

Undergraduate Research and International Initiatives to Link Teaching and Research

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“... universities should treat learning as not yet wholly solved problems and hence always in research mode”

—Wilhelm von Humboldt on the future University of Berlin (1810)

“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 MP, U.K., Minister of State for Higher Education (2006)

The term *undergraduate research* and the concept's integration into the curriculum grew out of U.S. practice, in particular the innovative work of Margaret MacVicar, who founded the pioneering Undergraduate Research Opportunities Program in 1969 while she was dean of undergraduate education at the Massachusetts Institute of Technology (Cohen and MacVicar, 1976). Internationally, a growing number of national systems and institutions have adopted the term “undergraduate research” and adapted its curricular form to their national academic cultures and funding systems. One indication of this worldwide interest is the publication by the U.K. Higher Education Academy of our book *Developing Undergraduate Research and Inquiry* (Healey and Jenkins, 2009). Drawing on a wide range of international case studies, this book demonstrates strong interest by departments, institutions, and national systems world-wide in developing and adapting North American conceptions of undergraduate research. We believe these international initiatives, in turn, can not only support the growing U.S. undergraduate-research movement by providing case studies of practice adapted to those contexts, but also provide further conceptual and research-based understanding.

However, to understand this growing interest in U.S. undergraduate-research initiatives, one has to widen the perspective and see it in the context of the mounting international concerns about pressures to separate teaching and research. Such interest parallels the arguments in Ernest Boyer's influential book *Scholarship Reconsidered* that “the time has come to move beyond the tired old ‘teaching versus research’ debate” (Boyer, 1990, xii), and the Boyer Commission's call to “make research based learning the standard,” (1998, 15-19). International adaptations may at times directly use the term “undergraduate research,” and set up special institutional and departmental undergraduate-research programs. However, in

many cases their focus is much wider, seeking to engage all students in research and inquiry or to recast the curriculum to more explicitly bring together the institutional and departmental research and teaching agendas.

Pressures to Separate Teaching and Research

Many scholars and national higher-education systems have seen the connection between teaching and discipline-based research, or what some have described as the “teaching-research nexus,” as the defining characteristic of *higher* education and what separates it from school and vocational education. Thus, the American scholar Burton Clark (1997, 242) argues “research activity can and does serve as an important mode of teaching and a valuable means of learning ... [S]tudent involvement in research is an efficacious way to educate throughout the education system the great mass of students, as well as the elite performers, for the inquiring society into which we are rapidly moving.”

However, recent developments have called into question this presumed close connection between teaching and research. Governments world-wide are intent on developing high-level research in universities as a means of promoting economic growth and scientific understanding. In some national systems and institutions, these pressures have led to research being further concentrated in selected universities and, consequently, to research staff with little or no involvement with undergraduates. A parallel academic workforce is growing with teaching-only or teaching-focused appointments.

As national systems expand to develop U.S. forms of mass higher education—seen as important to economic and social growth—the cost of providing research environments in all institutions is seen as too high. This has led the U.K. government to emphasize “the benefits for some institutions of



Australian undergraduate students engaged in research.

focusing their efforts on teaching well” (Department of Education and Skills, 2003, 55). While the U.S. higher-education system has developed a wide range of institutions, internationally there are a number of systems that until recently strove for similarity of institutional missions, including connections between teaching and research. Such systems now are becoming increasingly differentiated on U.S. lines, developing international-level research universities and other more local, vocationally focused higher-education institutions.

These international developments are probably unstoppable and may be desirable. They are, in fact, resulting in a range of developments demonstrating ways to bring teaching and research together, including a growing interest in the U.S. undergraduate research movement. There has been a significant increase in study of the relationships between teaching and research, which can enhance our conceptual understanding and, in turn, guide practice and policy. There have also been national and institutional-level initiatives to ensure that students learn in a research environment.

Developing Research and Conceptual Understanding

There is a large international research literature on teaching and discipline-based research relationships (Jenkins, 2004). Much of this research focused on statistical analysis of measures of student satisfaction and faculty research productivity. In an influential meta-analysis of that research, Hattie and Marsh (1996) concluded that:

“the common belief that teaching and research were inextricably intertwined is an enduring myth. At best teaching and research are very loosely coupled (p.529). ... *The strongest policy claim that derives from this Meta analysis is that universities need to set as a mission goal the improvement of the nexus between research and teaching. ... The aim is to increase the circumstances in which teaching and research have occasion to meet, and to provide rewards not only for better teaching or for better research but for demonstrations of the integration between teaching and research*” (p.533, emphasis added).

Setting a policy goal of bringing teaching and research together reflects value judgements as to what makes higher education *higher*.

Two scholars influential in reconceptualizing teaching-research relationships are Ronald Barnett of the Institute of Education in London and Marcia Baxter Magolda of Miami University, Ohio. For Barnett (2000a), the central role of the university should be to help *all* students cope with “supercomplexity”:

“A *complex* world is one in which we are assailed by more facts, data, evidence, tasks and arguments than we can easily handle *within* the frameworks in which we have our being. By contrast, a *supercomplex* world is one in which the very frameworks by which we orient ourselves to the world are themselves contested” (Barnett, 2000a, 257, emphasis in original).

For Barnett the curricular implications are clear: “the issue is whether lecturers adopt teaching approaches that are likely to foster student experiences that *mirror the lecturers’ experiences as researchers*” (Barnett, 2000b, 163, emphasis added).

Research by Baxter Magolda provides a similar message. Her major research has been a detailed, long-term study of a cohort of students who entered college in 1986. From that, and from related research, she has argued that university curricula need to support a shift in 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, 75).

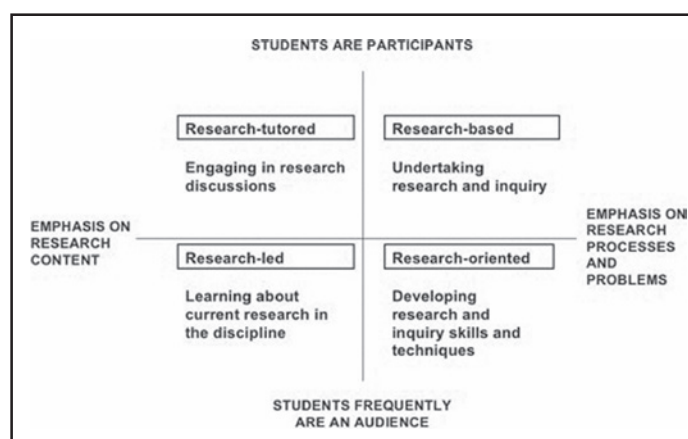
However, too often curricula “frame learning as the passive acquisition of knowledge” (Baxter Magolda, 2009, 155). She calls for curricula in which “teachers model the process of knowledge construction in their disciplines, teach that process to students, and give students the opportunities to practice it” (Baxter Magolda, 1999, 9).

While we recognize there are many ways in which undergraduate research may be experienced (Beckman and Hensel, 2009), we contend that there are four main ways of engaging undergraduates with research and inquiry:

- research-led: *learning about current research in the discipline*;
- research-oriented: *developing research skills and techniques*;
- research-based: *undertaking research and inquiry*; and
- research-tutored: *engaging in research discussions*.

These are shown in Figure 1.

Figure 1: The Nature of Undergraduate Research and Inquiry Source: Healey and Jenkins (2009, 7)



This model, amended from an earlier one (Healey, 2005), has two axes. One classifies the ways students may be engaged in research and inquiry according to the extent to which students are treated primarily as the audience or as participants. The second axis classifies the approach according to whether it emphasizes research content or research processes and prob-

lems. This framework is useful because it can help faculty members talk about the different ways in which they may introduce their students to research and inquiry.

All four ways of engaging students are valid and valuable, and we think curricula should contain elements of all of them. Our general view is that in much of higher education too much teaching and learning is the type in the bottom half of the model, and that most students would benefit from having more exposure to activities outlined in the top half. However, we would not want students to spend nearly all their time in the type of activities in the top half of the framework, as tends to happen in some problem-based learning courses. Our earlier work emphasizes that using a wide variety of methods of learning and assessment is a sensible strategy to respond to students' differing preferred learning styles (Healey and Jenkins, 2000; Healey et al., 2005).

The four ways of engaging students with research and inquiry are, of course, not independent. For example, undertaking research and inquiry and engaging in research discussions are effective ways to learn about current research in the discipline and develop skills and techniques for research and inquiry. Course teams may find it useful to discuss whether they have the appropriate balance among the four ways of engaging undergraduates with research and inquiry and how that balance may change as students progress through their education.

Much recent inquiry about teaching-research relationships has centered on understanding how the student experiences research and how institutional and departmental cultures shape student and faculty experiences. A study at the University of East Anglia in the U.K. concluded: “While students value being close to research, and to the idea of a university as a research community in which they are included, there are many ways in which they feel excluded” (Zamorski, 2000, 1). Drawing on the research literature and her own research at the University of Sydney in Australia, Angela Brew sees much current practice as keeping students “at arm’s length” from the world of university research (2006, 52). Related research on the faculty experience has found that national systems and institutional policies generally conceive of teaching and research as separate activities. While national and institutional mission statements proclaim the value of students learning in a research environment, the potential connections between policies for research and teaching often are not sought or realized.

Welcome to Our New Feature: “International Perspectives on Undergraduate Research”

Undergraduate research is a global movement! The *CUR Quarterly* is introducing a series of articles on the theme of “International Perspectives on Undergraduate Research.” There are a number of national educational systems, institutions, and individual faculty members in the international arena that have developed undergraduate research programs or other initiatives that explicitly seek to bring undergraduates into the research world of the university. In addition, there are a number of researchers working in international contexts that are actively shaping what we know about the undergraduate research enterprise. We are proud to share the work of our international partners with the CUR readership.

We are launching the “International Perspectives on Undergraduate Research” with an article penned by our International Editors, Mick Healey and Alan Jenkins, both from the UK. Mick and Alan have recently published a book, *Developing Undergraduate Research and Inquiry*, which may be downloaded free from the Higher Education Academy’s Web site at:

http://www.heacademy.ac.uk/assets/York/documents/resources/publications/DevelopingUndergraduate_Final.pdf.

You may expect to see further international offerings in future issues of the CUR Quarterly. To find out more about the “International Perspectives on Undergraduate Research” theme, you may refer to the Spring 2010 issue of *CURQ on the Web*.

Kelly McConnaughay
Editor-in-Chief
CUR Quarterly

Shaped by this conceptual and research-based rethinking of the relationships between teaching and research, a growing number of institutions and national systems have sought to reshape or reinvent their organizational structures, policies, and funding arrangements to bring teaching and research closer together (Healey and Jenkins, 2009). For example, McMaster University in Canada has developed a strong inquiry-based curriculum starting in the student’s first year; at Roskilde University in Denmark half of the curriculum features students working on research projects; the Australian National University has created a special curriculum in which selected students take research-based courses throughout their four years; Maastricht University in the Netherlands has a curricular focus on problem-based learning. A key way to understand these developments is to see them in the context of recent *national* initiatives to move beyond “teaching versus research.” While in the U.S. the federal government is but one player shaping institutional policies, in much of the rest of the Western world, national governments significantly shape policies and provide much of the funding for both teaching and research.

National Initiatives to Link Teaching and Research

These initiatives have taken a variety of forms, which we encapsulate as *auditing, sharing and enhancing good practice*, and *targeted funding*.

Many national systems have procedures and organizations that regularly audit institutions and departments to ensure teaching quality (similar to regional accrediting agencies in the U.S.). Some of their interventions recently have focused on ensuring effective links between teaching and research. Thus in New Zealand, a statutory definition of a university is one in which “*research and teaching are closely interdependent* and most of their teaching is done by people who are active in advancing knowledge” (Woodhouse, 1998, 41). In 2000-2001, all universities were audited for the extent to which they were achieving that requirement—a process that stimulated much rethinking of institutional policies.

In a related movement in the U.K., the Quality Assurance Agency (QAA) has focused on working with institutions and disciplinary communities to develop national benchmark standards for honors degrees. These benchmarks almost all refer to

aspects of the nexus between teaching and research as central to the requirement for honors classification. For example, the benchmark for an honors degree for an English major states that honors graduates “will be able to conduct research through self-formulated questions and tasks, supported by the gathering of relevant information and organized lines of enquiry, resulting in a sustained piece or pieces of work” (QAA, 2007, 8).

A somewhat different strategy than auditing institutional practices is governmental action to share and enhance good practice. From 2006 to 2008, the Australian Learning and Teaching Council funded a project that encouraged institutions and disciplinary communities to share and develop practices that enhanced the “teaching-research nexus” (trnexus.edu.au/). During the same period in Scotland, the Quality Assurance Agency (QAA Scotland) worked across the Scottish higher-education sector to enhance the abilities of graduating students through a focus on research-teaching links (www.enhancementthemes.ac.uk/themes/ResearchTeaching/default.asp). That focus is now being further developed by linking the research-teaching focus to other agendas, including introducing students to research in their first year of college and enhancing students’ employability.

Similarly, across the U.K. the Higher Education Academy has funded projects in which disciplinary communities have developed and shared effective practices for linking teaching and research. These have included a growing number of undergraduate research schemes and initiatives, such as publishing undergraduate research journals. Many of these initiatives were highlighted in a conference, *Bringing Research and Teaching Together: Adapting US Experience to the UK*. It was organized by the Higher Education Academy and the U.K. Research Council’s Executive Group (HE Academy, 2006) and featured a keynote speaker from the U.S. National Science Foundation.

Finally, two National Teaching Fellowship Projects, one in Australia and one in the U.K., are exploring aspects of undergraduate research. Angela Brew at Macquarie University in Australia is undertaking a project on “engaging undergraduate students in research and inquiry” (www.altc.edu.au/altc-national-teaching-fellow-angela-brew), while a team led by Peter Childs and Mick Healey at the University of Gloucestershire is investigating “leading, promoting and supporting undergraduate research in new universities” (resources.glos.ac.uk/tli/prsi/current/ugresearch/index.cfm).



Australian undergraduate students engaged in research.

Several useful case studies on undergraduate research from the latter project are available on the Centre for Active Learning’s Web site (resources.glos.ac.uk/ceal/resources/casestudiesactive-learning/undergraduate/index.cfm).

Many national systems allocate funds to higher-education institutions through block grants, some of which are targeted for particular initiatives. For example, in Ireland the Programme for Research in Third Level Institutions (PRTLII), which began in 1998, provides the bedrock for the expansion of research in the higher-education system. Excellence in the impact of research on teaching and learning is one of four criteria used by an international panel of distinguished researchers and scholars to evaluate awards (www.heai.ie/PRTLII/).

In England, two major funding initiatives have significantly increased the number of institutions with undergraduate research initiatives. Some institutions have sought to integrate undergraduate research into the mainstream curriculum, and other institutions have set up U.S.-style summer undergraduate research projects. The first U.K. institution to set up the latter was Imperial College in 1980, guided by Margaret MacVicar at MIT. In response to criticism of the Government White Paper calling for creating “teaching only universities” (Department for Education and Skills, 2003), the Higher Education Funding

Council for England (HEFCE) in 2006 allocated £40 million, through the Research Informed Teaching Fund, to institutions for projects to develop student research understanding and skills. The funding was awarded in inverse proportion to institutions' national research funding (www.hefce.ac.uk/pubs/hefce/2006/06_11/). A number of institutions, such as University of Plymouth and the University of Central Lancashire, have used some of their funding to establish undergraduate research journals. In 2005 HEFCE established 74 Centres of Excellence in Teaching and Learning (CETLs) in England, seven of which are directly focused on undergraduate research and inquiry, including how U.S. practice may be directly adapted to the U.K. context (Healey and Jenkins, 2009, 99-100).

Conclusion

Undergraduate research has developed out of U.S. practice and thinking and has now established itself as an important curricular form across the diverse North American higher-education landscape. Its success, including the growing research evidence of its impact on student intellectual development (Hunter *et al.*, 2010; Kuh, 2008), has started to influence national systems and institutions worldwide, and some are adapting undergraduate research to their different funding systems and cultures.

In particular, undergraduate research has resonated internationally with those who wish to hold on to the Humboldtian ideal of a university where teaching and research are intertwined, but who must adapt that ideal to the realities of a mass higher-education system. The threat of national systems creating in effect "teaching-only" or "teaching-intensive" institutions has stimulated much research to re-examine and reconceptualize the relationships between teaching and research. That research has helped provide the evidence to support national and institutional efforts to bring undergraduates into the world of research. Many of these initiatives directly focus on developing U.S.-style undergraduate-research programs. Others seek to develop related curricula that can support student learning through and about research. The North American undergraduate-research movement can draw from these international developments by using the research insights, curricular forms, and examples of effective practice to strengthen its own practices, policies, and understanding. Undergraduate research is now an international movement.

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