Australian Council of Deans of Science

The research-teaching nexus

Science encompasses both a body of knowledge and an evidence-based process of discovery. An effective university education must incorporate both aspects and this is best done when teaching is undertaken by academics involved in, or familiar with, research advances. University science curricula benefit from the research-teaching nexus when:

- a body of scientific knowledge is organised and presented in ways that are accessible to students and,
- the processes by which that knowledge is acquired are explained and evaluated.

It is only when the latter complements the former that graduates acquire the capability to be critical and analytical science-literate citizens, rather than simply consumers of knowledge.

Science as a body of knowledge

Ongoing curriculum development at the staff level is a hallmark of university teaching. It is the way that cutting-edge research ideas become mainstreamed into the undergraduate curriculum. Some examples are genomics and proteomics, nanotechnology, data science and artificial intelligence (AI). In the last century, these were on the frontiers of research but now they appear in undergraduate courses. Curriculum shifts to incorporate new knowledge are made over time by academic staff and made possible by their engagement with disciplinary research. Engagement should be such that they maintain currency in the fields that they teach, are able to review developments in both content and processes critically and integrate them creatively in courses as appropriate.

Science as a process of discovery

Acquisition of specialist knowledge, while remaining an important part of university education, is no longer the complete goal. Instead, the soft skills that are likely to be valued by employers include curiosity, creativity, a logical approach to planning and problem-solving, critical thinking, evaluation and self-evaluation skills and communication skills. Since these desired generic skills are in many respects similar to those needed to become an effective researcher, they may be effectively developed through the provision of opportunities for students to engage in research-based learning. This involves the development of course learning outcomes and coursework activities such as understanding current disciplinary research questions, developing expertise in research methods and analytical skills, and developing an understanding of the nature, practice and limitations of science.

Recommendations

The conceptualisation of the research-teaching nexus presented here emphasises a curriculum that uses researchers' expertise to develop the knowledge and skills that graduates need to contribute effectively to society. This requires:

1. Funding arrangements that acknowledge and support suitable forms of research engagement of teaching staff in the disciplines in which they teach, and the time needed for curriculum development.
2. Mechanisms by which universities support, monitor and report on the integration of research into the curriculum.

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