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# 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)

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# HKUST Context

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“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

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# HKUST Context

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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

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# Brief Biography

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- 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 Canadian Federal Government 'Roundtable on Research, Teaching and Learning in post-Secondary Education' (2006)
  - 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
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# Engaging students in research and inquiry

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

Ian Diamond, Chair Research Councils UK, 2010

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# Engaging students in research and inquiry

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“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)

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# High Impact Activities

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- ★ **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

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# **Engaging undergraduates in research and inquiry**

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- 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**
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**STUDENTS ARE PARTICIPANTS**

**Research-tutored**

**Engaging in  
research  
discussions**

**Research-based**

**Undertaking  
research and  
inquiry**

**Learning  
about current  
research in the  
discipline**

**Research-led**

**Developing  
research and  
inquiry skills and  
techniques**

**Research-oriented**

**EMPHASIS  
ON  
RESEARCH  
PROCESSES  
AND  
PROBLEMS**

**STUDENTS FREQUENTLY ARE AN AUDIENCE**

**Curriculum design and the research-teaching nexus**

(based on Healey, 2005, 70)

**EMPHASIS ON  
RESEARCH  
CONTENT**

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**

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**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**

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# Engaging undergraduates in research and inquiry

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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)
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# Undergraduate Research Opportunity Programmes (UROPs)

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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
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5E



Jayma Peterson  
Texas A&M University at Galveston  
Sponsor: Texas Institute of Geosciences

## Using Hurricane Ike to Assess the FEMA 100/100yr Flood Line and the Economic Impact of Increased Flood Insurance Rates on Galveston Island

Jayma Peterson, M.S. and Dr. David Jones



5D

WORLDWIDE  
WORLDWIDE  
WORLDWIDE





## Closing the 'Open Door'?

Conservative management public sector financial services  
Private sector leader in 2007



### Conservative management

### Management

### KEY FINDINGS

### Proposed on public services



# Capstone projects and dissertations

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**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

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**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)

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# Core elements of IBL

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- 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))

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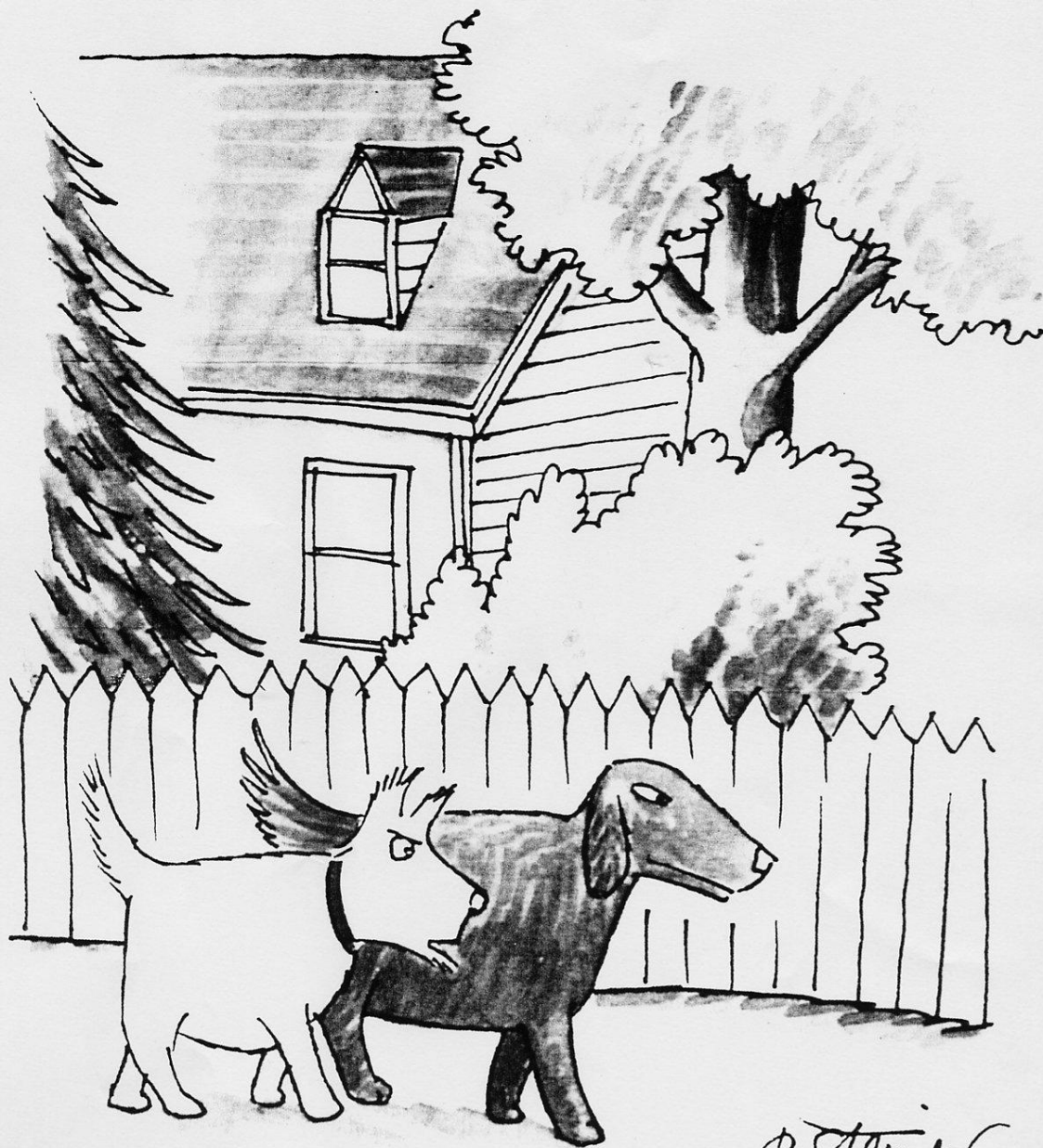
# Our argument: a 'research active curriculum'

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*“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).

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*"It's always 'Sit,' 'Stay,' 'Heel'—never  
'Think,' 'Innovate,' 'Be yourself.'"*

# Different views on undergraduate research

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## Dimensions of undergraduate research

**Student, process centred**

**Student initiated**

**Honors students**

**Curriculum based**

**Collaborative**

**Original to the student**

**Multi-or interdisciplinary**

**Campus/community audience**

**Capstone/final year**

**Pervades the curriculum**

**Outcome, product centred**

**Faculty initiated**

**All students**

**Co-curricular fellowships**

**Individual**

**Original to the discipline**

**Discipline based**

**Professional audience**

**Starting year one**

**Focussed**

**(Source: Adapted from Beckham and Hensel, 2007)**

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# Mainstreaming undergraduate research and inquiry

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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**

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# Mainstreaming undergraduate research and inquiry: conclusions

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- 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
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# Mainstreaming undergraduate research and inquiry: conclusions

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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’

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*"Never, ever, think outside the box."*

