Contribution ID: **161** Type: **Oral Presentation**

Developing representational competence in first year physics: Implications for curriculum and classroom practices

Thursday, 4 October 2018 14:00 (1 hour)

Physics educators recognise that successful introductory physics learning depends on understanding and using the various 'representational modes' (i.e. semiotic systems) (see Airey and Linder 2017) which are characteristic of the communication practices in physics (for example, specialised language, symbols, graphs, sketches, diagrams, mathematics, and gestures). Physics Education Research has demonstrated that the explicit use of multiple representations in undergraduate physics teaching is important for helping students learn the 'disciplinary discourse' (Airey and Linder 2009; Lemke
1990, 2004) of physics, and thus explicitly shift the physics education focus to
learning to 'think like a physicist' (van Heuvelen, 1991). It has been argued that this can be achieved through creating a 'representation-rich learning environment' (for example, see Rosengrant et al., 2009: 010108-2), which focuses on helping students learn and understand how to appropriately use physics representations; to appreciate why certain representations are useful, and to see the epistemological underpinnings of these representations, thus developing students' 'meta-representational competence' (for example, see Kohl and Finkelstein, 2008: 010111-11).

In this presentation, I discuss two different pedagogical approaches used in introductory physics courses; one more traditionally oriented and the other oriented towards developing students' 'representational competence' (see, Linder, Airey, Mayaba and Webb, 2014). The theoretical framing for this study draws on a particular Semantics perspective that was developed by Karl Maton at the University of Sydney, as part of his Legitimation Code Theory (Maton, 2014). The study examined how pedagogical approaches have an impact on the way that students approach physics problem tasks. The results illustrate how the adoption of a pedagogical approach that is based on an explicit unpacking of content through pedagogically designed 'moves' (Conana, 2016) between representations that includes making their underlying 'epistemological commitments' (Hewson, 1985) transparent, led to more sophisticated approaches being adopted by students when tackling physics tasks.

Finally, I will discuss what I see being the usefulness of the methodology used in the study for providing rich educational insight into ways that curriculum and classroom practices that I argue can make a meaningful difference when seeking to generate optimal ways of supporting student learning in the challenges that they meet in undergraduate physics courses.

Apply to be
 considered for a student
   award (Yes / No)?

No

Level for award
 (Hons, MSc,
   PhD, N/A)?

N/A

Primary author: Dr CONANA, Honjiswa (University of the Western Cape)

Presenter: Dr CONANA, Honjiswa (University of the Western Cape)

Session Classification: Plenary

Track Classification: Track L - Other (Please elaborate under comments below)