

DISTILLING TERTIARY PEDAGOGICAL CONTENT KNOWLEDGE TO SUPPORT A NEW GENERATION OF ACADEMICS

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ABSTRACT

Novice tertiary teachers rarely receive professional development in discipline-specific teaching practices. Instead they rely on a mixture of their own learning experiences, advice or mentoring provided by their colleagues and learning from their own mistakes as they gain teaching experience. This process is in stark contrast to secondary chemistry teacher training, where awareness of how students learn is linked to disciplinary context to help teachers develop their pedagogical content knowledge (PCK).

Ask a chemistry academic about their PhD background and they will typically identify a specific chemistry sub-discipline such as inorganic, organic or physical chemistry. For the vast majority, this is not chemical education (Barthelemy, Henderson & Grunert, 2013). As tertiary teachers, their background influences their epistemological perspectives and informs their understanding and explanations of basic chemical concepts.

As part of a study into the development and transfer of PCK to support the development of early career academics, we have collected a range of qualitative data. Participants in workshops and interviews were diverse in their experience and research alignment. Their explanations of their teaching strategies have been analysed inductively according to their background and the sub-disciplinary context of the teaching example that they provided.

Several key elements of tertiary chemistry PCK have emerged from an analysis of the qualitative data. Tertiary teachers integrated their PCK strategies in a manner parallel to that used by secondary teachers, including the use of analogies and metaphors, awareness of problematic concepts and use of representations (such as carefully selected demonstrations) (Loughran, Mulhall, & Berry, 2004). Findings indicate that the tertiary teachers' beliefs, goals and practices align with PCK frameworks derived from the secondary context (Fraser, 2015). A significant outcome was that experienced tertiary teachers expressed awareness of supporting students to progress to a deeper understanding of complex concepts. This presentation will identify and explore the ways that sub-discipline culture informs teaching practice

REFERENCES

- Barthelemy, R. S., Henderson, C. & Grunert, M. L. (2013). How do they get here?: Paths into physics education research. *Physical Review Special Topics - Physics Education Research*, 9, 020107(14).
- Fraser, S (2015). Pedagogical content knowledge (PCK): Exploring its usefulness for science lecturers in higher education. *Research in Science Education*. Published online 22 March 2015. DOI 10.1007/s11165-014-9459-1
- Loughran, J., Mulhall, P., & Berry, A. (2004). In Search of Pedagogical Content Knowledge in Science: Developing Ways of Articulating and Documenting Professional Practice. *Journal of Research in Science Teaching*, 41, 370-391. DOI: 10.1002/tea.20007

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