Nature and Development of Undergraduate Research and Inquiry: Mapping the Territory

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“We need to encourage universities and colleges to explore new models of curriculum. … There are several models that we might explore. They should all: … Incorporate research-based study for undergraduates”

(Paul Ramsden, 2008)
“Here you can learn about the fun of teaching and learning that we offer, the excitement that our research projects ignite, and the vibrancy that the University community manifests.”

Tony F Chan, President Welcome to HKUST on the Web

“Teachers and students alike participate in research-based teaching”

HKUST Web site - Teaching and Learning
Transforming the undergraduate experience

Undergraduate research. To integrate research and learning by introducing undergraduate research credits, senior research theses, research mentorships, and work-study in research facilities and centers.

HKUST Strategic Plan, 2005-20
Brief Biography

• HE Consultant and Researcher
• Economic geographer and Director Centre for Active Learning
• Director HE Academy projects on ‘Undergraduate research’ and ‘Rethinking final year projects and dissertation’
• Ex-VP for Europe International Society for Scholarship of Teaching and Learning
• National Teaching Fellow and Senior Fellow HE Academy
• Joint editor of international section of Council on Undergraduate Research Quarterly
• Visiting expert to Higher Education Authority for Ireland evaluating teaching and learning components of Programme for Research in Third Level Institutions (2003)
• Advisor to National Academy for Integration of Research, Teaching and Learning (Ireland) (2007-11)
• Advisor to Australian Learning and Teaching Council Project on the ‘Teaching-research nexus’ (2006-08) and ‘Undergraduate research’ (2009-10)
• Advisor to League of European Research Universities on research-based teaching (2009)
• Honorary Professor University of Queensland; Visiting Professor Edinburgh Napier and University of Wales Newport
• Research interests: scholarship of teaching; linking research and teaching; active learning; developing an inclusive curriculum for disabled students
Engaging students in research and inquiry

"Postgraduate study is too late to start; research attributes need to be integrated fully into undergraduate courses"

Ian Diamond, Chair Research Councils UK, 2010
 Engaging students in research and inquiry

“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.”

Brew (2007, 7)
High Impact Activities

- First-Year Seminars and Experiences
- Common Intellectual Experiences
- Learning Communities
- Writing-Intensive Courses
- Collaborative Assignments and Projects
- “Science as Science Is Done”; Undergraduate Research
- Diversity/Global Learning
- Service Learning, Community-Based Learning
- Internships
- Capstone Courses and Projects

Source: Kuh, 2008
Engaging undergraduates in research and inquiry

1. Different ways of engaging students
2. Undergraduate Research Opportunity Programmes (UROPs)
3. Capstone courses and dissertations
4. Inquiry based learning (IBL) and problem based learning (PBL) courses
Students are participants

Emphasis on research content

- Research-tutored
  - Engaging in research discussions
- Research-led
  - Learning about current research in the discipline

Emphasis on processes and problems

- Research-based
  - Undertaking research and inquiry
- Research-oriented
  - Developing research and inquiry skills and techniques

Students frequently are an audience

Curriculum design and the research-teaching nexus

(based on Healey, 2005, 70)
No entry for heavy goods vehicles.
Residential site only

Nid wyf yn y swyddfa ar hyn o bryd. Anfonwch unrhyw waith i’w gyfieithu.
Mainstreaming undergraduate research and inquiry through the disciplines

In pairs, each skim read at least ONE strategy for engaging students with research in disciplines (1.1 - 1.4 pp 1-6)

Discuss whether and how any of the ideas may be amended for application in your course team or departmental contexts

5 minutes
Engaging undergraduates in research and inquiry

Research based activities may involve engaging students with all four of Boyer’s (1990) scholarships:

- **Discovery** (e.g. UROP)
- **Integration** (e.g. Interdisciplinary projects)
- **Application / Engagement** (e.g. Work based and community based projects)
- **Teaching and learning** (SoTL) (e.g. Students as change agents)
Undergraduate Research Opportunity Programmes (UROPs)

1. An opportunity to work with a member of faculty or a research group for an extended period – sometimes outside the university
2. A stepping stone to postgraduate research degree
3. Often, though not necessarily, outside the curriculum – pay versus credit
4. Celebrate work through undergraduate research conferences and journals
5. Selective
Using Hurricane Ike to Assess the FEMA 100/500yr Flood Line and the Economic Impact of Increased Flood Insurance Rates on Galveston Island

Jayme Peterson, Advisor: Dr. David Jones
Projects that students undertake towards the end of their undergraduate degree, usually in their final or senior year, in which they engage in a significant amount of independent research or inquiry.
Rethinking dissertations and final year projects: creative honours and capstone projects

Alternative or additional projects, many of which may be employment or community-based, are required to meet the needs of all students regardless of background, discipline or life goals (pp27-28)
Core elements of IBL

• Driven by questions or problems
• Based on seeking new knowledge and understanding
• Student-centred and -directed, with teachers acting as facilitators

Spronken-Smith et al. (2007)

Primarily new knowledge and understanding for the students versus new knowledge and understanding for society (discovery-oriented V information-oriented (Levy et al., 2010)
Our argument: a ‘research active curriculum’

“All undergraduate students in all higher education institutions should experience learning through, and about, research and inquiry. ... We argue, as does much recent US experience, that such curricular experience should and can be mainstreamed for all or many students through a research-active curriculum. We argue that this can be achieved through structured interventions at course team, departmental, institutional and national levels” (Healey and Jenkins, 2009, 3).
“It’s always ‘Sit,’ ‘Stay,’ ‘Heel’—never
‘Think,’ ‘Innovate,’ ‘Be yourself.’”
# Different views on undergraduate research

## Dimensions of undergraduate research

<table>
<thead>
<tr>
<th>Student, process centred</th>
<th>Outcome, product centred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student initiated</td>
<td>Faculty initiated</td>
</tr>
<tr>
<td>Honors students</td>
<td>All students</td>
</tr>
<tr>
<td>Curriculum based</td>
<td>Co-curricular fellowships</td>
</tr>
<tr>
<td>Collaborative</td>
<td>Individual</td>
</tr>
<tr>
<td>Original to the student</td>
<td>Original to the discipline</td>
</tr>
<tr>
<td>Multi-or interdisciplinary</td>
<td>Discipline based</td>
</tr>
<tr>
<td>Campus/community audience</td>
<td>Professional audience</td>
</tr>
<tr>
<td>Capstone/final year</td>
<td>Starting year one</td>
</tr>
<tr>
<td>Pervades the curriculum</td>
<td>Focussed</td>
</tr>
</tbody>
</table>

(Source: Adapted from Beckham and Hensel, 2007)
Mainstreaming undergraduate research and inquiry

In pairs, each skim read at least ONE case study for engaging students in research and inquiry:

a) At the beginning of their academic studies (Section 2 pp.7-8); OR

b) In final year and capstone projects (Section 3 pp.8-11); OR

c) Through department and course team strategies (Section 4 pp.12-15)

Discuss whether and how any of the ideas may be amended for application in your course team or departmental contexts

5 minutes
Mainstreaming undergraduate research and inquiry: conclusions

- Getting students to produce knowledge rather than just consume knowledge is a way to re-link teaching and research.
- The challenge is to mainstream undergraduate research so that all students may potentially benefit.
- Adopting a broader definition of undergraduate research than is currently common is a way forward (Boyer et al.), which should benefit the learning of students in institutions with a range of different missions.
Mainstreaming undergraduate research and inquiry: conclusions

If undergraduate research is to be truly integrated into HE then the nature of higher education itself will need to be reconceptualised.

“universities need to move towards creating inclusive scholarly knowledge-building communities. … The notion of inclusive scholarly knowledge-building communities invites us to consider new ideas about who the scholars are in universities and how they might work in partnership.” (Brew, 2007, 4)

There is a need to do more thinking ‘outside the box’
"Never, ever, think outside the box."