

Can an Interactive Virtual Orientation e-Resource Reduce Cognitive and Sensory Loads to

Support the Transition to Higher Education?

Peter Stockwell

BSc Chemistry Project Student



Dr Smita Odedra & Dr Linnea Soler

Co-Supervisors

Introduction & Aims

- The **transition to higher education** can be viewed as a mental process by which students go from familiarity and comfort to a sense of the unknown.^[1]
- For many new students, lab environments are daunting and have potential to cause **Cognitive** and **Sensory Overload**.
- Cognitive and Sensory overload have a significant impact on emotional response and, as such, can reduce **meaningful learning**.^[2,3]
- The **aim** of this research project is to explore if **cognitive** and **sensory load** can be **reduced and/or managed** in a chemistry lab environment to aid the **transition to higher education Chemistry**.
- For this project, a **bespoke online interactive e-resource** was created to provide the opportunity for virtual immersion into the laboratory environment, the Chemistry building, and to provide supporting materials.

Creation of Synth-1 Lab e-Resource

Figure 1. Contents page of e-resource

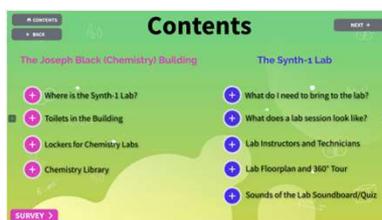
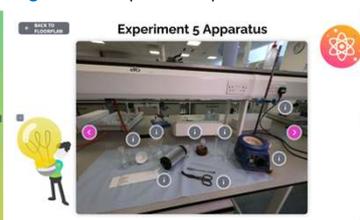


Figure 2. Example of hotspots in e-resource



Data Collection & Analysis

- Current first year Chemistry students completed the **Synthesis 1 Lab** module in semester 1 and were invited to engage with an online anonymous survey ($n = 29$) and a focus group in semester 2 to evaluate their **S1 lab experience** and to reflect on the **impact** of this newly created **S1 e-Resource**. Descriptive quantitative and thematic qualitative analysis were used.

Results

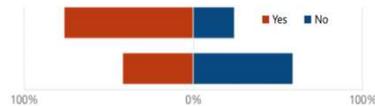
Student Reflection of Lab Experience

COGNITIVE LOAD

"Being surrounded by a lot of equipment and liquids without really knowing which one is which felt overwhelming"

Did you ever feel overwhelmed by **COGNITIVE LOAD**?

Did you **OFTEN** feel overwhelmed by this?

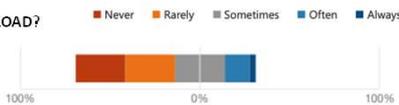


SENSORY LOAD

"I personally suffer from regular headaches and the bright lights often aggravated this."

Did you ever feel overwhelmed by **SENSORY LOAD**?

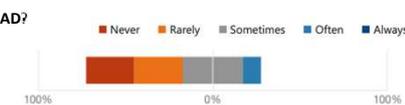
Roughly 20% of students reported **sensory** issues with **sound** specifically



SOCIAL LOAD

Did you ever feel overwhelmed by **SOCIAL LOAD**?

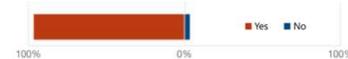
Almost half reported experiencing **Social Load** issues



Student Reflection on Utility of e-Resource

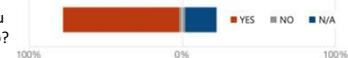
COGNITIVE LOAD

Do you feel that our Synth-1 lab e-map would help to reduce the stress (of **Cognitive Load**)?



SENSORY LOAD (SOUNDS)

Do you think this e-resource would have helped you to manage expectations about **sounds** in the S1 Lab?



Interestingly, **all** students who viewed the 'Fire Alarm & Exit Procedure' resource reported it as 'Helpful'.

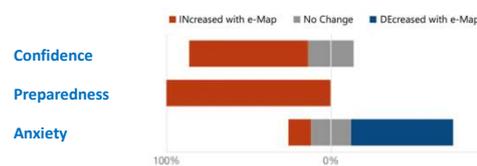
IMPACT of e-RESOURCE on CONFIDENCE, PREPAREDNESS & ANXIETY

"it would have been easier because I would have been more familiar with the layout of the lab and the equipment so I would have been able to spend more time and attention on the experiment at hand"

"I think this would take away a lot of apprehensions that new first years have"

'There will always be the uncomfortable and unexpected. That is something that should be considered. But this resource would help with dealing with the expected.'

Now imagine you had access to the Synth-1 e-map **before** starting your Synth-1 labs. **How useful** do you think this Lab e-Map would be for the following



Discussion & Conclusions

- Most students entering the Synthesis 1 lab for the first time are **overwhelmed** by the content and as such have potential to be impacted by **cognitive overload**.
- Fewer students experience feelings of **sensory** and **social overload** than cognitive overload, however there are still **triggers** for some students.
- According to the results, **all students** believe that having the **e-resource before** starting the Synthesis 1 Lab module **would help** them adjust to Higher Education Chemistry labs and **reduce** the **anxiety** and **fear** caused by the **transition** by helping to manage **cognitive & sensory load** expectations.

References & Acknowledgements

- Cheng, M.; Barnes, G. P.; Edwards, C.; Valyrakis, M.; Corduneanu, R.; Koukou, M. Transition Skills and Strategies Transition Models and How Students Experience Change; 2015.
- Gafoor, K. A.; Vevaremmal, S. Cognitive Load Factor in Designing Chemistry Instruction in Secondary Classrooms. 2012, 1–7.
- Egambaram, O.; Hilton, K.; Leigh, J.; Richardson, R.; Sarju, J.; Slater, A.; Turner, B. The Future of Laboratory Chemistry Learning and Teaching Must Be Accessible. *J. Chem. Educ.* 2022, acs.jchemed.2c00328. <https://doi.org/10.1021/acs.jchemed.2c00328>.

Thanks to: Dr James Gaynor (UofLiverpool, 360), Dr Sweta Ladwa (UofGreenwich, GoPro) for advice and inspiration; to our **Technicians, HoS, and HoT** for their support of our Scholarship & Research endeavours; and to our **student cohort** their insightful and powerful feedback.