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Developing Online Virtual Laboratory Kit

Following the onset of the COVID-19 pandemic, virtual versions of a number of the Durham University Level 1 Laboratories were developed during the course of the 2020-21 academic year using LabVIEW, a systems' engineering software [1]. The kit that was developed focuses on some of the circuit laboratories undertaken by students at the start of the module, which have the dual purpose of developing confidence working in a laboratory environment, and to teach good and correct data and error analysis.

Previous work has shown that students show increased confidence and laboratory efficiency having undertaken simulations in advance, and are more likely to ask questions about the science rather than experimental set-up [2]. At Durham, virtual equipment was developed to supplement undergraduate learning, for use either in advance of the practical session or to consolidate learning afterwards, but with the additional goal of providing a more realistic experience for any students who are unable to attend a session due to isolation or online working. As part of the work, Durham students were surveyed to find out which aspects of the practical experiments, earmarked for development into virtual instruments, which they struggled with the most.

The two experiments developed virtually looked DC circuits and AC circuits respectively, with the latter also including making of correct measurements with oscilloscopes. In each case, the virtual experiment followed closely what students would do during an in-person laboratory session, allowing individual sets of measurements to be made. The virtual laboratory kit will be deployed during the 2021-22 academic year, and its effectiveness measured via recording and coding of student interactions, both peer/peer and peer/instructor.

[1] National Instruments (2021) What is Labview? <https://www.ni.com/en-gb/shop/labview.html>

[2] Blackburn R. et al (2018) Preparing students for Practical Sessions Using Laboratory Simulation Software, *Journal of Chemical Education*, 96(1) 153 - 158

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