AuPS Education forum

Physiology teaching and Learning: Past, present and Future

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Book of Abstracts

List of abstracts

Stories of chimeric birds, agitated cats and (Dr) Wolf(f)s to illustrate gastrointestinal physiology concepts and engage students

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In a level 3 neurobiology course, research stories from the past are used to illustrate visceral physiology concepts and spark students' interest in the process of scientific discovery. In this presentation, three such 'stories' will be shared.

Students share in the 'discovery' of quail neural-crest-derived cells within the chick gut wall following explanation of Nicole LeDouarin's pioneering embryonic grafting experiments. Aspects of neural crest migration and ENS development are illustrated, and this story also provides a 'springboard' to discuss the contemporary use of transgenic animals and reporter genes to track cell migration.

Students are introduced to curious medical student Walter Cannon who is keen to unlock the potential of the newly-developed 'Roentgen Rays' to examine movement of barium salts through the cat intestine. In addition to reinforcing concepts such as the impact of increased sympathetic drive on GI motility; descriptions of Cannon's careful experiments and inclusion of appropriate controls emphasizes components of sound experimental design.

Students are intrigued by 9-year-old Tom Little who gulps hot clam chowder and ends up with a gastric stoma due to an oesophageal stricture. Drs Wolf and Wolff recruit Tom as their long-term research subject performing detailed investigations of gastric function. Their findings highlight important aspects of brain-gut communication and the story provides a segue to discuss surgical interventions for GI disorders and ethical research conduct.

Stories such as these are likely to create vivid mental images assisting with recall, generate excitement, humanize the research process and convey the passion, enthusiasm, and curiosity of past physiologists.

Using a classic endocrinology paper to inspire students.

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Classic research papers can be used to teach basic physiological principles to students (1). This approach teaches the history of advances in physiology in a contextual manner and helps students develop a deeper understanding of physiological concepts. In the field of endocrinology where it is difficult to find suitable practical classes, these classic papers can also teach critical thinking and problem-solving skills.

A suitable classic paper is that by Clarke & Cummins (2) on the definitive proof of the neurohumoral theory of hypothalamic releasing hormones. This paper has been cited 1049 times and is a short communication, making it easy for students to read and analyse in a workshop. The essential components of the approach include i) to establish a classical perspective, describing (to the students?) the state of knowledge at the time of the research, ii) to provide a classical profile of the authors, explaining what they did and why they were successful, this second component includes personal aspects of the research and finally iii) for the students to read and analyse the original classic paper. A workshop with a worksheet and structured questions was used to guide students through the analysis of the paper and to highlight the characteristics of the radical method undertaken by the researchers.

Reading and analysing this classical paper, from my experience as the workshop facilitator, helped students engage with the discipline in the way that physiologists do and it highlighted the sequential development of knowledge through landmark discoveries in the field of endocrinology.

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Gamification to the next level

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Gamification is a flexible technique that involves the application of game mechanics to engage students (1). In 2020, our second-year undergraduate physiology unit moved online. Flagging online engagement spurred the challenging task of developing engaging and content-driven storied scenarios for interactive online workshops. Students played different characters specific to the workshop's scenario: a doctor diagnosing a potential thyroid cancer patient, an astronaut moderating IVF on mars, an apothecary caught in an infertile tyrant king's escape room, a detective solving the murder of a clinical studies scientist and a handler helping a hacker escape.

To our knowledge, we are the first to create and deliver physiology-based escape room and murder mystery activities at a higher education level. In the escape room, physiology puzzles (i.e. labelling male reproductive anatomy) created codes to unlock clues. In the murder mystery, 4 pharmaceutical CEOs were under investigation for the murder of a scientist. Students pieced together clues from videos, scientific results and physiology pathways to determine whether proposed drugs worked and which CEO had motive to kill.

A voluntary survey showed that the majority of students agreed that the workshops improved their confidence in exams (n=70; 81% strongly agreed or agreed, 11% somewhat agreed, 5% neither agree/disagree, 1% somewhat disagreed). We received strong positive qualitative feedback in our survey, forum posts and personal emails for our workshops and their ability to engage and motivate students. Our understanding of gamification improved and we have ideas for refinement for 2021.

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Employing augmented reality for the provision of stroke education

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Stroke poses a concern in modern healthcare as it constitutes 6.8% of the total burden of disease yet remains preventable in many cases. As stroke affects many Australians, it may be beneficial to provide accessible and understandable information relating to stroke. Technologies such as augmented reality (AR) can allow people to interact with virtual models of the human body, showing great promise in improving both students, and the community's understanding of health[1,2]. The aim of this study was to assess the effectiveness of AR in contrast with a pamphlet as a learning tool. 59 participants were randomised into two groups, using either AR or a printed pamphlet to learn identical content relating to stroke physiology and anatomy. Participants answered a pre-test multiple choice questionnaire to evaluate knowledge prior to the intervention. A Likert-scale questionnaire was used to determine participant perceptions post-learning intervention, followed by another multiple-choice post-test. Pre- and post-test scores suggested that participants learned in both interventions, although there were no significance differences between the interventions themselves. Better learning experiences were reported when using AR, with participants perceiving that AR allowed them to better understand the physiology of stroke and that AR was a better learning tool. Overall, although AR was preferred over pamphlets as a learning tool, both modes were equally effective for participant learning and stroke education.

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The Virtual Gut: what we can learn from real estate tours

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Physiology students often experience difficulties when learning complex, hard to visualise concepts, in part due to ineffective representations of the structures and interactions of molecular mechanisms[1]. The importance of visualisation in communication of these processes is well understood[2], however representation of spatial and temporal mechanisms as abstract, jargon-heavy diagrams can be off-putting for learners[1]. In contrast, 3D visualisation of physiological mechanisms provides a means to present representations that are easier to interpret than a 2D image[2].

Taking this concept further, we have identified the potential for use of 3D virtual tours, originally developed for the real estate industry, to create new approaches to physiology education. Virtual 3D tours allow students immersive interactions with otherwise difficult to visualise concepts. Additionally, virtual tours provide an unmatched opportunity for temporally structured learning experiences capable of gently introducing students to complex concepts; combining a linear sequence of virtual environments leads to highly engaging narrative-based learning. These tours are also VR-compatible, for further immersivity.

We have developed an educational, immersive 3D tour of the stomach as a complement to traditional learning. A detailed CGI model of the stomach has been constructed and using virtual tour software, we have implemented interactivity within this model. Student users will first experience the general anatomy and peristaltic movements before delving into interactive visualisations of molecular events, such as hydrochloric acid secretion. Structure identification and multichoice questions are also included. It is hoped that the narrative structure and immersivity will improve student learning beyond the constraints of traditional visualisation methods.

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The informational interview: A useful tool for Human Biosciences students' career exploration and planning.

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Career development learning (CDL) has a positive impact on graduate employability, especially if it is integrated into the curriculum [1]. The informational interview is an example of CDL that helps undergraduate students learn more about a career path by interviewing a professional already working in an industry of interest [2]. A career module was embedded into a human biosciences subject in which students conducted an informational interview with a professional in the field they wanted to know more about or wished to enter. Post interview, students recorded their interview experience and reflected on their career development and planning. Student reflection activities comprising of open-ended and 5-point Likert-scale responses were analysed (N=88 students). When students were asked to rate their experience of the interview on a scale from 1-10, with 10 being the highest, a majority of students (95%) provided a rating of between 7-10, and 5% of students provided a rating of 6 or less. Post interview 49% of students were more interested, and 24% of students were much more interested in pursuing the career path. Students were of the opinion that completion of the module "improved their understanding of the state of the industry" (80% agreement), and "what a professional does" (91% agreement) in the field they wish to enter. Similarly, most students agreed or strongly agreed (94%) that they had "gained knowledge and developed skills that would be useful in the future". In conclusion, an informational interview assignment is an effective career development tool for human biosciences students.

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A fundamental shift in the traditional mode of delivery of undergraduate physiology education in 2020.

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From digital technologies to dissections, there is an understanding that a hands-on approach is valuable in creating life-long learning and graduates with a deeper level of understanding. This is supported by the literature and has led to a fundamental shift in the mode of delivery of human physiology education from theory only to the inclusion of laboratory practical classes. Physiology practicals utilising innovative cloud-based technology were approved for delivery in Semester 1 this year. This was an exciting development which paved the way for a cohort of >500 of 2nd-year students to experience physiology via laboratory practicals. Despite plans for hands-on practicals, online delivery due to COVID-19 was reactionary and against the primary intention of a hands-on experiential curriculum. The newly introduced practicals switched to online and revealed problems creating authentic learning with missed opportunities to understand problematic data and biological variability. Challenges were recognised which became opportunities with new approaches to overcome concerns in contextualising 'example data'. Digital supports by way of instructional videos and synchronous interactions with university staff overcame these challenges. I present on new initiatives taken to overcome some of the online challenges and include a brief comparison of two second year physiology cohorts (2019 & 2020) focusing on students' overall topic grades in a theory-only context compared with theory and practicals. In presenting this shift in curriculum delivery, I additionally highlight the importance of flexibility, understanding, and compassion in our teaching practice for the successful implementation and continued offering of practicals in physiology education.

Physiology educators' reflections on an abrupt transition to remote laboratories in response to the COVID-19 pandemic

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The COVID-19 pandemic forced universities around the world to rapidly transition from on-campus to remote physiology laboratories, a process that normally involves considerable time, planning and skills development. This study documented the experiences of 10 physiology educators, from universities in the US, Australia, Canada and the UK, in managing this rapid transition to remote laboratories. The educators wrote reflective narratives, framed around guiding questions, with the reflections de-identified then thematically analysed followed the process described by Braun and Clarke (1). Only half of the educators (reflectors) had previous experience of remote laboratories, but all redeveloped the on-campus laboratories for remote delivery, mainly using commercially available packages, home-made videos and/or sample experimental data. Challenges associated with the transition included the brief timeframe, loss of laboratory learning outcomes, excessive workload, disparities in educator and student access to appropriate workspaces and the internet (with work-from-home and online learning), limited interactions (and educator-student relationships), student cheating on assessments and stressed educators and students. Opportunities associated with the transition included skills development, new academic collaborations, the exploration and integration of new technologies and revisiting and redeveloping the laboratory curriculum. When asked if they would retain the remote laboratories post-COVID, a few reflectors intended to allow students to be flexible, with remote or on-campus delivery, but most favoured a hybrid model (remote and on-campus). Advice for remote delivery included meaningful planning, using pre-laboratory online assessments, reducing content, consistent delivery of remote laboratories, monitoring attendance, staff training for online resources and student training for virtual group work.

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Re-design of first year physiology labs for remote delivery

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Physiology laboratories across many courses (allied health, biomedical and exercise sciences) were rapidly adapted for remote delivery in Block mode with the onset of the COVID-19 pandemic. One of the major redesigns involved making the lab activities interactive and focused primarily on the learning outcome of analysing and interpreting experimental data.

Customised high-quality laboratory videos were filmed and embedded into PowerPoint presentations, interspaced with inquiry tasks that were conducted in small groups via Zoom. Breakout room activities involved active learning components, with the use of polls, surveys and the chat function. One-drive documents and Lt platform modules (ADI instruments) were used to develop content aligned to learning outcomes and complement active learning.

First year allied health students undertaking anatomy & physiology were invited to complete an anonymous survey via Qualtrics (ethics HRE-192). Results (n=58) indicate that students found remote learning challenging, but 65% agreed that it contributed to their learning and understanding of content. Students commented that having lab videos for revision purposes and a teacher present online was useful. The incorporation of active learning activities into the Zoom labs increased student participation in the activities. Students commented that the labs complemented the content covered in workshops and that labs were fun and interactive. Whist remote labs cannot fully replace the 'lab' learning experience, we are breaking new ground in virtual teaching. It is important to garner student feedback on the success of online physiology labs to help us identify how best they can be improved.

Multi-platform integration for skills-based learning in an online practical environment

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The appearance of SARS-CoV-2 at the beginning of 2020 demanded a rapid transition to online-learning. This posed significant challenges to educators, in particular to hands-on, practical-based subjects. In this paper, we present a strategy that we developed for an integrated system of online platforms and offline software for delivery of a 2nd year physiology practical subject in a fully-online environment. This system aimed to facilitate and promote teamwork in the online learning environment through Zoom meetings. Data and experimental recordings, alongside video recordings of the experiments were deployed through the Learning Management System, Canvas. The student could download the experimental recording for analysis on the Biopac Student Laboratory (BSL) software, which fully replicates the system used in the physiology laboratory. Software downloaded for offline use, include BSL and GraphPad Prism which provide autonomy to the students both during online class, and out-of-class. The student groups collaborated synchronously during Zoom meetings, and asynchronously, through the online electronic notebook, LabArchives, the preferred e-notebook at the University of Melbourne. To promote further collaborative work across the whole class, we utilised the online tool Padlet for co-operation between multiple groups. The integration of this suite of online tools and offline software provided students with autonomy while maintaining and promoting teamwork common in scientific laboratories. We present an integrated system that enabled students to mimic a laboratory experience while gaining valuable scientific laboratory skills in a fully online environment.

A systematic review of virtual physiology laboratories: do they support student learning?

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The COVID-19 pandemic forced many universities around the world to abruptly transition from face-to-face to virtual physiology laboratory classes. Even prior to this pandemic, there had been a move to virtual laboratories, prompted by ethical and financial issues (1,2), or to the use of blended model of teaching, with virtual laboratories supporting the face-to-face laboratory (3). With this shift to virtual laboratories likely to persist, it is critical to determine if they support student learning. This study used a systematic review to investigate if virtual physiology laboratories are effective for student learning. The systematic literature search was conducted on the 21st September 2020 using the Ovid Medline and ERIC databases. The search retrieved 115 articles, with 11 deemed eligible for inclusion. Ten papers used quantitative testing to investigate students learning of physiology concepts, with 9 of these studies finding that virtual laboratories supported conceptual learning. Six papers used subjective student feedback to explore if virtual physiology laboratories were effective for motivating students to learn, with 5 studies supporting this statement. Three studies assessed technical laboratory skills and found that the virtual laboratories were effective for the learning of technical skills. However, no studies examined if students developed research skills during the virtual laboratories. This systematic review provides useful insights for educators regarding the educational impacts of virtual laboratories. It also highlights a need for further explorations of virtual physiology laboratories, using valid and reliable research strategies, and with a focus on the laboratory design and the development of research skills.

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Our Challenges and Triumphs with online peer assessment in a fully remote course

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Peer assessment enables deeper understanding of content and can increase academic performance (1-3). We have reported to the Society the use of peer assessment in a 2nd year introductory cross-disciplinary neuroscience course, run as a series of 5x2-weeks integrated modules around "hot topics" (4-5). The invigilated in-class assessment started as paper-based (4), then moved to the Moodle workshop tool (5). Thus, when COVID-19 forced this activity to be fully online in 2020 we felt prepared. However, students had trouble managing time limits, and Moodle workshop did not automatically save answers, thus, only 50% of answers in the first module were submitted successfully. This improved to 89% successful submissions in the final two module assessments. Despite the challenges, student feedback was very positive, and marks for this task (16.2/20) were comparable to 2019 (17/20). Student performance in the related final exam written questions was better than in 2019, and substantially higher compared to the three previous years (2020/2019: 74/68% vs. 2018/2017/2016: 59/56/61%).

Analysis of the recorded lectures showed total lecture views were significantly higher than in 2019 (56±2.5% vs. 45±3.4%; p=0.0097, unpaired t-test), and also found significantly higher engagement with structured online learning resources.

In conclusion, the Moodle workshop tool is a valuable learning tool but needs additional support when run remotely. The technical and time challenges with the peer assessment did not cause apparent disadvantage for student performance. Increased viewing time for lectures and other online resources in combination with the use of peer assessment may explain the improved final grades.

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Adjusting curricula for the modern age: Can face-to-face live polling be transferred effectively to an online learning environment in physiology education?

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With the worldwide educational environment changing due to current events, it is important to determine which learning activities might be transferrable between online and face-to-face teaching. This has challenged tertiary educators to find techniques that can promote equal engagement during multi-modal sessions, regardless of whether the students are online or physically present in the class[1]. One such method, formative assessment using live polling, may be a suitable option where this can occur[2]. This study investigated health science and medical student perceptions of using the live polling platform, Kahoot!, as a physiology assessment tool in either a face-to-face class, or when the class was delivered online. A total of 174 participants studying health science and medicine utilised Kahoot! in either face-to-face or online during live sessions, and their experiences and perceptions were recorded. Overall, students enjoyed the live polling platform, with no significant differences between those studying face-to-face (n = 72) or online (n = 102). Several themes emerged from qualitative analysis of written responses, such as live polling being enjoyable, engaging, and a good revision and learning tool. This study presents live polling as a suitable method of instruction that is not impacted by the mode of delivery in a health science and medical course. For educators using multi-modal delivery or presenting classes that may be delivered both online and face-to-face, live polling is an ideal instrument to provide a consistent and engaging experience to both cohorts.

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Empowering students for group work: an integrated program of in-class face-to-face (F2F) teaching and online environment

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Collaborative learning is recognised as an effective teaching and learning methodology; and is a major employability and transferrable skill sought by future employers. Although highly valued by the university, many studies have found student perception of group work is poor. We examined the efficacy of in-class activities in face-to-face (F2F) classes, and after transition to online learning due to COVID-19 with an online tool, Padlet. These activities are designed for the student to work independently then as a group to arrive at a consensus strategy to showcase the value of collective knowledge and experience. We deployed these activities in 2nd and 3rd yr Physiology subjects (enrolments: 30 – 300 students). The students were surveyed using a 5-point Likert Scale on their perception of the usefulness of the activity (n = 125, F2F; 95, online). In both F2F and online classes, >80% of students agree/strongly agree that the activity was a good ice-breaker. In addition, >75% of respondents agree/strongly agree that the activity was helpful in improving their team communication and identify team dynamics. Students found the activity helpful in identifying their individual communication ability and increased their comfort with their group (>79% positive responses). Overall, students agree that this activity should be a regular part of the subject and should be expanded to other subjects with teamwork (>79% positive). The inclusion of in-class activity had a positive impact on the student perception of their team and could be faithfully replicated to the online environment.

Highlighting the importance of face to face teaching in physiology following the return to campus after COVID-19 lock down

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It has long been accepted that the practical application of knowledge within the context of physiology is extremely beneficial to students' understanding of lecture content and enhances critical thinking through an underpinning in research skills. The swift transition to online teaching as a result of the COVID-19 pandemic saw all physiology teaching within our college, including newly designed practicals, move to a completely online format. Educators quickly adapted with innovative, novel ways of delivering remote physiology practicals that were well received by students and provided an excellent alternative to face to face delivery. Upon students' return to campus there was clear appreciation of the benefit of peer to peer and academic interaction offered by face to face practicals with recognition of the loss of these elements during the COVID-19 lock down. Student evaluation data demonstrates a strong preference for in person practicals with students finding this a far more engaging, enjoyable, and rewarding method to learn physiology. I present on the demonstrated benefits of face to face teaching when compared to the online alternative in a second-year integrative human physiology cohort focusing on the student experience, academic success, and overall sense of student wellbeing.

Encouraging staff reflection when implementing large scale innovations in physiology education

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With strong evidence for the value of active and collaborative learning (Freeman 2014) we embarked on major pedagogical change in 2016, whereby we shifted our emphasis from didactic to active learning in the classroom. We knew this would lead to marked changes in the role of educators, as they moved from being the "sage on stage" to the "guide on the side" (King, 1993). This resulted in a need for our educators to develop new skills in classroom management, questioning and techniques that facilitated higher-order thinking and collaboration.

Over the course of 2 semesters, staff completed weekly journals, reflecting on their teaching practice to promote self-development and enable us to monitor the impact of the change on educators. The journals were provided to us by staff on a voluntarily and de-identified basis and informed meetings and training sessions for our staff. The outcomes from these reflections have also allowed us to assist other academics embarking on similar journeys.

The reflective journals were evaluated qualitatively in conjunction with data from staff focus groups. The data was analysed for themes to determine the challenges perceived by educators as well as the support staff needed while adjusting to the change in pedagogy. Through this presentation we will illustrate the benefits of reflective journals in higher education, demonstrating how they can be used to support staff during large scale pedagogical changes. This method, which is routinely used in K-12 education, has the potential to challenge staff perceptions and values of themselves as an educator.

A cycle of improvement: multiple iterations of a foundational unit in the Pharmacy curriculum

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In this presentation, we describe the process undertaken to design, develop and deliver a foundational Human Biology unit 'How the Body Works', as part of the strategic redevelopment of the Pharmacy curriculum at The Faculty of Pharmacy and Pharmaceutical Sciences, Monash University in 2017. Briefly, 'How the Body Works' was purposefully restructured to adopt a student-centered learning approach. Lecture notes were replaced by self-directed online modules which were incorporated into the learning management system (Moodle) by an educational support team of assistant lecturers. In-class didactic lectures were replaced with newly developed Interactive Lectures comprised of active learning exercises only. Workshops were also designed with student-centered learning in mind. In 2017, the units were delivered for the first time to a cohort of ~190 1st year Pharmacy students. Both students and instructors were engaged throughout the entire learning / teaching process. Now in the fourth year of its inception, we report our experience in the initial design, development and delivery of 'How the Body Works', as well as the cycle of improvement that was used for the second and third offering of the unit in 2018 and 2019 respectively, as well as the emergency move to online learning in 2020. The impact of these changes were reflected in the teaching evaluation surveys which showed an 8%, 11% and 10% increase in the overall unit satisfaction in 2018, 2019 and 2020 respectively. Feedback obtained from staff and students this year will be used to further develop the unit in 2021.

Theme-based modular learning of physiology during a global pandemic and into the future.

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Traditional science-based disciplines, such as physiology, are generally taught in face-to-face mode with students attending activities such as lectures, practicals and tutorials to enhance their learning. This is achieved through interactive and hands-on sessions, leading to specific scientific skills. Due to the global COVID-19 pandemic, these activities that generally enhance student engagement have had to be delivered online. Currently, student engagement in the online learning space is relatively unexplored in the field of physiology education. Given this, a second-year unit of study (PHSI2X08) that is core to a Physiology major for the Bachelor of Science at the University of Sydney was transitioned. Historically, PHSI2X08 was taught with sequential didactic lectures, practicals and tutorials that did not translate easily to online mode. Given this, a thematic approach was introduced containing three, four-week modules (Cellular neurobiology, Exercise physiology and Nutrition, and Biomedical Engineering) that allowed students to engage both vertically (within the module) and horizontally (across the modules). Each module was supported by practicals that were delivered through the online teaching platform, Lt (ADInstruments). Whilst you cannot replace hand-on practical activity online, we introduced interactive videos and real-time data analysis and interpretation to achieve the unit learning outcomes. Together, this theme-based modular learning has created a greater flow of content and application of knowledge for second-year physiology students. The transition to online mode has demonstrated strong student engagement with the practical activities and offers a suggested approach to enhance the delivery of physiology compared to traditional face-to-face methods.

Achieving Consensus on the Core Concepts of Human Physiology in the Australian Context using the Delphi Protocol

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There is a set of core concepts (CC) that are central to the discipline of human physiology. These concepts are important for students to understand and to demonstrate their capacity to apply. In a previous study, we identified Australian universities offering a physiology major as part of their undergraduate degrees and accessed their online subject handbook. Content analysis and mapping of subject learning outcomes against a list of existing CC of physiology (1) revealed that many of the CC were not obviously covered across the physiology majors. The project team also believed that key physiology CC were missing and that some CC were not specific to human physiology.

The aim of this project is to reach Australia-wide agreement on the CC of physiology using the Delphi method - an iterative process that explores agreement and disagreement amongst participants to achieve representative consensus. Expert physiology educators from 25 Australian universities, accepted an invitation to join a Task Force (TF) and met to discuss potential questions related to the CC of physiology that would comprise two surveys. Subsequent completion of survey one, analysis and discussion with the TF will inform questions for survey two, to be distributed to the broader community of physiology educators in order to finalise and adopt an agreed list of CC of physiology. These concepts can be used to inform curriculum design and will form a key component of an Assessment Framework being developed across biomedical science disciplines, and will provide consistency across Physiology education in Australia.

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How to future-proof your teaching with use of UYP and other Lt contents

ADC McKnight

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The COVID pandemic requires adaptability in our teaching and provides a unique opportunity to rethink what we do. Whatever we do, this rethink should be built around the concept of active learning and be guided by what I call 'The 4 E's of Learning'. Learning should be Efficient, Effective, Everlasting, and Exciting. Whether you teach a conventional lecture/laboratory course with some tutorials, a blended learning course with a mix of on–line tasks, flipped classroom activities and laboratories, or a fully remote on–line course, the same principles can be applied. In particular, it is really important to future–proof your course so that you can move with as little disruption as possible, to the required type of delivery. Whatever your preferred format for delivering your course, there are elements in common.
Lectures: The new technologies are making the conventional 50-minute lecture obsolete. Can we devise a format that would be equally suitable for the conventional program, blended learning and fully on–line remote courses?
Tutorials: So often, students prepare poorly for tutorials. Again, can we devise a format that is equally effective for all types of program?
Laboratories: Physiology is a laboratory–base discipline and laboratory work designed to illustrate important concepts and enhance their understanding, is central to a tertiary level physiology program. How best to deliver this experience?
My talk will expand on these themes and be illustrated by examples from the work that we have been doing at ADInstruments to support Physiology teaching.