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<tbody>
<tr>
<td>Engaging in research discussions</td>
<td>Undertaking research and inquiry</td>
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<th>Research-led</th>
<th>Research-oriented</th>
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<tr>
<td>Learning about current research in the discipline</td>
<td>Developing research and inquiry skills and techniques</td>
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**STUDENTS FREQUENTLY ARE AN AUDIENCE**

*Figure 1.* The nature of undergraduate research and inquiry. Source: Healey and Jenkins (2009a, amended from Healey, 2005, p. 70).
The Research Evidence

There is growing international research on teaching and discipline-based research relations. In brief this shows that the asserted close interconnection between research and the curriculum is professed more than it is delivered, and in Brew’s (2006, p. 52) powerful phrase too often undergraduate students are “at arms length” from the worlds of university research.

Coordinated interventions in zoology at University of Tasmania, Australia (Edwards et al., 2007)
- Years Two and Three. All invited to participate in Student Research Volunteers program (http://www.zoo.utas.edu.au/volunteers/summvolunteer3.htm). Volunteers are matched with mentors, usually Postgraduate or Honours students, for short-term, in-house research placements that may offer either laboratory or field experiences.
- Years One, Two and Three. ‘Reach into Research’ seminars held several times each semester (www.zoo.utas.edu.au/rir/rir2&3.htm). Speakers from industry, collaborating institutions and PhD students present their research, and then all non-undergraduate audience members, except the facilitator, leave the room.

Miami University Ohio, US, are embedding inquiry into the largest courses (Hodge et al., 2008)
They have instituted a Top 25 project in which over a four-year period the largest recruiting courses, mainly at first year level, are being supported to convert to inquiry-based learning.

Undergraduate research at University of Gloucestershire begins at induction
In 2007 over 650 students in the Faculty of Education, Humanities and Science undertook discipline-based inquiry projects during induction week. This involved them working in small groups to collect information from the library and in the field, analyse it, present it to tutors in novel ways, and receive formative feedback. For example, the human geographers and the sociologists researched the experience of Gloucester residents of ‘the Great Flood of 2007’. The Biologists and the Psychologists investigated primate behaviour at Bristol Zoo, while English Literature students visited an arboretum and explored the use of trees in literature. Social and academic activities were integrated, the students had fun, and, importantly, they made friends. The approach was developed, and initially supported, by the Centre for Active Learning (http://resources.glos.ac.uk/ceal/pre-induction/index.cfm). It has proved a significant staff development activity both for the many academic tutors and the library staff who changed their approach to library induction to support the specific student research projects. Over the next two years other Faculties in the University are developing their versions of developing undergraduate research as part of induction.

Academic journal writing in geography at Oxford Brookes is part of course requirements (Walkington and Jenkins, 2008)
The geography programme at Oxford Brookes has developed a set of linked requirements that support all students learning to write research articles. In the second year all students undertake field-based research in a range of venues. A third-year compulsory first semester course ‘Geography Research and Practice’ has as its main assessment students writing an article of up to 4,000 words from the data collected in the second-year fieldwork (http://www.brookes.ac.uk/schools/social/geoversity/index.html).

Undergraduate research programmes at University of Michigan, US, support racial diversity and widening participation (Huggins et al., 2007)
While the University had been successful in recruiting Afro–American students from inner-city Detroit their drop out rate was high. Special programmes were targeted at these students in years one and two to enhance their integration and academic success with significant positive impacts.

Table 1. Examples of ‘interesting’ curricula interventions
Particularly important to our argument here is the research of Baxter Magolda. Based on a detailed interview-based study of students’ intellectual development during and after university, she has argued that university curricula need to support student and citizen development from “absolute knowing (where) students view knowledge as certain; their role is to obtain it from authorities (to) contextual knowing (where) students believe that knowledge is constructed in a context based on judgement of evidence; their role is to exchange and compare perspectives, think through problems, and integrate and apply knowledge” (Baxter Magolda, 1992, p. 75). However, too often curricula “frame learning as the passive acquisition of knowledge” (Baxter Magolda, 2008).

We have gathered a large collection of ‘interesting’ international examples of mainstreaming undergraduate research from a range of disciplines, institutions and national systems (Healey and Jenkins, 2009a, 2009b). A small selection is shown in Table 1.

Where Next?

We know of many examples of interesting practices for engaging students in research and inquiry in individual modules, but far fewer cases where undergraduate research has been mainstreamed across a course, department, institution or national system. More strategic interventions to reinvent the curriculum, such as Miami University Ohio is attempting, are needed.

We believe that undergraduate research and inquiry should be an important part of the curriculum from the day students start studying at University, and perhaps before then, as the example of the University of Gloucestershire suggests. Undergraduates should be included in the research community, as happens with Zoology students at Tasmania, and not kept ‘at arms length’.

Developing students’ competencies to engage in research and inquiry and to begin to think like discipline specialists is a significant way of meeting many graduate attributes and the government’s employability agenda, as is well illustrated by The Scottish Higher Education Enhancement Committee approach to developing research-teaching links.

Finally, we echo the perspectives of Angela Brew (2007, p. 7) that:

“For the students who are the professionals of the future, developing the ability to investigate problems, make judgments on the basis of sound evidence, take decisions on a rational basis, and understand what they are doing and why is vital. Research and inquiry is not just for those who choose to pursue an academic career. It is central to professional life in the twenty-first century.”

In other words, as David Hodge (2007, p. 1), President of Miami University, says, “undergraduate research should … be at the center (sic) of the undergraduate experience”.

NOTE

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SOME USEFUL WEBSITES

- Council on Undergraduate Research: www.cur.org
- Higher Education Academy Research and Teaching: www.heacademy.ac.uk/ourwork/research/teaching
- Learning Through Enquiry Alliance: www.ltea.ac.uk/
- The Scottish Higher Education Enhancement Committee Enhancement Themes: Research-Teaching Linkages: www.enhancementthemes.ac.uk/themes/ResearchTeaching/default.asp
- University of Gloucestershire: NTFS Project ‘Leading, promoting and supporting undergraduate research in new uni-
• Universities of Warwick and Oxford Brookes, The Reinvention Centre for Undergraduate Research: http://www2.warwick.ac.uk/fac/soc/sociology/research/cetl/ugresearch/

REFERENCES


HEALEY, M., JENKINS, A. 2009b. Linking discipline-based research and teaching through mainstreaming undergraduate research and inquiry. resources.glos.ac.uk/ceal/resources/index.cfm.


