Promoting Interdisciplinary Endeavours in Graduate Education and Research: Observations from Hong Kong

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The Need for Interdisciplinarity

There has been and continues to be a tendency for disciplinary specialization and super-specialization in research and higher education. Clearly specialization has its advantages as scholars develop the knowledge base and strategies that allow them to solve increasingly complex problems. However, responses to complex scientific and societal problems require true collaboration among different disciplines and we need to move beyond silo-based thinking. When researchers from different disciplinary perspectives come together to tackle a research problem there is potential for novel theoretical insights and methodological innovations.

We are all familiar with the story of the six blind men and the elephant. The men were asked to describe what the elephant looked like but each man touched one and only one part of the elephant. The man who touched the leg said the elephant was like a pillar, the one who felt the tail stated the elephant was like a rope; the one who touched the trunk thought the elephant was like a tree branch and so on. The six men argued among themselves about what they touched and it was only when they worked together and integrated their different ideas and experiences that they were able to discover the truth. In this case, further research in the form of more in-depth investigation and deeper specialization by each of the blind men would not have brought them closer to the answer to the question of what they were touching. They needed to bring together their knowledge from their disparate perspectives (disciplines) to come up with a comprehensive understanding of the elephant. A horizontal integration of views was needed.

In a similar vein, we need to take an interdisciplinary or trans-disciplinary perspective to solve problems in need of a solution and it is our responsibility as providers of tertiary education to promote the notion of inter-disciplinary thinking among our students. This interdisciplinary "mindedness" needs to be promoted right from the undergraduate level and nurtured and honed through graduate study. However, this is not an easy thing to do. As noted in the background papers for this 2014 Summit, common barriers are "institutional structures that are organized by single disciplines; funding structures that discourage interdisciplinary research; and a lack of resources or expertise needed to create interdisciplinary degree-granting programs."

Against this backdrop, this paper will focus on factors that support and those which may hinder interdisciplinarity in graduate education and research in the Hong Kong SAR. It will describe the current landscape and consider specific challenges and opportunities.

Landscape: Hong Kong Context

There are 18 degree-awarding institutions in Hong Kong and eight of them are funded by

the government. The Research Grants Council comes under the aegis of University Grants Commission (UGC) and provides the majority of funding for research and research postgraduate (MPhil and PhD) education in these eight government-funded universities. Its remit is to advise the Hong Kong government on priority areas for academic research, taking into account both global trends and local needs. The Research Grants Council in Hong Kong invites and receives, through the institutions of higher education in Hong Kong, applications for various research grants from academic staff. The allocation of earmarked research grants covers the Theme-based Research Scheme, General Research Fund, Collaborative Research Fund, Joint Research Schemes and other schemes. Two of these schemes—the Collaborative Research Fund and the Theme-Based Research Scheme privilege inter-disciplinary research. The Collaborative Research Fund (CRF) was set up to encourage research groups to engage in collaborative research across disciplines and/or across institutions with a view to enhancing the research output of institutions in terms of its level of attainment, quantity, dimensions, and/or speed.[1] In 2013/14, The University of Hong Kong (HKU) received the highest number of CRF awards (29 awards) and the highest amount of funding (HK$23.404M[2]) among the eight institutions. On the other hand, the Theme-based Research Scheme (TRS)[3] funds collaborative research on topics that are key to the development of Hong Kong and beyond. The selected themes necessitate interdisciplinary collaboration and relatively large grants are dispersed after a rigorous peer-review selection process. The three themes covered in the most recent round of TRS include (i) Promoting good health; (ii) Developing a sustainable environment; and (iii) Enhancing Hong Kong's strategic position as a regional and international business centre. HKU academics play a significant role in the four recently funded projects and will co-ordinate three of them.[4]

Landscape: Institutional Context (The University of Hong Kong)

Excelling together through interdisciplinary research has long been a goal of HKU as it seeks to develop strategically relevant research themes. Since 2004, the University has been identifying themes of current or potential strength for strategic development to maximize the impact of its research. These themes build on expertise and interests that cross disciplines—utilizing the synergies that such collaborations can bring—and address issues of importance to the community here in Hong Kong and Greater China as well as around the world. The current 16 strategic research themes[5] and five emerging themes come under the following five strategic research areas: Community, Biomedicine, Environment, Frontier Technology and China, which both necessitate and afford trans-disciplinary research.

HKU also encourages interdisciplinary research and some doctoral students are jointly supervised by academic staff from two different departments or faculties (Schools). For example, there is joint supervision of students by academic staff in the Faculties of Social Sciences and Education (children with autism), Engineering and Medicine (biomedical Engineering),

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[1] Information extracted from the RGC's website (http://www.ugc.edu.hk/eng/rgc/fund/grants.htm#d)

[2] Excluding on-costs

[3] Information extracted from the RGC's website (http://www.ugc.edu.hk/eng/rgc/theme/theme.htm)

[4] The 3 projects coordinated by HKU have been awarded a total of HK$184.54M for a period of 5 years, representing 90% of the total funds.

[5] *Community* (Ageing, Neuroscience, Public Health, Sciences of Learning, Food*, Law, Literature, Language*); *Frontier Technology* (Computation and Information, Drug, Genomics, Integrative Biology*); *Biomedicine* (Biomedical Engineering and Nanotechnology, Cancer, Development and Reproduction, Infection and Immunology, Stem Cell and Regenerative Medicine*); *China* (China Business and Economics, China-West Studies, Cotemporary China); *Environment* (Clean Energy, New Materials, Earth as a Habitable Planet*).

Engineering and Science (materials for energy applications), Dentistry and Science (dental public health), and Architecture and Education (school design). Interdisciplinary thinking is also encouraged through course and experiential requirements for doctoral students.

Challenges and Opportunities

We know that multi-disciplinary research is pivotal for innovation. When individuals from different disciplines work together, more can be accomplished than if they work alone. Further, when researchers from different disciplines integrate perspectives, methodologies and data they are better primed to enhance our understanding of phenomena and solve real-world problems than groups of researchers from one discipline (Trewhella, 2009).[6]

There are many challenges associated with promoting interdisciplinary thinking. First, universities are organized into departments and schools/faculties and this promotes a disciplinary mentality. Second, recruitment, tenure and promotion policies do not typically favour interdisciplinary research. Third, grant awarding agencies do not facilitate interdisciplinary research as the peer review system tends to rely on experts from a single discipline (Trewhella, 2009). Fourth, interdisciplinary journals are less common than discipline-specific ones. Higher education institutions are in a unique position to train the next generation of scholars to value and engage in interdisciplinary research. Students need both solid discipline-based knowledge as well as the opportunity to work in different disciplines and both undergraduate and postgraduate levels. That stated, an "individual" interdisciplinary researcher is not common (Trewhella, 2009) but it is more likely that teams of researchers from different disciplines will work together.

According to Davoudi,[7] we have to overcome "disciplinary tribalism" and move beyond both multidisciplinary (multiple disciplines coming together but each working primarily with their own framings and methods) and interdisciplinary (occupying the spaces between disciplines to build new knowledge) approaches to trans-disciplinary approaches (creating a cross-road in which different disciplines intersect and influence each other).

Clearly there is much value to promoting both interdisciplinarity and trans-disciplinarity in graduate education and research. At an institutional level, we can provide the conditions to promote high quality interdisciplinary research and dismantle barriers which hinder it. However, we still have to gain a better understanding of how we can use best technology to support interdisciplinary communication and collaboration and how we can effectively facilitate trans-disciplinary team work.

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[6] Trewhella, J. (2009). *Multi-disciplinary research – an essential driver of innovation*. Paper presented at the Australian Financial Review Higher Education Conference.

[7] Davoudi, S. & Pendlebury, J, 2010, Evolution of planning as an academic discipline, *Town Planning Review* 81(6):613-644

Table 1
Drivers and barriers for interdisciplinarity in research

	Internal factors	External factors
Drivers	√ Strategic Research Themes √ Award of Post-doctoral Fellows √ Award of internal research grants	√ Funding agencies (Collaborative Research Fund, Theme-Based Research from the RGC) √ Reputational incentives (League tables in terms of number of projects funded and amount of funding from funding agencies)
Barriers	► Disciplinary silos (organization into departments) ► Lack of funds ► Institutional culture ► Methods of assessing and rewarding research productivity ► Lack of acceptance among peers about the value of interdisciplinarity	► Peer review process for grants and journal publications (low priority to inter-disciplinary projects)

Source: Adapted from Improving Business Environmental Performance: Corporate Incentives and Drivers in Decision Making. p. 33-34. DEFRA 2006.