Virtual laboratories: a panacea for the financial and ethical challenges associated with face-to-face physiology laboratories?

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### BACKGROUND

- The last century has seen a gradual transition in the delivery format of physiology teaching laboratories, followed by a tectonic shift in 2020 due to the COVID-19 pandemic.
- Reflecting on the rapid transition of on-campus, face-to-face laboratories to remote online mode during COVID-19, our group of 10 physiology educators from four countries asked the question:

**Does a switch to online laboratories solve the financial and ethical issues typically associated with face-to-face, on-campus, physiology laboratories?**

### METHODS

10 physiology educators wrote reflections on their experiences of the transition to remote online teaching (Mar-Jul 2020).†

### Financial Implications of Online Physiology Labs

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<th>Benefits</th>
<th>Costs and Challenges</th>
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<td>Reduces reliance on costly animal models.</td>
<td>Institutional reluctance to purchase subscriptions given sector-wide cutbacks, potentially increasing inequalities between institutions*</td>
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<td>Wider access for rural, remote, interstate and international students, improving financial viability of courses.</td>
<td>Reluctance of information technology departments to support external services*</td>
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<td>Inbuilt support in digital platforms reduces reliance on non-tenured academic staff.</td>
<td>Students burdened with license fees if full costs aren’t covered by the institution*.</td>
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<td>Allows capture of complex biological data without cost of longer labs.</td>
<td>Possible loss of enrollments due to higher attrition in entirely online courses**</td>
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<td>Some digital platforms and resources can be transferred between courses, reducing per student costs.</td>
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<td>Improved environmental and sustainability outcomes (reduced carbon footprint due to reduced travel times and consumable use).</td>
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*Some points relate more specifically to the use of a third-party purchased product rather than the use of online laboratories more generally.

### REFERENCES


### SUMMARY & CONCLUSIONS

- Small group human experimentation in physiology labs is replacing wet-lab animal experiments due to:
  - High costs of wet-labs.
  - Changing student and social attitudes to animal experimentation.
  - In parallel, proliferation of software packages and web-based platforms for physiology labs have produced benefits including:
  - Improved accessibility and equity for students.
  - Improved animal usage whilst increasing maximum class sizes.
  - Reduced curriculum delivery costs including reduced technical and lab management costs.
  - Despite this, most of the physiology educators in this study intend to retain a hybrid model (face-to-face & online) of lab delivery, as:
  - Continue the engagement and learning generated in physical labs by providing students with opportunity to record and analyze ‘real-life’ data and experience biological variability in an authentic way.
  - Serve the diversity of students needs by adjusting teaching for individual students/groups.
  - Embrace the excellent digital alternatives available for data capture and transferrable skills development.