Short report:

Reflections on practice: A virally-infected curriculum must adapt or suffer!

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Abstract

Viruses are recognised for their ability to induce genetic evolution and cause disease. SARS-CoV-2 has catalysed rapid evolutionary changes in the delivery of preclinical teaching of the Griffith University medical program across diverse sites by inducing the use of progressive student feedback to enhance active learning in an online flipped format. These COVID-induced adaptations in medical education delivery, innovation and fast-tracked modernisation are, unlike viral infection, a curve that we embrace and do not want to squash.

Keywords: COVID-19; SARS; curriculum, medicine; medical education; flipped classroom

Introduction

Social media feeds and email inboxes have been replete with information and controversy regarding challenges to personal freedom, wellbeing and health during the global COVID-19 pandemic (Nay, 2020). There has been both support and criticism for delivery of education and assessment online, and the impact of the global pandemic has had far-reaching consequences for tertiary education, with the virus infecting our curricula such that we will never revert to pre-COVID delivery. Adapting to life in the time of global SARS-CoV-2 infection has caused considerable confusion and suffering in the tertiary education sector, with 20% of students stating that their mental health has worsened during the COVID-19 pandemic (Active Minds, 2021). An increased feeling of isolation, heavy reliance on email and increased screen time have had an obvious impact. Staff have fared

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no better, with feelings of isolation and additional concerns over job security, and recent estimates suggest a loss of 12,500 jobs in the Australian tertiary sector alone (Zhou, 2020). These combined circumstances during an unpredictable year have affected the delivery of complex, multi-themed, traditionally-delivered degrees, including medical programs, many of which use year-long course structures (Rose, 2020).

In early 2020, after the initial reactive shuffle to adapt traditionally-taught curricula to online delivery, Australian health academics began to embrace the "new normal", continuing to work from home to purposefully and collaboratively develop online courses and virtual classrooms. At the close of 2020, as planning began for 2021, many academics were reluctant to return to full campus-based, face-to-face delivery. This was not a great surprise. Australian office workers' experiences of home-based working are largely positive, with 49% reporting actively working during time that would have previously been spent commuting, 36% reporting lower stress levels, 38% reporting more time for leisure, 81% working the same or more hours and 70% maintaining or improving productivity (Citrix, 2020).

The 23 medical programs in Australia and New Zealand (Australian Medical Council, 2020) vary in length, geographic distribution and pre-COVID online technology use. Many universities, in the face of increasing financial uncertainty, have had to rapidly upgrade technical infrastructure and academic and administrative expertise to effectively transition to virtual training environments for the medical and health sciences.

Teaching preclinical medical students the foundational medical sciences remotely has presented different challenges than work-based training. Our own experiences echo those of other work-based training. We have had to rapidly adapt a partially-blended curriculum, previously delivered at two preclinical locations, for online and virtual delivery to an amalgamated student cohort (Torda, 2020). In this report, we share some evolutions in preclinical teaching of the medical sciences that have occurred in response to the SARS-CoV-2 pandemic, many of which will be relevant to other degree programs.

Curriculum adaptation

A new site and updated learning objectives
The pre COVID-19 curriculum in our graduate medical program used a campus-based, face-to-face, problem-based learning (PBL) approach for the first 2 years of a 4-year program, with most face-to-face lectures recorded for students to review if required.

One year before COVID-19, a second teaching location became active for a cohort of 50 first-year preclinical students, with 1.5 full-time equivalent (FTE) academic staff employed to "duplicate" the delivery of the medical science curricula on that site; 170 students remained at the original campus, which had a greater staff presence. This necessitated the

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redevelopment and realignment of medical science learning objectives (LOs) for equitable teaching and assessment across sites. This lengthy and labour-intensive process was largely completed by the start of the COVID-19 pandemic and enabled transition to online learning using a recently revised set of common LOs.

Learning maps

Pre COVID-19, the teaching style, order and content of classes were markedly different at each teaching site. The new site purposefully used the revised LOs to guide academic and clinical staff to deliver sessions, whilst the original site had not yet adapted, and most lecture-based sessions were still largely historical, with no articulation of LOs. It was evident that a transition to a common online delivery was required and that the development of learning maps was essential to improve cross-site alignment and clarity. The maps enabled recorded content previously delivered at both sites to be freely available to all students, and it mapped to LOs for transparency.

Initially, in order to rapidly adapt the existing foundational medical sciences curriculum for complete online delivery, pre-existing lecture recordings were linked to 2020 online timetabled sessions for all students. The task of reviewing all recordings and selecting the best fit was overwhelming, especially as many did not align well to current common LOs. A curriculum-mapping framework was developed to enable clearer alignment of learning items (e.g., recordings and purpose-made vodcasts) with LOs and to serve as a developmental record of up-to-date resources that were available to students (Al-Eyd et al., 2018). There were individual learning maps for each PBL case, where each LO was linked to specific digital resources, which included lectures, vodcasts, workshops and practical classes that were previously recorded, newly recorded or hosted in virtual classrooms.

Having the most appropriately qualified personnel recording entirely new, fully-aligned resources in such a short time frame has not been possible, however the maps have enabled the identification of resource gaps and encouraged students to drive their own learning through access to a variety of relevant and targeted resources.

Problem-based learning sessions have been delivered as virtual learning groups for most of 2020, which has prevented the face-to-face conversational flow and use of visual cues previously experienced by students. By providing learning maps clearly aligned to curriculum LOs with each PBL case, students have been able to use them, as well as the unfolding PBL case materials, to specifically target the learning issues to cover during each virtual session. The PBL delivery has, in essence, more closely reflected a case-based learning model (McLean, 2016) during 2020 and has largely been well received.

The strengths and weaknesses of the curriculum were highlighted, by both students and academics not directly involved in its development, to the academic team during the process of adaptation for online delivery. Interestingly, students appear to have become

stronger metacognitive learners. They have actively identified which of the introduced strategies best assists them to learn virtually, manage cognitive load and ameliorate confusion. In response to student feedback, learning maps have been further refined to identify resources as "primary" or "secondary", rather than labelling them by campus of origin. Many students were only looking at resources "tagged" to their enrolled study site, and others were looking at all listed resources and becoming overwhelmed. The resources now listed as "primary" align most strongly to the revised LOs, while "secondary" sources contain additional relevant information, have contrasting delivery styles and serve well for extension learning. This offers academics a higher degree of instructional guidance but also allows students flexibility and the opportunity to exercise their learning preferences.

Social interaction and application of learning

Before COVID-19, curriculum delivery varied across sites out of necessity. Lower student numbers at the smaller site allowed for frequent flipped classrooms and application-based face-to face workshops for 25 students at a time. The workshop worksheets were provided online to students at the larger site, who were encouraged to complete them in study groups and email responses or questions to academics. This was rarely done. In early 2020, when lecture gatherings were still feasible, a compromise was achieved for the larger site, with cancelled teaching spots re-timetabled to explore key application workshop messages for groups of up to 170 students. The worksheets were reformatted into guided slide presentations to break up the case materials in a way that was accessible to a larger cohort and allow for insertion of illustrative content. Although this was an improvement, workshops were still less frequent, less interactive, and poorly aligned with the smaller site.

Adaptive expertise

As the virus began to hijack the curriculum, student transition to the online environment was better than initially anticipated, and students expressed a desire for increased virtual interaction in the medical sciences. It was clear that the application workshops could meet this need with some redesign to make them suitable for virtual delivery to the amalgamated online cohort of students. The redesign hybrid used some original worksheet content and structure, while providing additional instruction and a slide-share format, delivered through Collaborate Ultra. Academic staff guided students through relevant structured case scenarios, which utilised specific questions to allow students to apply their learning to new theoretical clinical situations. Students answered structured questions using the chat function, and we found that there was significant in-chat peer teaching during these sessions. Through a continual cycle of student feedback, using online questionnaires, these workshops transitioned into a format optimal for multi-site delivery of key medical science content integrated with clinical reasoning. To date, all workshops have been team taught,

and the attendance record and preliminary student feedback suggests high engagement and value. Staff perceive an improvement in overall alignment and equity.

Unfortunately, Collaborate Ultra has imposed some restrictions. Teachers are unable to see students and online etiquette requires that students must type rather than verbalise their discussion. The functionality of break-out groups is also limited by restrictions embedded in the software. This has had a greater impact on students from the smaller site, who were used to small group, face-to-face, verbal interaction pre-COVID. Nevertheless, there have been clearly positive changes, including the use of team teaching to model good professional practice behaviour and the enhanced integration of clinical reasoning. In addition, the clear LO focus enabled better assessment alignment, and despite the disruptive changes throughout the program, there have been no obvious differences in medical science assessment outcomes across the sites throughout 2020.

Conclusions

Although the learning maps have been universally well accepted, early evaluation of the COVID-induced workshops was intriguing. The majority of students at the larger site indicated that they would be happy for workshops to continue online post-COVID, however more students at the smaller site indicated a preference for the pre-COVID face-to-face arrangement, when possible, instead of online instruction. In addition, almost all students at the larger site, but only a quarter at the smaller site, said they were happy for sessions to continue to be delivered to the whole cohort rather than to smaller groups multiple times. Does this mean that to honour student preferences, post-COVID delivery will again differ across locations, or might the smaller cohort's preference simply reflect nostalgia for the pre-COVID learning environment?

As we anticipate a return to campus-based teaching, we view our virally-induced adaptations as exemplars for further innovative pedagogical design. However, just as viruses adapt to their environment, using continual mutation to avoid immune destruction, we need to ensure continual academic adaptation to provide the most flexible and robust curriculum possible (Carney et al., 2018). A continual cycle of feedback and appropriate change must occur, when required, to ensure effective and efficient teaching and learning, taking into consideration equity across diverse sites and different learning attitudes. This will necessitate some element of academic risk taking.

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