APT 2013
RESEARCH-LED EDUCATION FOR ENGINEERING 2 BUILDING CASE STUDIES

Presented by:
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Architecture
Interior Design
Landscape Architecture
Planning
Urban Design

Australia
China
Hong Kong SAR
Singapore
Thailand
United Kingdom

Advanced Engineering Building, University of Queensland, Australia
HASSELL in Joint Venture with Richard Kirk Architect
“The mind is not a vessel to be filled, but a fire to be kindled” (Plutarch, c46–127 AD). Never has the educational philosophy behind this belief been more important: the changing world to be faced by today’s students will demand unprecedented skills of intellectual flexibility, analysis and enquiry.

Teaching students to be enquiring or research-based in their approach is not just a throwback to quaint notions of enlightenment or liberal education but central to the hard-nosed skills required of the future graduate workforce.”

Research-led education for engineering
2 Building Case Studies

- Research process, scenarios and discovery integrated into curriculum
- Researchers teach and mentor students

Research

- Multi-disciplinary research teams collocated for critical mass and to drive innovation and discovery

Test + Prototype

- Prototyping, testing and trailing
- Acceleration of research innovation and discovery into practice

Curriculum + Learning

- Diverse learning modalities to optimise learning experience and outcomes

Application + Practice - Industry

- Industry participation in learning. Studio based approach models professional design practice. Industry experts provide real life experience and perspectives

Collocation

- Connectivity
- Accessibility
- Transparency

A research-led translational approach to learning

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Traditional Campus model
- Faculty buildings with adhoc distribution of teaching and research
- Research in cellular distributed pockets focussed around academics

Traditional Campus model

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Research Precinct model
Research only buildings for critical mass of research community, sharing of infrastructure, and improved collaboration

Research
Learning

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Hub and Spokes model
- Leverages research capacity within existing infrastructure
- Establishes an administration and meeting hub for the spokes
- Allows a fluid and dynamic structure of networks

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Integrated Research and Learning model
- Collocates Research and Learning, and supports Industry engagement
- Laboratory infrastructure shared between Learning and Research

Integrated Research and Learning model
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Satellite model to integrate Industry, Research and Learning
- Outreaches to collocate with Industry
- Collocates Research, Learning and Industry facilities

Satellite integrated Industry, Research and Learning model
Kinetica, Flinders University

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Comparative section diagrams
Research Precinct model versus Integrated Research and Learning model

RESEARCH ONLY MODEL
Ecosciences Precinct
Secure building to optimise sharing, interaction and movement between researchers

INTEGRATED RESEARCH AND LEARNING MODEL
Advanced Engineering Building, University of Queensland
Kinetica Building, Flinders University
Encourages open interaction between students, researchers and industry
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Comparative images
Research Precinct model and Integrated Research and Learning model

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The place of learning critical to authentic active learning
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Inverted Classroom
Core content online prior to lectures - students come prepared to engage

Tutorials
Structured interactions with tutors

Lecture Theatre
Large format lectures

Aligning theory with practice
Understanding of fundamentals

Research Labs
Pure and applied research

Active Learning by doing hands-on
Experiencing research processes
Test of concept

Practice based research by design
Creativity and innovation team based and collaborative

Interactive Visualisation Studio
3D Interactive Visualisation

Simulation + modelling Labs
Understand fundamentals
Apply using computational modelling

Design Studio
Team based role play
Design processes
Self-directed + open-ended

Large Scale Test Labs
Understanding the physical world
Abstract to test of concept

Student Technology Centre
Workshop to fabricate components

Active Learning Lab
Team based
Role play - model building + testing

Authentic active place-based learning for engineering
A range of blended learning modalities to enrich the learning experience

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The Learning Landscape
Conceptualising the space between formal research and learning settings

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Interaction and communication drives innovation and learning

Cross disciplinary approach.

Innovation occurs at the boundaries.
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Collaboration strategies
Conceptualising the space between formal research and learning settings

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Open circulation model
- Office and open plan areas secured but transparent to labs and circulation
- Atrium open to student circulation
- Meeting/interaction spaces on bridges

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Test laboratories_structures, concrete, hydraulic, advanced form processing

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Learning spaces

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Research spaces

Academic and Research Offices

Active Learning Studios

Research Labs
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Atrium connects Research and Learning levels, and provides interaction spaces at each level to facilitate informal communication between Students, Academics, Researchers and Industry.
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Kinetica Building, Flinders University
Cluster diagram

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A structured series of stepped voids to provide a more intimate engagement between levels.

Kinetica Building, Flinders University
Cluster diagram

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Kinetica Building, Flinders University
External perspective
Kinetica Building, Flinders University
Internal perspective
Kinetica Building, Flinders University
Internal perspective

ARTIST’S IMPRESSION
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Level 3
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Level 4

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Level 5

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External perspective
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2 Buildings - 2 approaches driving similar outcomes for research-led learning

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