ENHANCING CHEMISTRY EDUCATION THROUGH TECHNOLOGY-ENHANCED LEARNING: SUPPORTING EFFECTIVE STUDENT LEARNING

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KEYWORDS: Personalised learning, Diversity, Lightboard, Virtual Laboratories

PROBLEM

The student cohort in first-semester chemistry at Bond University has a diverse background of chemistry knowledge when they start the subject, as there are no pre-requisite HSC chemistry requirements. This subject teaches students from multiple programs, including health science, biomedical science, and sports and exercise science. With the exception of some extension topics, the subject aligns with high school chemistry curricula across Australia and is delivered at a fast pace over 12 weeks. This fast pace can cause students with little or no chemistry background to have difficulties.

PLAN

In response to these challenges, we redesigned the subject to support diverse learners through a highly personalised and scaffolded curriculum. Core content was broken into bite-sized, meaningful segments to make complex ideas more accessible and build student confidence. Our approach aimed to position each student within their zone of proximal development, providing enough challenge to promote learning without causing disengagement.

ACTION

Teaching is underpinned by a socio-cultural learning model that fosters active engagement and collaboration, both between students and with educators. To extend learning beyond the classroom, we developed a suite of custom digital tools, including lightboard videos (Schweiker et al., 2020) and interactive virtual laboratories (Tauber et al., 2022). These resources form part of a blended, technology-enhanced learning environment that supports flexible, self-paced learning while reinforcing key concepts.

REFLECTION

Over six years of delivery, student feedback has consistently highlighted high levels of satisfaction, strong engagement, and appreciation for the clarity and accessibility of learning materials. Students regularly cited the additional resources as instrumental to their success and reported feeling more confident navigating challenging content. These outcomes suggest that combining modular content, active pedagogy, and tailored resources significantly benefits students with varied academic backgrounds.

IMPLICATIONS FOR STEM EDUCATION

This model offers transferable strategies for other STEM subjects facing similarly diverse cohorts. Modular curriculum design, formative assessment scaffolding, and integration of technology can be adapted to other disciplines. These approaches promote equity, reduce cognitive load, and enhance learning outcomes, supporting both academic success and student wellbeing.

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Proceedings of the Australian Conference on Science and Mathematics Education, The University of Melbourne, 30 September - 2 October 2025, page 67, ISSN Number 2653-0481.