

**TOPIC:** Using lab simulations for teaching/practising practical skills**TAGS:** Undergraduate Practical Skills, Simulations**BRIEF DESCRIPTION**

Simulations can be a useful tool for engaging students with laboratory techniques. The interactive nature of simulations, coupled with built in, or instructor generated quizzes can be an effective method of demonstrating knowledge about techniques.

Technique	For example (then)	Using simulations (now)
Experimental execution	Correctly carrying out a practical task using the appropriate techniques	Students gain familiarity with the equipment and can work through tasks multiple times
Experimental design	Design an experiment to conduct in the laboratory	Conduct a virtual experiment and learn from mistakes – experimental learning with no risk
Experimental evaluation	Consider practical findings and quality of data generated	Critique performance in simulations, acting on interactive feedback

The interactive nature of many simulations has additional benefits over videos.

- The act of actively engaging with the simulations enhances enjoyment and allows for deeper learning
- Evidence suggests that simulations increase students' confidence with theory and technique. They will be more familiar with equipment when in a lab setting.
- Can be carried out remotely without the time and safety restrictions of the lab
- Longer term knowledge retention suggested in the literature.
- May help relieve some pressures on running reduced capacity, socially distanced wet labs

**CONSIDERATIONS**

- Simulations may require a subscription to a paid provider.
- Free simulations are available but offer less customisation
- Robust IT infrastructure is required, especially if large numbers of students access resources simultaneously.
- Students require access to a computer or tablet and decent internet provision
- Simulations will not develop the fine kinematic motor skills, but do enhance theory of practical design and execution – time in the lab will still be required
- Simulations are a supplement rather than a replacement for longer term, lab-based teaching
- Need to fully explain the benefits and give the students a reason to engage e.g. quizzes

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