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## Emergency remote teaching for design thinking in health innovation

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Received 17 October 2020; Accepted 26 October 2020; Published online 27 November 2020

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### Introduction

In March of 2020, South Africa responded to the global COVID-19 pandemic by instituting a full lockdown. This meant that only essential services were allowed to operate, causing schools, universities and workplaces to close. The University of Cape Town was about to complete its first term when this occurred. With campuses closed, students were asked to vacate residences and return home. The university went into emergency remote teaching, with all teaching and learning moving online. Students were provided with the necessary resources to access content via the university learning platform, but strict guidelines were set to ensure that the delivery of content was not data or bandwidth intensive.

For our master's-level course on Health Innovation and Design, this posed many challenges. Health Innovation and Design is part of the curriculum for the MPhil in Health Innovation and the MSc in Biomedical Engineering. It utilises design thinking methodologies as an approach to innovate for improvements in health and wellbeing. The course comprises group-based action learning with a project partner and endeavours to promote engaged scholarship (UCT, 2020) by interacting with constituencies outside the university for public good. For 2020, we had secured the provincial Department of Health as our project partner. Our students were going to work with a team on designing and developing an operating theatre information system for scheduling. We would have had our first hospital visit the week after the university closed its on-campus activities.

How would a collaborative environment such as ours, which includes an outside stakeholder, translate to the virtual environment? We share a few lessons we have learned through experiencing a semester of emergency remote teaching due to the COVID-19 pandemic.

### Preparation

At the start of this journey, familiar tools seemed new. We had used Zoom (for communication; <https://zoom.us>), Google Slides (online collaborative workspace; <https://www.google.com/slides/about>) and Vula (the university's learning management platform; <https://vula.uct.ac.za>) before but had not used them exclusively for the bulk of teaching and never all at once. For example, we may have used Zoom for meetings and preparation. Vula had always been used to load presentations, announcements and assignments, but had never been used as the major repository of all content, since content for the Health Innovation and Design course is created in each class. Google Slides had been used on an ad hoc basis.

The initial preparation to use Vula offered by the University's Centre for Innovation in Learning and Teaching (CILT) was critical in our preparation to take the course online. We attended webinars on the main Vula functions that may be used to facilitate emergency remote teaching. We were guided on how to create content

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for the low bandwidth and low data constraints that many of our students faced; real-time video calls for one hour would not be possible for many students as it would require too much data and bandwidth. Thus, we avoided video and restricted communication to audio only. However, this decision made the interactions online harder. It has been suggested that the gaps left by not being in a physical environment adds to cognitive load (Sklar, 2020).

We attended most of the webinars offered by CILT. We learned that Vula as a tool is extremely underutilised and many, if not most, academics are not using it to its full potential. We found the webinars necessary to enable us to learn to navigate the platform successfully, as it was otherwise difficult to navigate and not intuitive.

There was a limit to the extent that CILT could help in preparation for emergency remote teaching for Health Innovation and Design. The design thinking methodology was crafted to be team-based, high-energy and collaborative. To transfer design thinking online we needed to consider collaboration tools, ways of facilitating design thinking, and content that could be used effectively. We discovered that there was no precedent to conduct facilitation and group-based exercises effectively online. Design thinking has six phases, namely understand, observe, reframe a new point of view, ideate, prototype and test. Two of these phases, observe and test, required in-person interviewing and interactions. The lockdown restrictions ruled such activities out completely.

## **Effects on design thinking**

### *Understanding and Observing*

By the time the lockdown in South Africa was activated, the understand phase was underway in the classroom environment. Once we moved online, we started with revisiting the themes that had been discussed. Students delved more deeply into documents provided by the Department of Health. It was then time to conduct interviews with hospital staff to understand the needs for a theatre information system. We intended to conduct telephonic or video-based interviews. Soon we learned that these stakeholders were no longer available, given that resources were being directed towards fighting the COVID-19 pandemic. This meant that we would need to change the scope of our project dramatically.

We decided that students should interview parties to whom they had access, such as family, friends and acquaintances. This worked well, bringing in a rich set of data, but it also created disparities across the two design thinking teams as some students had access to a range of health professionals, whereas others only had access to patients and health care workers in primary healthcare settings.

### *Reframing the Point of View*

Creating reframed challenges is a key step in design thinking. It takes the observations and insights that arise from interviews and reframes them as new problem statements. Problem statements were formulated over two weeks to ensure intensive revision. The students generated two point of view statements per team. Because we only used one and a half hours per online session, students were left with instructions to complete activities offline. Usually in design thinking we would use time-boxing to move us along during interactive sessions. This does not play out online as it does in person, often resulting in poor output. In future, we should embrace more complex collaboration tools, trial more templates and incorporate video where possible.

### *Ideation and Prototyping*

The approach we used for the ideate and prototype phases was to ask students to ideate using different activities that could translate to the online environment. Some tasks were completed during class and others on their own, after which students would amalgamate and cluster their ideas. Given that the students had an understanding of design thinking from the face-to-face sessions prior to lockdown, these activities were easier to communicate remotely than to students who had never heard of design thinking before.

A disadvantage of teams conducting ideation offline is that the facilitator is not present when the idea is formulated. Usually the facilitator would be present as the ideas develop in class, but with asynchronous

activities this is no longer the case. We learnt that synthesis and critique of ideas at this stage is critical. In future, we will need to factor in time to clarify ideas before we move on to other activities.

The disadvantages of asynchronous sessions seem obvious, but there are also distinct benefits. The time between sessions and the independent off-line activities give participants time and distance from their ideas. We noticed that if the students came back to their ideas after a few days, they looked at the ideas more objectively. However, mutually reinforced energy present in a face-to-face session is absent, which means that the development of the idea can be diminished along the way.

## **Tools**

Google Slides was selected as our collaboration modality, rather than a purpose-built collaboration tool such as Mural (<https://www.mural.co/>), Miro (<https://miro.com/>) or Stormboard (<https://stormboard.com/>). The purpose-built tools require high bandwidth and in exploring them, we noticed challenges in navigation. Therefore, we elected to use the least technologically ambitious tool, which was Google Slides. The students were familiar with it and it didn't impose another learning requirement. Online collaboration tools create a more seamless experience but are not essential. They also have templates and functions that make design thinking easier to carry out online, with sufficient preparation.

## **Online teams**

Design thinking is done through group-based activities. Before restrictions due to COVID-19 forced us online, we had already created two teams, to which students had been allocated based on personalities and interaction styles. This had been done to encourage productive participation and engagement in the physical classroom space, where we had experience of how students function in groups. We discovered that team dynamics and individual styles play out differently in an online environment.

The online space inhibits various aspects of students' engagement and opportunities to contribute. For instance, in the physical space students are often encouraged and animated by the energy and attitude of fellow team members. An element of this energy is lost online during sessions with cameras off, contributing to fatigue and troughs of enthusiasm. On the other hand, the asynchronous methods and offline activities allowed for expression of ideas that may have been muted during classroom sessions.

One of the ways in which the physical classroom enables mitigation of some of the factors leading to fatigue is the use of warm-ups, which are aimed at destressing students before beginning the work and enabling them to engage with each other in a playful and energetic manner. This can be replicated to a degree online but was not feasible with the data-constrained nature of our classes with cameras off. Creative ways of encouragement and group activities without the use of video or other data-intensive modes of engagement should be explored in future online classes.

In the physical classes, facilitators navigate the class energy and dynamics through observation. Reading body language and attitude can provide information that enables facilitators to steer groups towards progress. Other markers of engagement were required online. Student contributions to the content created and organised online by the groups can be used as a measure of individual progress and group dynamics. Additionally, fatigue and lack of enthusiasm during online sessions are indicated in how students are communicating and verbalising their contributions. Of course, these observations exist within the context of COVID-19 and related anxiety and stresses, adding to the challenge of managing teams in an online space.

## **Facilitator learning**

Besides the multiple ways an online space can slow down progress and derail momentum compared to the physical space, there are ways in which the online space teaches us about teaching and innovation. Since design thinking is concerned with iterative, user-centred design, the process of moving to, and maintaining, online engagement provided an opportunity for facilitators to reflect on and improve the learning experience for students based on feedback and observations. The duration of lessons, usually three hours, was cut once it was understood that students would not be able to participate productively for prolonged periods. The use of

Google Slides as a replacement of the physical whiteboard was an easy-to-learn and quick shift to achieve the objectives of collaborative and visual work. Utilising breakout rooms in Zoom became a way of replicating separate sessions for the two groups. However, this introduced a challenge where the communication and ease of access between the facilitators was hindered. In the physical classroom, facilitators can check in with each other on developments within the group or discuss ideas and concerns that arise. The online space does not allow for such discussion seamlessly. Even the private chat functions in Zoom, did not enable the same kind of interaction.

## Conclusion

Moving classroom activities online at speed with limited preparation was always going to be challenging. Considering that the pandemic and the accompanying restrictions will remain until a vaccine or successful treatment is available, classes and how we teach need to be improved upon iteratively, as design thinking dictates. It is important to listen and observe how students and teachers are experiencing the classroom space if acceptable solutions are to be created within the existing limitations. Creativity and innovation will be required in addressing what has become the “wicked” problem (Buchanan, 1992) of teaching and learning during a pandemic.

## Author contributions

NC was responsible for manuscript conceptualisation and design. NC and JF were responsible for data collection and analysis and the writing of the manuscript.

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