

## ORAL PRESENTATION 7

### ON THE THRESHOLD: AFFORDANCES OF ONLINE TUTORIALS IN THE LEARNING OF THRESHOLD CONCEPTS

Peter, M.<sup>1</sup>, Harlow, A.<sup>1</sup>, Balsom, T.<sup>2</sup>, Scott, J.<sup>2</sup>, & Round, H.<sup>2</sup>

<sup>1</sup>WMIER, University of Waikato, NZ; <sup>2</sup>Faculty of Science & Engineering,  
University of Waikato, NZ

#### Introduction

According to *threshold concept theory*, in each academic discipline there exist concepts that once grasped allow new and previously inaccessible ways of perceiving and thinking about the subject to emerge [1]. Acquiring a threshold concept (TC) often resembles a phase transition as observed in other psychological perception-action dynamical systems [2]. Previous studies of student learning in introductory electronics have revealed areas where students get stuck [3]. In the present study we investigated the impact of multimodal, online tutorials on learning TCs.

#### Methods

First-year analogue electronics students (120) took part in the study. A set of online tutorials, relating to specific concepts in the course, assessed students' previous and new knowledge (e.g., TCs). Multiple-choice questions had additional space provided for students to explain why they chose the particular answer. Links to related online resources were provided for each question and immediate feedback to answers was given. Students' trajectories through the virtual tutorials, their success in answering tutorial questions, and their results on midterm and final exams were analysed for evidence of learning based on "grasping the affordances" of the online environment.

#### Results

The results from students' experiences and actions in virtual space provided insights into students' shifts in understanding as they mastered TCs. Importantly, they revealed that the affordances of *virtual* tutorials (or "metaaffordances") provide *real* opportunities for exploration of multimodal materials in a way that best suits an individual's learning style and previous knowledge.

#### Discussion/Conclusions

The relations between virtual spaces and learning suggest that the affordances of virtual tutorials can be perceived—and acted upon—in a similar but potentially more effective way as real tutorials, especially for the acquisition of difficult threshold concepts.

#### References

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- [3] Harlow, A., Scott, J., Peter, M., & Cowie, B. (2011). 'Getting stuck' in analogue electronics: Threshold concepts as an explanatory model. *EJEE*, 36, 435-447.

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