

CREATING A MOTIVATING AND ENGAGING CURRICULUM BY SHARING THE COGNITIVE LOAD

Glennys A. O'Brien, Simon B. Bedford

Presenting Author: Glennys O'Brien (gobrien@uow.edu.au)
School of Chemistry, University of Wollongong, Wollongong NSW 2522, Australia

KEYWORDS: curriculum transformation, key concepts, blended learning, student engagement and motivation, collaborative learning, peer assessment and feedback, cognitive load theory

ABSTRACT

We present our transforming curriculum for first year chemistry subjects that are part of the foundation of many degree programmes here at the University of Wollongong (UOW). Curriculum development has been ongoing and, while not at an end yet, 2014 has seen major structural change and thus it is a good time to share with our peers.

Entry to tertiary studies is a key transition in students' lives. This transition into science or applied science can be especially difficult for those without senior school chemistry entering a degree programme requiring first year chemistry. Traditionally at UOW we have taught first year chemistry to one large mixed ability cohort without streaming based on academic background. We have researched, developed, applied and evaluated new teaching methodologies to engage all students and aid them in reaching successful learning outcomes notwithstanding their academic backgrounds or competencies. This year we are taking these powerful tools into subjects now streamed on the basis of chemistry background. Here we discuss:

1. Group learning activities and assessment tasks, that model inquiry, through which the students develop connections between learning, critical inquiry and problem-solving.
2. A curriculum that is technology enriched in its delivery and content, allowing the learners to become digitally literate and experience a blend of face-to-face and online interactions.
3. A platform project to examine student engagement and motivation while at the same time inviting the learner to question and test their grasp of key concepts, challenge and rebuild these when misconceptions are "self-discovered."
4. Specific training and support of part time teaching staff to deliver the new curriculum.

The ability to make realistic judgements of one's performance is a demonstration of the possession of strong metacognitive skills. One of the key changes to our curriculum was to put the learners in a position by which they could make such value judgements of their work and that of their peers, but in an environment where the "learning comes through shared struggle". This means that the cognitive load is also shared thus sustaining motivation and engagement for learner as well as teacher.

REFERENCES

- Bedford, S. B. and O'Brien, G. A. (2011). "How to have a good first year experience in chemistry – as easy as from Part A to Part B." Proceedings of the Australian Conference on Science and Mathematics Education, Melbourne, 2011.
- O'Brien, G. A. and Bedford, S. B. (2012). Small group work in large chemistry classes: Workshops in First Year Chemistry. *HEAcademy STEM Annual Conference 2012*. Retrieved September 12, 2014 from <http://journals.heacademy.ac.uk/doi/abs/10.11120/stem.hea.2012.070>.
- Kirschner, F., Paas, F. and Kirschner, P.A. (2011). Task complexity as a driver for collaborative learning efficiency: The collective working memory effect. *Applied Cognitive Psychology*, 25: 615 – 624.
- Lawrie G et al (2013). Using formative feedback to identify and support first year chemistry students with missing or misconceptions. Paper presented at the 16th international FYHE conference, Wellington, NZ 2013. Retrieved September 2, 2014, from http://fyhe.com.au/past_papers/papers13/5C.pdf.
- Bedford, S. B. and O'Brien, G. A. (2013). The Flat Earth Project. In M. Sharma & A. Yeung (Eds), *Proceedings of the Australian Conference on Science and Mathematics Education 2013* (pp12-13). Sydney, NSW: UniServe Science.
- Proceedings of the Australian Conference on Science and Mathematics Education, University of Sydney, Sept 29th to Sept 30th, 2014, page 63, ISBN Number 978-0-9871834-3-9.