International educators' attitudes, experiences and recommendations after an abrupt transition to remote physiology laboratories

Julia Choate,[1] Nancy Aguilar-Roca,[2] Elizabeth Beckett,[3] Sarah Etherington,[4] Michelle French,[5] Voula Gaganis,[6] Charlotte Haigh,[7] Derek Scott,[8] Terrence Sweeney,[9] and John Zubek.[10]

1 Department of; Physiology, Monash University; 2. School of Biological Sciences, University of California, Irvine; 3. Medical School, Faculty of Health and Medical Sciences, University of Adelaide; 4. Discipline of Medical, Molecular & Forensic Sciences, Murdoch University; 5. Department of Physiology, University of Toronto; 6. College of Medicine and Public Health, Flinders University; 7. School of Biomedical Sciences, University of Leeds; 8. School of Medicine, Medical Sciences & Nutrition, University of Aberdeen; 9. Department of Biology, The University of Scranton; 10. Department of Physiology, Michigan State University.

BACKGROUND

The COVID-19 pandemic has been associated with university lockdowns, forcing physiology educators to pivot undergraduate laboratories into a remote delivery format. This study documents the experiences of physiology educators as they rapidly transitioned to remote laboratories in March-July, 2020.

METHODS

Participants: Ten physiology educators from the U.S., U.K., Canada and Australia.

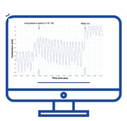
They wrote **reflective narratives** that explored their experiences of **the transition to remote laboratories**. These anonymous reflections were thematically analyzed.

DEVELOPMENT OF REMOTE LABORATORIES

Six educators **converted all of their existing in-person laboratories** for remote delivery, with another three cancelling only one or two labs (considered unsuitable for remote delivery).

Many respondents (60%) used **commercially available online physiology laboratory resources** for all or some of their remote laboratories.

Home-made videos were widely used to present preparatory material, explain equipment usage and/or demonstrate experiments.



A majority of respondents also reported using **sample data**, collected internally in preceding years or provided by a commercial partner, to allow students to practice the skill of data interpretation.

OPPORTUNITIES

New collaborations *(local and international)*

The biggest opportunity has been the collaborations that have been established between physiologist teaching at universities both close by and in other countries

Staff development

[laboratory technicians] rapidly retrained to provide expert support for teaching online

Exploration of unfamiliar technologies

The student comments are graded via artificial intelligence, so the time requirement for teaching assistants was minimal

Revisiting the laboratory curriculum and structure

the pandemic situation has made us question whether the way we performed this class in person was giving the students the best experience in gaining the practical skills they required

CHALLENGES

Excessive workloads

It has been challenging to modify so many labs in a relatively short period of time while at the same time having to teach

Lack of expertise

I spent a lot of time on YouTube trying to learn how to do different things and work different types of software

Disparities in online & workspace access

A few students had to sit in the parking lot of a local library to access the internet

Changes in learning outcomes

One of the biggest losses in the online lab was students not being able to design and carry out some of their own experiments

Educator and student stress

Out of my 7 TAs [teaching assistants], 3 struggled to balance teaching, research and overwhelming anxiety

Academic integrity issues

In the interest of personal sanity, I let go of concerns about online cheating with the pre-lab quizzes and weekly assignments

Reduced student engagement

Even during Zoom office hours, many never turned on their camera or microphone

RECOMMENDATIONS FOR REMOTE LABORATORIES

Despite the challenges, most of the educators planned on retaining successful aspects of the remote laboratories post-pandemic, particularly with a blended model of remote and in-person laboratories. This study concludes with recommendations for physiology educators as to how they can plan, develop, deliver and assess effective remote laboratories, developed from the main themes that emerged from the reflective narratives:

Planning:

purposeful
reconsider learning outcomes
try hands-on activities at home

Delivery:

consistent structure
reduce content
low educator: student ratios
synchronous
blended
facilitate collaborations
videos of data acquisition.

Assessment:

reduce assessment
use pre-lab assessment
team-based assessments

Training:

train educators for effective online delivery

REFERENCE: Choate et al., (2021). International educators' attitudes, experiences and recommendations after an abrupt transition to remote physiology laboratories (Advances Physiology Education, *https://journals.physiology.org/doi/full/10.1152/advan.00241.2020*).