



Contribution ID: 227

Type: Oral Presentation

## Is the Abstract/Concrete Distinction a Useful Tool in Physics Education Research?

Thursday, 7 July 2016 11:30 (20 minutes)

**Abstract content** &nbsp; (Max 300 words) <a href="http://events.saip.org.za/getFile.py/?target=\_blank">Formatting & Special chars</a>

The terms “abstract” and “concrete” are widely used in physics education research, and are linked to core educational concepts such as transfer and conceptual change. They are also pivotal in arguments for the development of educational materials. For example, a “modern” first year physics text book contains an abundance of concrete examples. Some commentators argue that this allows the material to be more accessible and relevant for students. Others argue that it obscures the underlying abstract physical principles and hinders knowledge transfer. However, given that the terms “abstract” and “concrete” originated in a priori philosophical inquiry, and have since been adopted by diverse disciplines including cognitive psychology, linguistics and artificial intelligence, it is unsurprising that their meaning can differ substantially both between and within disciplines. We present four different ways in which the “abstract/concrete” distinction is employed in education research: (i) immaterial/material; (ii) general/particular; (iii) sparse/rich; (iv) unfamiliar/familiar. In particular, we critique the “sparse/rich” distinction as it is used in the widely cited studies of Kaminski et al. and suggest that other theoretical concepts, such as cognitive resources and working memory may be more productive in explaining their results. In sum, we argue that an interrogation of the reasons for using the terms “concrete” or “abstract” will point toward more productive theoretical tools that provide greater conceptual clarity, and avoid the inherent ambiguity of the “abstract/concrete” distinction.

**Apply to be considered for a student &nbsp; award (Yes / No)?**

Yes

**Level for award (Hons, MSc, &nbsp; PhD, N/A)?**

PhD

**Main supervisor (name and email) and his / her institution**

Saalih Allie  
saalih.allie@uct.ac.za

**Would you like to submit a short paper for the Conference Proceedings (Yes / No)?**

No

**Please indicate whether<br>this abstract may be<br>published online<br>(Yes / No)**

Yes

**Primary author:** Mr SOUTHEY, Philip (UCT)

**Co-author:** Prof. ALLIE, Saalih (UCT)

**Presenter:** Mr SOUTHEY, Philip (UCT)

**Session Classification:** Physics Education

**Track Classification:** Track E - Physics Education