Teaching–Research–Industry–Learning Nexus in ICT Education

Background

In addition to the extensively reported teaching-research nexus concept, we have examined the relationships between teaching, research, industry and learning (TRIL) in ICT education as part of an ALTC-supported project.

Methods

An extensive review and analysis of the literature on the relationships between TRIL was undertaken. A survey of the academic leaders of ICT in Australian universities was conducted (22 responses were received from 18 universities). The survey explored:
- The outcomes associated with the research component of the TRIL nexus
- The benefits associated with the industry component of the TRIL nexus
- Synergies associated with the TRIL nexus
- What else universities could be doing to take advantage of TRIL synergies

Key Findings – ICT education literature

- Integrating research into teaching and learning
  - Many examples of successful attempts to integrate research and teaching
  - Benefits in higher quality pedagogical outcomes and enhanced student experience
  - Integration can be difficult to manage especially with large classes
- Integrating industry into teaching and learning
  - Examples of approaches to exposing students to various aspects of industry by providing some form of work integrated learning
  - Little formal evaluation of the impacts of ICT industry connections in teaching and learning, but agreement that industry links are associated with positive outcomes for students, academics and industry

Key Findings – Survey of ICT academic leaders

86% agreed there is a synergy between teaching, research, industry and learning

The industry component of the TRIL nexus:
- 77% felt that their school needed more connections with industry
- Both direct and indirect (staff) industry connections were seen as important for student learning:
  - Direct: work placements, industry related projects, and obtaining industry certifications.
  - Indirect: provision of courses to industry, use of industry advisory boards, consultancy and industry-based research activity.
- The main ways that students benefit from industry connections were thought to be:
  - Increased awareness of the problems and issues faced in the industry (95% agreement)
  - Stimulation of interest and enthusiasm (91% agreement).
  - Increased understanding of subjects (73% agreement).

The research component of the TRIL nexus:
- 64% agreement that discipline-based research leads to better student learning
- The main ways that students benefit from involvement with research were thought to be:

- o Increased understanding of subjects (86%)
- o Improved research skills (95%)
- o Increased interest and enthusiasm (91%).
- Risks were identified:
  - o 40% agreed and 45% disagreed that academic staff who are focused on discipline-based research are less inclined to be interested in learning and teaching
  - o 27% agreed that the emphasis on research by academic staff may have a negative impact on student learning and 59% disagreed.

What more could universities be doing to take advantage of TRIL synergies?
- 82% believed that universities should be doing more to take advantage of TRIL synergies
- Predominant recommendations were that universities should provide more support for connections with industry; e.g., financial and administrative support and sabbaticals

Recommendations

The key conclusion is that the connections between academia and industry reinforce learning and research in many and various ways and provide a wide range of benefits to all involved. The following recommendations may help achieve these benefits.

- Consider the degree as a whole and redesign the degree, not just individual courses
- Build up from problem-based approaches in early courses to research-based approaches in more advanced courses
- The research and industry aspects of TRIL should not be considered in isolation, rather there should be integration and balance appropriate to the university and its stakeholders
- Embrace sector wide recommendations to include work integrated learning in all degrees
- Industry advisory boards should play a strong role in strengthening the TRIL nexus, e.g. curriculum and content advice, provision of guest lectures, and support in obtaining student projects and sites for internships
- More sharing of innovative practices is needed; e.g., seminars, conferences and scholarly papers
- Address student teamwork skills that research and industry focused initiatives require
- Many innovative approaches to strengthening the TRIL nexus are labour intensive; workload issues need to be addressed early to ensure success
- Use sabbatical leave for consultancy or work in relevant enterprises to strengthen academic staff ability to provide appropriate industry exposure to students
- Encourage and develop research strengths and cultivate interest and connection with industry amongst academic staff

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Addressing ICT curriculum recommendations from surveys of academics, workplace graduates, and employers

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