e-HECC 2020

RE-EXAMINING LEARNING, RESEARCH, AND TEACHING IN CHALLENGING CONTEXTS: FROM DISRUPTION TO POSSIBILITIES
A warm welcome to colleagues and students to this year’s virtual Higher Education Campus Conference (e-HECC) 2020. Three years ago, when we changed the focus of our yearly conference from an international one to an NUS campus conference, our intent was to enhance conversations among NUS community on teaching and learning issues that matter to us. By doing this, we have hoped to strengthen community networks for colleagues and students to share and learn from one another perspectives and good practices.

Since the 2018 campus conference, we noted a positive increase not only in terms of participation from colleagues but also from students, especially as presenters. For this year’s e-HECC, we are pleased to feature 66 presentation sessions – 33 paper presentations, 25 PeckaKucha presentations, and 8 poster presentations – with nearly 10% of these featuring undergraduate students as single and co-authored presenters. We would also like to make a special mention of the increase in teacher-student collaborations in examining how teaching has had an impact on how students engage with subject matter content, learning materials, and one another in a knowledge building community.

This year’s theme, “Re-examining learning, research, and teaching in challenging contexts: From disruption to possibilities” builds upon many recent experiences and conversations on responding to massive changes and challenge: the COVID-19 pandemic, the need to address new workplace demands, as well as the priority of developing interdisciplinary programmes, all in the context of the pervasiveness of digital education. The 66 presentations are rich in insights on how these recent and ongoing changes have affected our curricula, materials, as well as our approaches to assessment in our respective contexts.

As this is our first attempt at organizing a fully online conference, we ask for your forbearance if there are interruptions or if things sometimes perhaps do not run as smoothly as we might wish. We have made every effort to ensure a meaningful conference experience for presenters as well as participants, with a key focus being to draw on the affordances of technology to foster meaningful conversations.

We are grateful for strong support from NUS senior management, colleagues, students, and friends of CDTL. May we also take this opportunity to acknowledge our CDTL colleagues who have journeyed with us in the organization of this fully online HECC.

We wish you a productive conference.
Programme

08 DECEMBER 2020 (TUE) | 9:00 AM - 12:00 PM
09 DECEMBER 2020 (WED) | 9:00 AM - 11:15 AM
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**Team-Based Learning With Zoom Breakout Rooms To Improve Online Learning Engagement**

**Blended learning approach for faculty development workshops during COVID-19**

**Performance = f (Engagement) A Preliminary Study on the correlation between class engagement and student grades**

**Moving Student-led Teaching and Learning Activities Online in Unforeseen Circumstances: Student and Instructor Experiences on the Use of Technology**
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   https://zoom.us/support/download

02 Sign-in with SSO
   nus-sg.zoom.us

03 Test audio and video devices

04 Share slides or any files by clicking Screen Share;
   Share computer sound if the file contains audio and
   turn it off after use (applicable only to the presenters)
Opening Address & Invited Paper

Professor Bernard TAN
Senior Vice Provost (Undergraduate Education)
Emergency remote teaching and beyond: A media studies approach towards understanding student affect and emotional presence in online learning

Jinna TAY and Shobha AVADHANI
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Sub-theme
Community of Learning

Keywords
Community of Inquiry, emotional presence, emergency remote teaching, digital ethnography, student voice, media and cultural studies

In the context of a global pandemic and the resultant shift to ERT for classrooms across the world, academic literature and journalism reports have described the chaotic and even scattered online teaching characterising the shift to online learning. Our study seeks to examine one aspect of this larger global experience: namely to give voice to and understand the affective experience of students within this bigger picture.

Pedagogically, we seek to combine our digital media studies background with learning frameworks. The Community of Inquiry framework (CoI) (Garrison, Anderson & Archer, 2000), examines emotional presence as a key element by moving beyond a focus on the learning situation alone, and by drawing students’ voices more deeply into the exploration. As communication and media studies educators, we see the rise of online learning as an emergency response to a global pandemic, as occurring against a backdrop of specific pedagogical explorations in which we engage our students.

In our media classrooms, our students develop a familiarity with research on digital literacies, digital sociality and affect, the politics and culture of virtual reality and technological embodiment, the mediation of audiences and so on. This familiarity allows our students to bring to ERT extensive experience as reflexive digital citizens in digitally shaped environments; where their affect has long been recognised as a significant factor by media and cultural studies research (Ahmed, 2004; Goldberg, 2012; Kuntsman, 2012). Reflecting on the intersections of pedagogy, media and affect, Hickey-Moody and Crowley (2010) posit that affect “expresses the embodied experience of learning, the places in which we learn, the histories and desires we bring to learning”. We seek to expand the boundaries of discussions on online learning in higher education through this pilot study using the method of digital ethnography that centres student voices.
Research Questions:

In the context of the current ERT phenomenon, we seek to answer the following questions:

1. How do media students used to a physical campus life experience embodiment in ERT?

2. What are the places in which they learn?

3. What are the educational, technological, and other histories and desires they bring to their learning?

Methodology

We situate our methods in digital ethnography, an approach that is grounded in the field of media studies. Based on principles of multiplicity (engaging with the ecology of digitality), reflexivity (a focus on our relationship with the digital), and non-digital-centric-ness (de-centring the digital). We use two qualitative methods—the group interview and the video diary. The proposed flow targeted twenty participants, and two group interviews bookending six video diary entries. The first group interview was conducted in the third week of September. At the time of writing, our preliminary findings are based on this completed stage. The video diaries and final group interview are pending.

Preliminary findings

The group interview highlighted the richness of student experience and insight in making sense of their learning during a virtual semester. Based on a shared understanding of Media Studies concepts, students gave us descriptive and analytical insight into the spatial-temporal arrangements that they constructed as they navigate their digital learning. Several key themes emerged at this preliminary stage and will be elaborated: micro-migrations within the home, high levels of self-monitoring and self-reflexive methods of performing ‘study’, the need to align their semi-virtual campus and semi-physical home, and the adjustment of emotional states, to name a few. Students bring different affective resources to their virtual classrooms which are unrecognised. This paper aims to elaborate more on these resources, and suggest how we as educators might utilise them to engage students more holistically as learners.
Teaching systems thinking concepts during a pandemic: 3 strategies for engaging learners

TAN Yuen Ling, Lynette, Navarun VARMA and Naviyn BALAKRISHNAN
Residential College 4
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Sub-theme
1. Community of learning
2. Engagement with online materials

Keywords
Classroom community, online learning, digital education, hybrid teaching, innovation

Among the pressing concerns in the thick of the current global pandemic, particularly in the context of Higher Education Residential Colleges, is the educators’ ability to create a sense of community amongst students, as well as to effectively facilitate online learning.

Residential College 4 (RC4) offers a ‘Living-Learning Programme’ (Inkelas, 2016) within the National University of Singapore. The curriculum focuses on ‘Systems Thinking’ – both as a philosophy and a diagnostic tool arising from the principle of interconnectedness in the world. Internationally, educational institutions like RC4 are also termed ‘Living-Learning Communities’ (LLCs) where the interaction and collaboration that arise from community living are at the top of what students expect.

For Semester 1 of AY2020-2021, our faculty addressed these challenges of teaching in a pandemic on two fronts—creating hybrid classrooms that would integrate as much of the face-to-face (f2f) experience for undergraduate residents as possible, and using asynchronous material to support students in their online learning. To encourage student engagement, education technologies such as gamification are also utilized. The basis for these strategies are established practices from pedagogical theory: active learning stemming from Vygotsky (1978) and popularized in Hattie’s ‘visible learning’ (2012) as well as Bloom’s taxonomy (1956, 2001).

This paper considers the employment and impact of those strategies in three Systems classrooms – UTC2706 ‘Committed to Changing Our World: The Systems Pioneers’ (n=24), UTC1702F ‘Thinking in Systems: Disaster Resilience’ (n=48) and UTC1702B ‘Thinking in Systems: Diseases and Healthcare’ (n=32), with a total number of 104 students participating in the study. The students are mostly first and second
year undergraduates attached to RC4 and are majors from the Faculties of Engineering, Computing, Science and the Arts and Social Sciences.

UTC2706 deepens students’ understanding of Systems concepts using a hybrid classroom throughout the module where students experience f2f interaction on a rotational basis. Students outside are projected onto the screen where students are taught in the physical classroom simultaneously through Zoom and community is built at the interface between the two groups. UTC1702F teaches Systems concepts related to disasters using gamification (‘Forest@Risk’) and other platforms, with partial use of a hybrid classroom. UTC1702B blends asynchronous material and a messaging app (Telegram) with the fully online Zoom classroom in the study of diseases and healthcare.

In each case the principles of active learning, where the student engages in the learning process and builds on his prior knowledge, are adhered to. A sense of community is also created via collaboration and teamwork. Finally, a common survey is administered to gauge student reception of the strategies and the level of community experienced, and whether there is a significant difference in students’ perceptions regarding this sense of community across these classes. The research question the survey aims to answer is: “What are students’ perceptions of connectedness and learning when a blend of online, asynchronous resources and face-to-face teaching strategies are used in the Systems Thinking classroom?”

Rovai’s (2002) Classroom Community Scale, which measures a sense of community via two subscales (learning and connectedness), is used as a basis for the survey. Unlike similar studies that find a marked distinction between fully online and hybrid classrooms (Ritter et al, 2010), our project investigates whether this sense of community will be significantly different when strategies of active learning are employed across these 3 Systems classrooms.

Historically the research and experience of teaching and teaching well has mostly focused on the f2f environment. However, in the present climate, the ability to effectively wield online tools in digital education has moved irrevocably to the forefront. This paper shows three examples of how we as educators can innovate by using these online tools, while embracing the principles of good teaching, to best support our students in their learning.

References


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**Does Zoom spell doom for peer-to-peer learning?: A comparison of students’ perceptions and evidence of peer learning between a socially distanced and masked class and a Zoom-based class**

**Vyna SANI**  
Ridge View Residential College  
vynasani@nus.edu.sg

**Sub-theme**  
Community of learning

**Keywords**  
Online learning, peer learning, goal orientation, Zoom, COVID-19

**Research question**: This study aims to investigate the question: “How is the experience of peer learning impacted differently between a classroom where students are socially distanced and masked (henceforth SDM class), and a Zoom-based class?”

**Literature.** In higher education, there is growing recognition of the importance of peer learning. Boud (2001, p. 9) defines peer learning as consisting of ‘the sharing of ideas, knowledge, understandings, meanings and experiences, fostering interdependent as opposed to autonomous learning’.

The effects of peer learning can manifest in different dimensions, one of which is on a student’s goal orientation. A community of peers can influence a student’s motivation to achieve goals (Wentzel, 1999; Krappmann, 1985), and their engagement in mastery and performance goals (Dweck and Legget, 1988). Motivational theories, such as self-determination (Deci & Ryan, 2000; 2017), or achievement goals (Liem & Elliot, 2018) posit that relationships with peers inform students how to regulate their efforts and motivational orientations towards goals.

Interaction during class time offers an avenue to enhance peer learning. However, with the implementation of COVID-19 mitigation strategies such as zoning, new challenges arise for class interaction. In physical classes, students are socially distanced and discouraged from engaging in discussions in close proximity with each other, or communicating across allocated groups. Mask-wearing also reduces observable facial cues. Educators who are unable to conduct physical classes often use Zoom video conferencing platform as an alternative. This platform contains elements for interaction, including the chat function and breakout rooms.
Common approaches to promote peer learning are implemented in both formats. These include tone setting and modelling behaviour by the class instructor, employing group discussions, and carving out opportunities during the sessions for experienced students (gleaned from a pre-class survey) to share their experiences with the class.

**Significance of the study.** Given the likelihood of such classes continuing in the foreseeable future, the effectiveness of these new learning arrangements, and exploring how they impact the peer learning climate should be scrutinised.

**Method.** RESL10 Building Your Financial Blueprint is a 12-hour, non-graded personal finance course where Year 2 residential college undergraduates design their personal finance goals and undertake steps to achieve them.

The course was taught concurrently over the same four-week period at the start of the academic semester. The undergraduates were divided into two groups: in-residence students in one zone (n=13) experienced two SDM classroom sessions, while non-residents and other zone students (n=20) participated in two equivalent Zoom sessions.

Students’ responses to a survey, their presentation materials, and teacher observations form the basis for evidence of peer learning which is used to compare between a SDM class and a Zoom-based class using thematic content analysis.

**Key findings.** Results suggest both platforms have their own strengths and limitations that can impact a student’s goal orientation through peer learning. However, both formats were equally effective in influencing students’ goal orientation by inspiring them to start planning for their financial future or consider investing. In addition, other peer learning effects in both formats include greater confidence in expressing thoughts on personal finances with family and friends outside of the class, instigating mindset changes, broadening of perspectives, and greater awareness of resources to turn to.

In spite of similar effects on peer learning found for both formats, the Zoom class participants exhibited a greater desire for different forms of peer learning through making concrete suggestions for improvements through the post-class survey, which were not raised by participants of the SDM format. This may indicate that while peer learning is not compromised in a Zoom-based class, students do feel the loss of the learning environment they enjoyed prior to the COVID-19 period, and are still adapting to the online environment.
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Integrating community-based learning into a technical module in engineering to create an authentic learning environment with a tangible social impact

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Sub-theme
Pedagogical change

Keywords
Authentic learning; community-based learning; service learning; engineering design; gerontechnology

Community-based learning (CBL) is a teaching strategy fostering active and engaged learning by integrating experiential learning with classroom learning through community engagement. It allows students to directly put academic theory into real-world practice, and has a substantial pedagogical research base, grounded in the notion that learning is more effective if it is not just theoretical but also experiential and inquiry-based (Watson & West, 1996). It therefore gives students an opportunity to develop a broader and deeper understanding of course content and higher order thinking skills (Quitadamo et al., 2008). The ability to impact people’s lives also provide great motivation for our present Gen Z students, given their inclination to find meaning and social impact through their learning (Willms et al., 2009).

We therefore integrated external community partnerships into a technical module, BN4102 Gerontechnology in Ageing, not only to enhance student learning and engagement through experiential learning in community settings, but also to train them to apply their learning to solve healthcare-related challenges to impact lives. BN4102 is a technical elective taught to a large class of 73 third and fourth year biomedical engineering undergraduates. It introduces them to various healthcare technologies that alleviate burdens associated with ageing, with a focus on developing appropriate technological innovations for the silver economy. Unlike the conventional way of teaching through a lecture-cum-tutorial methodology, we designed an authentic experiential learning environment through a CBL approach to bridge the engineering concepts learnt to real-world product development and implementation in social service agencies (SSA) related to elderly care.

The students worked in small groups with a community partner (e.g. Care Corner Singapore, St. Luke’s Eldercare, etc.) to interact with the elderly and identify a challenge faced by them. They apply their learning by defining technical specifications, performing ideation, and developing a final prototype using their knowledge and understanding of engineering principles, microcontroller programming and 3D
printing etc. The students then presented their final prototype to the SSA as part of their assessment and subsequently gave the prototype to the SSA. The quality and ability of their prototype to meet the needs of the elderly according to specifications provided an authentic assessment of their learning outcomes.

This CBL approach also involved supporting lectures introducing the concepts required to scaffold the students’ learning towards successfully implementing the project. The supporting lectures covered topics on the biology of ageing, technologies in assisted living, caregiving, and compensating declining physical abilities, as well as digital health in ageing.

The requirement for students to present their final prototype as a gift to the SSA and the SSA to participate in their project assessment ensured the students maintained an active engagement in their learning. Evidence of the students’ enhanced learning is reflected in the quality and ability of their prototype. This forms an authentic assessment of their learning outcomes on effectively applying concepts learnt to real-world problem solving (Ashford-Rowe et al., 2014). All groups produced a working prototype. Our community partners have also affirmed the quality and potential of these prototypes for upscaling and deployment in eldercare. The students appreciated the real-world experiential learning and the practical opportunity to apply their learning as articulated in their qualitative feedback on the module.

As the safety measures associated with COVID-19 kicked in halfway through the module, students moved their interaction with the elderly online due to restricted site visits. The circuit breaker also disrupted their prototype development as they could only develop their prototype at home, and present it to the community partner online. Despite these challenges, the module feedback, the quality of the students’ prototype outcome, and feedback from our community partners suggest that this CBL approach has helped enhance student learning in BN4102.

References


A Scoping Review of Professional Identity Formation in Undergraduate Medical Education

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Sub-theme
Community of learning, curricular change

Keywords
Professional Identity Formation, medical schools, medical students, mentors, role models, curriculum, learning environment

Background. Professional Identity Formation (PIF) is a dynamic developmental process involving the integration of an individual’s conceptions of self with the characteristics and values required of a medical professional. This process of identity negotiation can cause significant stress and anxiety in young medical students, highlighting the need for PIF to be taught at an early stage to aid with their transition between personal and professional identities.
We asked the following research questions:

- What is currently known about the process of PIF in undergraduate medical education in the literature?
- How do medical schools influence the PIF of medical students?
- What are steps that medical schools can take to better support PIF?

**Methods.** To better understand the complex process of PIF, the Ring Theory of Personhood was employed as a framework for delineating what constitutes one’s identity. Two teams of researchers [the PIF team and the Ring Theory of Personhood (RToP) team] employed Hsieh and Shannon’s (2005) Directed Content Analysis (DCA) approach to independently review the articles identified from five bibliographic databases (PubMed, Embase, PsycINFO, ERIC, Scopus), while a third team of researchers created tabulated summaries of the included articles. The two DCA teams then met to discuss their findings.

**Results.** A total of 10477 titles and abstracts were reviewed, and a final 76 full-text articles were included in the review. For the PIF team, the four categories identified are the characteristics of PIF, the characteristics of professionalism, the role of socialisation in PIF, and nurturing PIF in medical school. For the RToP team, the key categories identified are the Individual Ring, Relational Ring, Societal Ring, their enablers and barriers, and their intrinsic and extrinsic factors.

**Conclusion.** PIF is influenced by both intrinsic and extrinsic factors, both of which are largely influenced by the process of socialisation. Aside from opportunities to engage in the socialisation process, the presence of trained mentors and role models who can guide, advise and provide feedback as medical students practice their new roles, skills and competencies is significant in medical schools. This review provides evidence that medical schools play an active and vital role in PIF, through inculcating professional values, beliefs, knowledge, skills, and characteristics in medical students. Their ability to reflect and internalise various aspects of professionalism along their medical training serves to acknowledge the wider impact of PIF upon the medical student.

Currently, medical schools are to varying degrees supporting PIF. The varied approaches, and multiple opportunities and interventions set along the course of medical schools serve to acknowledge the varied influences of intrinsic and extrinsic factors upon PIF. This review offers synthesised tangible steps that medical schools can adopt to assist medical students in navigating personal, relational and societal expectations as they evolve into their professional roles. Such steps include ensuring that there is personalised, accessible, timely, holistic and longitudinal support of medical students provided by trained and well-supported mentors and role models. This would prevent any inappropriate mentorship from negatively affecting PIF. The review also underlines the need for regular, effective assessment of PIF and
personhood along the learning trajectory to directly support medical students and adaptations of the training provided to ensure consistency.

Thus, for effective PIF, medical schools must provide structured learning and working environments, and well-organised curricula, whilst at the same time ensuring that students receive individualised support from mentors and role models. Further research on the design of assessments of PIF is required to gain a deeper understanding on how best to structure programmes to nurture PIF.

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Orchestration of talk: teaching critical thinking and writing using dialogic scaffolding

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Sub-theme
Curricular change, pedagogical change

Keywords
Blended learning; Engineering leadership, critical thinking and writing; Community of Inquiry

It is hard to imagine a classroom without talk. Nevertheless, research shows that tutors are most effective when they scaffold learning by balancing the control of dialogue between the students and themselves (Kazak, Wegerif, & Fujita, 2015). Studies on scaffolding in English language teaching focus on creating the conditions where meaningful learning is fostered (e.g. Sahadi, & Ghaleb, 2012). Reiser (2004) points out that in scaffolding, students receive support and assistance to successfully perform certain tasks and move to more complex ones. During a dialogic discourse, a tutor’s engagement in tutor-student interaction is considered a method of scaffolding, only if the latter consists of three parts: contingency teaching, fading, and transfer of responsibility (Van de Pol, Volman, & Beishuizen, 2010). However, the examination of dialogic interactions among the participants (tutor and students) in providing scaffolds to promote learning and developmental processes is still an area that is under represented in the literature (Rojas-Drummond et. al., 2013).

Indeed, most scholars concur how critical and important the quality of classroom talk as well as the use of effective scaffolding strategies are to students’ learning and developing understanding. While many studies have tended to focus on scaffolding during the discourse that takes place in a face-to-face (f2f) classroom, there is a growing recognition to explore the dialogic scaffolding that takes place in a blended learning environment (BLE). Therefore, the study aims to extend the research conducted in recent years by the likes of, Michaels, O’Connor and Resnick (2008), on the importance of talk for “sensemaking and scaffolded discussions” to “promote deep understanding”, with a special emphasis on a blended learning environment.

Gathering classroom observational data from 14 sectional groups in AY1920 as part of a TEG research project, the researcher sought to answer the following research question: How can the utilisation of scaffolding strategies be adopted in a BLE to achieve a dialogic approach to teaching and learning? 14
lessons were video recorded and all interactions during whole class instruction and group discussions were transcribed. Transcripts of the interactions in online forums were also examined in detail. The research utilises an analytical approach, which employs ‘codes’ that are derived from the scaffolding principles of means and intentions of Tharp and Gallimore (1988), and Wood, Bruner, and Ross (1976). A coding scheme is developed, which codifies utterances that contribute to a dialogic interaction. This is done by linking communicative acts with the scaffolding principles to the characteristics of dialogic teaching and learning (DTL) – collective, reciprocal, supportive, cumulative, purposeful (Alexander, 2004). An adapted conversation analysis (CA) approach was also adopted in order to uncover the moment by moment experiences of the students and tutor. As the aim of CA in the classroom is to identify organisations of interaction, as determined by the participants, it offered insights into how the tutor’s scaffolds were taken up by the students.

Preliminary findings suggest that while the dialogic scaffolding played a central role in mediating learning in the f2f lesson, the accompanying online discourse not only favoured students’ understanding of the concepts but also gave support to their construction of knowledge. It is through this interplay between online and f2f spaces that effective learning and deep understanding were achieved. Therefore, in elucidating the evidence of effective teacher practice, this study suggests that the support provided by a teacher can be timely, in a classroom culture of safety and success.

References


Motivating students pre- and during challenging times – a multidisciplinary perspective

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Sub-theme
Engagement with online materials, community of learning, motivating students

Keywords
Student motivation, motivational teaching, learning environment, online teaching, hybrid teaching

Introduction
Motivation has great impact on learning. A highly motivated student may engage actively in a learning environment, which in turn provides opportunities to deepen their learning. However, it is not uncommon to hear educators lament that students seem disengaged and unmotivated in class, especially with the current COVID-19 environment that requires a shift away from face-to-face interactions. How do we motivate students to attend lectures that will subsequently be webcasted? How do we engage students who are not interested in a subject? Galvanized by mutual interests and common challenges, a group of educators from various disciplines in the National University of Singapore formed a learning community to learn about what motivates university students in their learning. This paper aims to study their perspectives on (1) the teaching strategies they employed to motivate students in their learning and (2) which strategies they felt were more challenging to employ in the current climate of teaching during the COVID-19 pandemic.

Methods
Guided by the eight elements described in the “motivational teaching and learning environment framework” (Figure 1) by Kember (2016), a survey comprising 23 Likert-scale statements was constructed. Two open-ended questions asking what strategies the educators have previously employed in their teaching and what they would do differently after learning about the framework, were also included. The group discussion consisted of members of the learning community from the faculties of Arts & Social Sciences, Dentistry and Science, as well as the Schools of Computing, Design & Environment, and the Yong
Loo Lin School of Medicine. All 13 members of the learning community participated in the survey and discussion in June 2020, after they had experienced a semester of teaching and assessment adapted to safety measures implemented due to the COVID-19 pandemic. Participants were asked to respond to these questions by relating it to a specific course they had previously taught before attending the online discussion. Participants discussed the 2 open-ended questions in smaller groups and related their experiences to teaching in the current climate.

### Key Findings

Strategies to “establish interest” and “relevance” were most commonly employed by the educators to motivate their students in learning. Some of these strategies included field trips and having guest lecturers in their course. However, certain experiential learning activities such as field trips were postponed due to the pandemic. Some of the common challenges faced by educators include the difficulty of inculcating a “sense of belonging” among students, which was further worsened by the lack of social interaction in physical lessons. In-depth discussions on the challenges and strategies with respect to the eight elements in Kember’s framework will be presented in the conference.

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**Figure 1:** The motivational teaching and learning environment framework discussed in the study (Kember, 2016).
Significance

A rich sharing of commonly employed strategies to increase motivation in learning across different disciplines was obtained. Applying the framework to these strategies allows us to critically analyse, reflect and put careful thought into designing teaching and learning pedagogies to motivate students in their learning. The wide views encompassed in the focused group highlight the relevance of our findings for the larger community of educators in today’s “new normal”.

References

From Trial to Implementation, Bringing Team-Based Learning Online—Duke-NUS Medical School’s Response to the COVID-19 pandemic

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Sub-theme
Engagement with online material

Keywords
Flipped classroom, curriculum continuity, remote learning, home-based learning

In response to the heightened restrictions brought about by the COVID-19 pandemic, Duke-NUS Medical School (Duke-NUS) transitioned its pre-clinical curriculum to an online method of delivery. This was made after much deliberation as Duke-NUS employs a team-based learning (TBL) pedagogy known as TeamLEAD, for its preclinical curriculum (Compton et al., 2016; Puthucheary et al., 2017). This approach is heavily dependent on student attendance and participation to promote collaborative learning. Recreating similar conditions online as compared to a face-to-face (F2F) class required overcoming several obstacles. This paper presentation delves into the strengths, opportunities, weaknesses and threats (SWOT) of online TBL as detailed by the authors in their publication (Jumat et al., 2020).

In a typical TeamLEAD session, students prepare beforehand with the assigned pre-reading materials. They then attend a F2F class where they take an individual readiness assurance test (IRAT). This test covers the main learning objectives students are expected to know for the given topic. Following that, they take the same test in teams. This test, known as the group readiness assurance test (GRAT), provides immediate feedback. If the team requires further clarification on the topics, they can then pose questions in the next phase of the class, known as the modified team readiness assurance process (MTRAP) (Wong et al., 2020). Here, team questions will be posed to the rest of the class for a facilitated discussion. At the end of the facilitated discussion, faculty will provide their insights and comments in a debrief.

In 2015, Duke-NUS implemented a compulsory e-Learning Week where lessons were delivered through an online format. Lessons were still delivered in a TBL format. Due to the availability of technology at the time, students only participated in text-based conversations for the GRAT and MTRAP phases. Feedback from students indicated that despite several shortcomings, they felt e-learning was similar to F2F classes. Despite these limitations, the educational leadership were assured that TeamLEAD could be delivered online.
During the pandemic in 2020, the educational leadership swiftly moved TBL classes online using the processes and infrastructure that were in place from e-Learning Week. The student and faculty feedback gathered from e-Learning Week in 2015 guided this implementation and allowed for the identification of shortcomings before the roll-out. The educational leadership actively sought feedback from students and faculty throughout the implementation in 2020 to improve the online learning process. While these steps allowed for continuity of learning in pandemic conditions, executing online TBL was not without some concerns. First, without adequate proctoring, academic integrity might be compromised. Owing to the high number of tests that students take in a TBL curriculum, the inability to ensure that students comply to the honour code might prove to be a huge flaw in online learning (Azulay Chertok, 2014). Second, online TBL is highly dependent on technology. Internet connectivity issues, limited bandwidth for a large class, and internet separation in healthcare institutions would further restrict the transition and maintenance of an online TBL class (Ministry of Health Singapore, 2018). Third, faculty have also expressed an inability to assess professionalism through online TBL. Another key concern is that the long term effects of online TBL on student’s mental health, morale and cognitive development remain largely un-investigated and warrants further examination.

Several new opportunities arose from this new method of delivery. The educational leadership also revised the curriculum in order not to overload the students. Different strategies were employed to engage students in class and a new approach to academic coaching was developed to support students struggling to cope with their studies online (Lee et al., 2020).

References


Using Interactive Animation to Enhance Students’ Participation in Online Lecturing During the COVID-19 Social Distancing

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Sub-theme
Engagement with online materials

Keywords
Interactive animation; e-lab; online lecturing, students’ engagement, COVID-19

Online education has gained more attention after the COVID-19 pandemic resulted in lockdown and circuit-breaker policies being implemented worldwide. Online discussion platforms such as Zoom and Microsoft Teams have been employed by the higher education institutes for meetings and educational seminars. For lecturing, live or recorded video streaming were adopted. However, there are many challenges that educators have to face while trying to fulfil the requirements of delivering an effective learning session through online platforms or streaming. Modules that have lab session are even more challenging.

We have been instructing BN2201 “Quantitative Physiology for Biomedical Engineers”, a core undergraduate module at NUS, for several years. The module had been developed to have lectures and lab sessions. Attending the lab sessions were mandatory as many topics were taught through experiments. In the current pandemic situation, we decided to use recorded videos to replace the lab sessions as students are not allowed to gather in the confined lab area. Therefore, we recorded a thorough explanation of the theory, as it was originally given in the lab sessions, and a demonstration of the experiments.

It is obvious that teaching effectively requires skill and experience. In a lab, the students would be engaged through the experimental procedures and equipment they have to handle as well as the group interaction. However, in this current situation, keeping the recorded sessions engaging is a serious challenge. Besides the videos we prepared for BN2201’s online lab component, we are also building on a growing
body of existing literature on the use of virtual labs in STEM education (Balamuralithara & Woods, 2009; Ray & Srivastava, 2020) by proposing an interactive animation to boost students’ focus and make the online lab sessions more interesting. The question that motivated us to conduct the study was, “How do the recorded videos and interactive animations improve students’ engagement and enhance their learning of practical concepts in Biomedical Engineering?”

For BN2201’s online lab session, students have to watch the interactive animation and answer some questions. The interactive animation is based on the e-lab video, produced under the supervision of the module instructors and the lab teacher. The main purpose is to simulate an environment like the lab sessions and increase students’ participation and engagement during the learning process. The students will not be assessed based on their answers in the animation, and this video is merely for educational purposes rather than for assessment. The animation is designed such that the students are interacting with a virtual group member who asks for help. All the questions can be answered based on the recorded video that students have to watch in advance.

To assess the effectiveness of the method, we put up a questionnaire claiming that exam questions may include the virtual lab topics. We included two multiple choice questions in the exam and checked the scores. Based on our experience, not all students participated in online activities. We will ask if they completed BN2201’s virtual lab in the module evaluation survey. If those who completed the virtual lab and the interactive animation score better, we consider the initial assessment of the approach to be positive. Our team will refine the module’s design and investigate further based on the results.

References


The symptom-focused health assessment and empathy (SHAE) programme: Using an integrated approach to learning physical examination for nursing students

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Sub-theme
E-Learning, innovation learning

Keywords
educational video, health assessment, physical assessment, self-directed learning, nursing, nursing education, health professions education

Health assessments are a vital competency required of nurses. The more traditional ways of teaching and learning this skill require practice and are often limited by time constraints. With the rise of technology-based platforms, students can supplement their learning of health assessment skills through other means such as videos. Videos not only visually demonstrate the steps but also allow students to learn in context. This study describes how a symptom-focused health assessment and empathy (SHAE) program, which primarily involves the use of a case-based health assessment video, was implemented and evaluated.

The study involved a single-centre and single-blind, parallel randomised controlled trial. First-year undergraduate nursing students enrolled in the Comprehensive Health Assessment (CHA) module during Semester 2 of Academic Year 2018/2019 participated in the study. A total of 253 participants were randomized into one of the two parallel groups: the experimental group or the waitlisted control (WL) group. The experimental group received the SHAE program in addition to conventional learning methods (e-lectures, lab demonstration, and pair practice). The WL group received only the conventional learning methods.

A total 209 participants completed the programme. Pre- and post-test measures of study variables such as knowledge, health assessment skills, confidence, empathy, and intention to learn were conducted. The WL group was only given access to the SHAE program after the post-test. Analyses of covariance (ANCOVA) were used to compare the means of the study variables between the intervention and WL groups. Participants in the intervention group had significantly higher scores on knowledge (p = 0.016), confidence (p = 0.03), and health assessment skills (p = 0.004). No significant differences in intention to learn and empathy were found between the two groups.
The use of a case-based video has the potential to be a valuable method for teaching health assessments to nursing students. The SHAE program has shown beneficial effects on students’ knowledge, health assessment skills, and confidence. However, there was no effect on students’ intentions to learn and their empathy. Further refinements of the program will need to focus on improving these domains.
Process-Oriented Guided Inquiry Learning (POGIL) in online environments

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Sub-theme
Engagement with online materials

Keywords
Process Oriented Guided Inquiry Learning, student interaction, online learning, interactive learning, learning experience

The current pandemic has forced teaching to go online. Learning is compromised when content is delivered remotely and often does not conform to the high standards of learning through face-to-face (FTF) interaction. In the bargain, an important learning opportunity is lost. Moving forward, we need to look at ways to motivate and engage students in creative learning activities without the crutches of grades, assessment anxiety, and tutor control, and instead promote collaboration, flexibility, and social learning (Collective, 2020).

In online learning, passive or active pedagogies result in students downloading course material and uploading assignments. Learning in isolation activates some prior knowledge, and contains the knowledge with the individual. On the contrary, constructive or interactive pedagogies result in students participating in co-creating knowledge and learning more deeply as per the ICAP framework (Chi & Wylie, 2014; Zhang et al., 2016). Process Oriented Guided Inquiry Learning (POGIL) is an interactive student-centric pedagogy grounded in social constructivist theory (Churcher, 2014). Students work in groups to construct knowledge through interacting in activities designed and scaffolded to develop skills, ideas, or concepts (Moog, 2014). POGIL is based on the learning cycle of exploration, concept invention, and application. In the exploration phase, students assimilate and process data to explore patterns. In concept invention, students further develop concepts. In the application of concepts, students learn to apply concepts in new situations and determine their generalisability. The success of POGIL depends on the quality of interaction between the members of the group which varies a great deal in synchronous, asynchronous, online and FTF sessions.

The POGIL sessions had a similar format for both FTF and online mediums. Each POGIL session was divided into 3 sub-sessions of 30 minutes each, scaffolded by leading questions. Each sub-session started with a 5-minute introduction or recap of concepts covered in video lectures. The tutor explained the task and posed
critical thinking questions to be discussed explicitly solved by the end of the sub-session. Each sub-session progressively developed on the solutions from the previous sub-session. At the end of the three sub-sessions, students presented their work to their peers and tutors for feedback. The interactive nature of these sessions promoted constructive discussions among peers and with tutors. Each student contributed to the task explicitly and was encouraged to participate in discussions.

This presentation will share the findings of the study conducted by the authors in AY 2019-20 on 150 Architecture undergraduates. They studied the impact of POGIL as a medium of instruction on the students’ cognitive performance and learning experience. A quasi-non-experimental, explanatory, mixed-method study was conducted where a standard validated tool, a learning climate questionnaire (Bartram et al., 1993), qualitatively measured students' learning experience after online and FTF sessions. Thirty student interviews gave explanatory qualitative data for the findings. Rubrics developed for 4 levels of cognitive ability: (1) understanding, (2) application, (3) analysis, and (4) creation, measured the students’ performance. There were four POGIL sessions throughout the semester, two online and two FTF. One teaching assistant guided two groups of four-to-six students each. A two-hour POGIL session had 20-minute sub-sessions scaffolded progressively by leading questions.

The findings of the study reveal that although there is no difference between the cognitive performance of students during either online or FTF mediums, a change in overt engagement was observed that altered students' approach to learning. Students reported the need for additional tutor support in the online medium, which is consistent with previous literature findings (Zhang et al., 2016). Factors such as group dynamics and discussion quality also changed between the two mediums. This study highlights the differences between the two mediums related to the POGIL framework and suggests ways to adopt it for online learning.

References


Blending Learning: Using critical thinking and writing to internalise engineering leadership

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Sub-theme
Curricular change; pedagogical change

Keywords
Blended learning; engineering leadership; critical thinking and writing; Community of Inquiry

In recent years, the flipped classroom (FC) and blended learning (BL) approaches have been widely adopted across universities with some scholars referring to it as the “new normal” in course delivery (Norberg et al. 2011, p. 207). BL has evolved from integrating face-to-face experiences with text-based and web-delivered activities (Garrison & Kanuka, 2004) to a combination of online and face-to-face experiences that support each other. Most researchers concur that BL in universities promotes active learning (Freeman et al., 2014). A learner-centred environment that emphasises interactivity, BL could include instructional activities to develop problem-solving skills, higher-order critical thinking, and application of knowledge (Breivik, 2015).

From the start of Academic Year (AY) 2018/19, the module for Engineering undergraduates, ES2531 “Critical Thinking and Writing”, has undergone a curriculum redesign to include an engineering leadership focus and formatted into a FC. A question worth exploring is, “How does the blended learning environment contribute to student learning in ES2531?” Gathering data from almost 300 students in AY 2019/20 as part of a research project funded by the Teaching Enhancement Grant (TEG), the researcher explored the affordances of BL and investigated students’ learning experiences from the perspective of the Community of Inquiry (CoI) model. Garrison and Vaughan (2008) shaped BL practice by describing the CoI framework as a unifying process that “integrates the essential processes of personal reflection and collaboration in order to construct meaning, confirm understanding, and achieve higher-order learning outcomes” (Garrison & Vaughan, 2008, p. 29). Thus, with the module’s tri-part conceptual framework consisting of BL, critical thinking, and engineering leadership and problems, adopting the COI framework is appropriate as it seeks to develop higher-order critical thinking skills and critical reflections in students so as to enhance learning outcomes (e.g. the internalisation of engineering leadership).
Data collected were analysed using a validated coding scheme informed by the CoI framework. Students’ assignments, critical reflections, scenario-based assessment and open-ended responses in surveys were transcribed and coded with NVivo. In interpreting the overall merged results, the researcher looked for data convergence and divergence. This was done using side-by-side comparison that showed how the findings of one data set confirm or refute findings of the other data set.

Overall findings show that both the online and face-to-face learning spaces reflect the CoI presences. A high cognitive presence in online forums resulted in engaged and deepened understanding, with evidence of application of critical thinking skills. A higher teaching presence in face-to-face lessons was associated with the dialogic scaffolding approach of diagnosing students’ learning needs, fading support gradually, and transferring responsibility of learning to students in the online forums. The evidence of all presences, despite the relatively low social presence, highlights the importance of a constructivist pedagogy to achieve deep applied learning. These findings show that a BL environment needs to become more of a collaborative and social learning space, particularly if the contact time is limited. Online discussion forums require meaningful tasks and skilful facilitation, as students would otherwise participate poorly. It is crucial for conceptual links to be highlighted across the learning spaces so that students see the value in the online learning space and how it is linked to the face-to-face lesson.

It is found that the learning outcomes are enhanced not simply because the module utilises a BL environment but because there is a purposeful and meaningful integration of an adopted BL instructional model as well as pedagogical and conceptual frameworks to develop students’ critical thinking and writing skills. The study also shows that learning outcomes are enhanced when there is a reiterative and cumulative cycle of integration between the learning spaces.

References


Use of E-learning in Peyton’s Four-Steps-Approach: Locating the Posterior Ledge on Facial Computed Tomographic Scans

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Sub-theme
Engagement with online materials; pedagogical change

Keywords
E-learning; Peyton’s Four-Steps Approach; Halsted’s Approach

Background and Aims
Imparting procedural skills during the COVID-19 pandemic can be challenging. As countries establish lockdowns on large-scale gatherings to minimise infections, higher education institutions employ remote online training to ensure learning continuity. However, this usually takes the form of didactic lessons which are ineffective in skills training. According to the literature (Romero et al., 2017), Peyton’s Four-Steps-Approach has proven to be superior to Halsted’s ‘See One, Do One’ approach for in-person skills training. Our team developed E-Peyton’s to impart procedural skills through Peyton’s teaching technique remotely via an electronic learning platform. We evaluate the efficacy of E-Peyton’s in teaching the interpretation of facial computed tomography scans (CT).

In this study, we aim to investigate the efficacy and feasibility of automated platforms for imparting procedural skills remotely.
Methodology

Naive learners (n=61) were randomised into three groups based on the teaching techniques employed: E-Peyton’s (n=20), Peyton’s (n=21), and Halsted’s (n=20). The distance between the infraorbital margin and the posterior ledge was measured using a three-part standardised measuring protocol on the Osirix® Digital Imaging and Communications in Medicine (DICOM) Viewer v9.0.1 (Pixmeo SARL, Geneva, Switzerland). Twenty measurements were assessed for accuracy against the benchmark (+/-2mm) at Weeks 0 and 1. Training durations were compared. Questionnaires were administered before and after the study to identify learners’ acceptance of teaching techniques, and their confidence in interpreting facial CT scans (based on the Likert scale, 1="Strongly Disagree; 5="Strongly Agree").

Results

Gap scores indicated a significant increase in confidence levels for E-Peyton’s (+1.73/5, p<0.05), Peyton’s (+1.65/5, p<0.05), and Halsted’s (+1.18/5, p<0.05). Confidence levels of learners in E-Peyton’s (4.05/5), Peyton’s (3.87/5), and Halsted’s (3.35/5) were similar (p>0.05) after the study. There was a trend towards greater confidence levels after the study for learners in E-Peyton’s compared to learners in Halsted’s (p-value=0.067).

At Week 0, the mean number of measurements within range (+/-2mm of benchmark) for E-Peyton’s (8.00/20), Peyton’s (8.86/20) and Halsted’s (7.55/20) were similar (p>0.05). At Week 1, learners in all three teaching techniques had comparable skills retention (p>0.05). The mean number of measurements within range for E-Peyton’s (9.35/20) and Peyton’s (9.10/20) increased from Week 0 to Week 1. There was a trend towards greater skills retention in E-Peyton’s and Peyton’s. E-Peyton’s (4.47/5), Peyton’s (4.51/5), and Halsted’s (4.24/5) were similarly well accepted by learners (p>0.05). E-Peyton’s and Peyton’s required longer training durations compared to Halsted’s.

Conclusion

The COVID-19 pandemic highlights the importance of effective remote learning platforms. E-Peyton’s and Peyton’s are comparable in skills retention and training duration. High approval ratings of E-Peyton’s by learners indicate that the longer training duration is not of concern. Improved confidence levels allow E-Peyton learners to apply their acquired skills more readily in practical usage. E-Peyton’s standardises the quality of remote training while reducing the manpower burden. It supplements skills training through self-directed learning, allowing learners to go through the module at their own pace and convenience. E-Peyton’s is an effective automated teaching tool when face-to-face training is not feasible. It minimises disruptions in training when teaching cannot be done in person. E-Peyton’s can be applied to the design of training modules for imparting procedural skills beyond the medical context.
References
A Study on Learner Engagement with Synchronous Online Team-Based Learning as Part of the Integrated B. Pharm. (Hons) Curriculum

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Sub-theme
Engagement with online materials

Keywords
Team-based learning, digital education, student engagement, interdisciplinarity

Team-based learning (TBL) is a pedagogical approach grounded in constructivism, a learning theory that is frequently used in healthcare and pharmacy education to improve attainment of learning outcomes (Reimschisel et al., 2017). TBL is effective because students engage with each other and the teacher to solve problems (Hrynchak & Batty, 2012; Fatmi et al., 2013).

TBL is employed in the Bachelor of Pharmacy (Honours), [B.Pharm. (Hons)] curriculum to promote active learning and enhance communication skills required of pharmacists as healthcare providers (AFPC, 2017). In Academic Year 2020/21, TBL had to be delivered online to ensure student and faculty safety during COVID-19 pandemic (Martin-Barbero, 2020). However, literature supporting TBL is largely based on face-to-face sessions, and there is limited evidence to inform whether online TBL is as effective in engaging learners (River et al., 2016).

This study aims to: 1) describe evidence-based design of synchronous online TBL in the B.Pharm. (Hons) curriculum, and 2) outline a plan to evaluate student engagement and experiences.

The framework by Michaelsen et al. (2008), placing student engagement at its core, is used to inform the design of synchronous online TBL (see Figure 1).
All aspects of Michaelsen’s framework were considered in the design of online TBL. Recognising the importance of teacher decisions which affect both aspects of student engagement, a Learning Community (LC) was formed to review evidence, learn best practices, and establish consensus. LC members also included undergraduate students to minimise expert blindness. Teacher decisions (see Table 1) were made by contextualising evidence from the literature and best practice recommendations from an online TBL white paper to pharmacy education and digital infrastructure within the University (Clark et al., 2018).

Figure 1. Conceptual framework for TBL (Michaelson et al., 2008)
Table 1
Alignment of evidence-based teacher decisions with best practice recommendations (Clark et al., 2018)

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Teacher Decisions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Orientation</strong></td>
<td></td>
</tr>
<tr>
<td>▪ Formulate teams, provide information, practice readiness assurance test (RAT) and application exercise</td>
<td>Faculty assigns teams of 5 students to ensure gender balance and diversity in academic background (Gullo et al., 2015)</td>
</tr>
<tr>
<td>▪ Develop social presence</td>
<td>Conduct TBL Orientation Workshop (explain approach, allow interactions) and mock TBL sessions (for students to experience RAT and application) (Hall et al., 2014)</td>
</tr>
<tr>
<td><strong>2. Readiness Assurance Test (RAT)</strong></td>
<td></td>
</tr>
<tr>
<td>▪ Invest time early for team building</td>
<td>Team charter activity for team building (Aaron et al., 2014)</td>
</tr>
<tr>
<td>▪ Use technology to support RAT design, team collaboration and interactions</td>
<td>Technology: Zoom breakout rooms, LumiNUS</td>
</tr>
<tr>
<td><strong>3. Application Exercises</strong></td>
<td></td>
</tr>
<tr>
<td>▪ Consider method of delivery in design of application exercises</td>
<td>Application exercises designed based on the “Four S” framework to enhance engagement through application of knowledge (Gullo et al., 2015)</td>
</tr>
<tr>
<td>▪ Employ technology to support application design that promotes collaboration</td>
<td>Promote interdisciplinary thinking by integrating biomedical, clinical and system sciences (Gonzalo et al., 2017)</td>
</tr>
<tr>
<td></td>
<td>Technology: Zoom breakout rooms, PollEverywhere, LumiNUS</td>
</tr>
<tr>
<td><strong>4. Peer Evaluation</strong></td>
<td></td>
</tr>
<tr>
<td>▪ Ensure transparency and student buy-in</td>
<td>Formative peer evaluation to promote engagement, accountability and bonding (Burgess et al., 2014)</td>
</tr>
<tr>
<td>▪ Deploy technology that supports collection, analysis and dissemination of peer feedback</td>
<td>Technology: Teammates</td>
</tr>
</tbody>
</table>
Since its implementation in August 2020, we aim to evaluate the level of student engagement and experiences. Within the constructivism framework, engagement is described by how a learner participates in educationally purposeful activities (Bowden et al., 2019). Therefore, the TBL Student Assessment Instrument (TBL-SAI), which is validated in pharmacy education and measures student’s preparation, attention level and satisfaction, will be used (Mennenga, 2012; Nation et al., 2016).

In summary, this study demonstrates evidence-based design of synchronous online TBL. The TBL-SAI will be used to evaluate student engagement and experiences. Our evaluation of online TBL is of particular relevance in face of rapid digital transformation.

Acknowledgement: This work is supported by the Centre for Development of Teaching and Learning’s Teaching Enhancement Grant (TEG) for Learning Community (LC) Projects.

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Technology acceptance model and the perception of learning quality in online design studio environments

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Sub-theme
Engagement with online materials

Keywords
technology acceptance; self-regulated learning; design studio; remote teaching; online learning

Given the shift to fully online learning environments during the COVID-19 pandemic in March 2020 of Semester 2, it is important to unravel how students’ use of digital technology is influenced by their perceptions towards these learning environments. This study adopts a quantitative approach in surveying around 440 undergraduate and graduate architecture students on their self-regulated learning strategies (Zimmerman & Campillo, 2003) and their intention to use technology (based on technology acceptance model, TAM) on several constructs such as perceived usefulness, perceived ease of use and behavioural intention to use technology (Davis et al., 1989; Venkatesh et al., 2003). Contextual variables related to design studio learning such as computer self-efficacy, interactivity and adaptation to online learning were also included (see Table 1 for constructs and reliabilities of items in the questionnaire). Three open-ended questions were used to elicit students’ responses to the challenges and benefits of online design studio learning environments.

This study is guided by the following research questions:

• What is the relationship between students’ self-regulated learning strategies and their intention to use technology (in both design and non-design modules)?

• What are the challenges and benefits of engaging students in a fully online design studio learning environment?

Key findings indicate that ability to self-regulate in online environments is an important skill when students learn remotely, regardless of whether it is teacher-led or self-paced. About half of the students in this
study used self-regulated learning strategies when learning remotely or online. Self-regulated learning strategies were positively correlated to students’ intention to use technology in both design and non-design modules (see Table 2). Undergraduates and graduates who perceive themselves as using more self-regulated learning strategies were more likely to accept the use of technology for learning in design and non-design online environments.

An iterative qualitative analysis by two student research assistants on the responses from the open-ended questions revealed key findings:

- Students faced difficulty communicating ideas to their tutors and peers during online learning. They found it challenging to present their work (design projects) through Zoom.

- Students felt that online learning removed peer-to-peer learning that happens in a studio space, and also limits studio culture (e.g. spontaneous feedback from tutors, collaborative environments, sharing of peers’ work progressively).

Most students lacked adequate space, tools and equipment when learning and working from home. The distractions in home environments (intentional or otherwise) also made it harder for them to focus.

We will share more findings and highlight the implications for supporting students to enhance their learning in online design studio environments.

References

Table 1. Descriptive statistics and the 13 subscales' corresponding Coefficient Alphas

<table>
<thead>
<tr>
<th>Scale</th>
<th>Code number in the Subscale</th>
<th>M (SD)</th>
<th>Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-regulated learning strategies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Goal-setting</td>
<td>4, 5, 6</td>
<td>3.53 (0.67)</td>
<td>.88</td>
</tr>
<tr>
<td>2. Planning</td>
<td>7, 8, 9</td>
<td>3.54 (0.77)</td>
<td>.71</td>
</tr>
<tr>
<td>3. Help-seeking</td>
<td>10, 11, 12</td>
<td>3.59 (0.76)</td>
<td>.74</td>
</tr>
<tr>
<td>4. Self-evaluation</td>
<td>13, 14, 15</td>
<td>3.44 (0.85)</td>
<td>.72</td>
</tr>
<tr>
<td>Intention to use technology in online environment (non-design)</td>
<td>16, 17, 18</td>
<td>3.49 (0.78)</td>
<td>.61</td>
</tr>
<tr>
<td>1. Perceived usefulness</td>
<td></td>
<td>2.95 (0.88)</td>
<td>.92</td>
</tr>
<tr>
<td>2. Perceived ease of use</td>
<td></td>
<td>2.88 (0.95)</td>
<td>.86</td>
</tr>
<tr>
<td>3. Behavioural intention to use</td>
<td></td>
<td>3.17 (0.87)</td>
<td>.73</td>
</tr>
<tr>
<td>Intention to use technology in online environment (design module)</td>
<td>22, 23, 24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Perceived usefulness</td>
<td></td>
<td>2.80 (1.05)</td>
<td>.87</td>
</tr>
<tr>
<td>2. Perceived ease of use</td>
<td></td>
<td>3.17 (0.87)</td>
<td>.73</td>
</tr>
<tr>
<td>3. Computer self-efficacy</td>
<td></td>
<td>3.43 (0.82)</td>
<td>.77</td>
</tr>
<tr>
<td>4. Behavioural intention to use</td>
<td></td>
<td>2.63 (1.06)</td>
<td>.86</td>
</tr>
<tr>
<td>5. Interactivity</td>
<td></td>
<td>2.49 (0.85)</td>
<td>.83</td>
</tr>
<tr>
<td>6. Adaptation to online learning</td>
<td></td>
<td>3.38 (0.92)</td>
<td>.87</td>
</tr>
</tbody>
</table>

Table 2. Pearson correlations between self-regulated learning strategies and students’ intention to use technology

<table>
<thead>
<tr>
<th>Measure</th>
<th>SRLS</th>
<th>DM_Use</th>
<th>NDM_Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-regulated learning strategies (SRLS)</td>
<td></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Intention to use technology (design modules) (DM_Use)</td>
<td>.501**</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Intention to use technology (non-design modules) (NDM_Use)</td>
<td></td>
<td>.483**</td>
<td>.890**</td>
</tr>
</tbody>
</table>

Correlation is significant at **p < 0.01 level (2-tailed).
Bringing case studies to life through scenario-based e-learning (SBeL):
A collaborative effort

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Sub-theme
pedagogical change, engagement with online materials

Keywords
scenario-based learning, case study, learning design, nursing education, technology enhanced learning

At the height of the COVID-19 pandemic, some 1.5 billion students globally were affected by school closures (UNESCO, n.d.). With these physical spaces shuttered, digital spaces became de facto classrooms across the world. Teachers had to transform their face-to-face lessons almost overnight. Academic teachers (AT) at our university were no exception. Successful transformation requires thought and planning, therefore, this paper will address the question: “How might pedagogy need to change?”, specifically how might an online scenario-based learning artifact enhance case-studies pedagogy practices?”. The authors will share their experience transforming a text-based case study for adult learners in a nursing programme into scenario-based e-Learning (SBeL).

Lave and Wenger (1991) posit that learning cannot be divorced from context. Their situated learning theory (SLT) supports the notion of learners as novices who are “peripheral participants” in a learning event. Learning is therefore a participatory endeavour where learners’ involvement increase in complexity as they gain mastery in tasks. The best learning environment is an authentic one, and that the learning of abstract concepts cannot and should not be isolated from their real-world applications. While SLT may seem to be at odds with learning design where learning events are formulated—and to a certain degree manufactured to achieve a pre-defined set of learning outcomes, Winn (1993) argues that they can coexist.

A well-formulated SBeL provides a near-authentic learning environment to support problem solving, critical thinking, and transfer of knowledge. Given that over 90% of the learners are practicing nurses working in hospitals, the SBeL is situated in a fictional hospital Emergency Room (ER). The patient is an elderly
gentleman suffering from hypovolemic shock. The learner is the nurse attending to the patient, and making decisions based on the patient’s signs and symptoms. Every step of the process becomes a task or decision point for the learners. A timer was added to each task to mimic an emergency room setting, where time really is of the essence. Creating this SBeL was an iterative process. The AT provided the content and validated all scenes and tasks of the scenario formulated by the Learning Designer (LD).

Figure 1: Emergency Room scene where Nurse Sally (learner persona) is examining patient Mr Tan upon arrival
In this paper, the efficacy of SBeL is studied by unpacking the learners’ perception. While using case studies and SBL as instructional methods are similar as both encourage problem solving, critical thinking and reflection, the authors propose that the different modes of delivery impact learners’ perception of the two learning activities. The authors will examine data from both pre- and post-SBeL surveys, and learners’ overall performance after the first exposure, and again after the second exposure to the SBeL.
Learners complete a pre-SBeL survey sharing their perspectives on case studies and their online learning experiences. Key initial findings include:

1) Learners have a positive perception of working with case studies (Figure 3).

Figure 3: Results for learners’ perception of eLearning in general
2) Only 12% have experienced scenario-based self-directed learning (Figure 4).

![Figure 4: Results for type of eLearning experiences learners have participated in](image)

9. Which of the following online learning experiences have you participated in? (Select all that apply)

- Asynchronous/Recorded lectures: 46
- Synchronous lectures/Webinars: 44
- Synchronous tutorials: 28
- Self-directed interactive learning: 27
- Self-directed scenario-based learning: 20

![Figure 5: Results for learners' perception of online learning experience](image)

3) The learners participating in the study are not particularly enthusiastic about online learning in general. (Figure 5).

10. On a scale of 1 to 5, how would you rate your online learning experiences thus far?

<table>
<thead>
<tr>
<th>Responses</th>
<th>Average Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>3.52</td>
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</table>

Learners have two weeks to complete the SBeL tasks at their own time and pace, with unlimited attempts provided. Only the final attempt is logged. This is their first exposure to the SBeL. A post-SBeL survey gathers their perspectives on the SBeL they have experienced. The data will be collected and analysed to determine the difference in the learners’ perception of text-based case studies and the online SBeL experience. The authors expect to see a positive perception of the learning experience in the post SBeL survey, with more learners leaning more towards the “Agree” and “Strongly Agree” on the Likert Scale for statements relating to the SBeL. The authors also expect a score higher than 3.2 for online learning experience.
References


Taking the sociomaterial route to enhance social presence through contributions to an online word list

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Sub-theme
Community of learning; engagement with materials

Keywords
Sociomaterial approach; social presence; academic words

In recent years, there have been calls for higher education instructors to consider teaching and learning through a sociomaterial approach. This approach challenges the dominant realities of learning and proposes alternate avenues for where and how learning may occur (Postma, 2012). Besides promoting critical dispositions towards teaching and learning, taking this approach also extends instructors’ and students’ repertoire of knowledge interpretation and construction (Gourlay, 2017). In the last few months, taking a sociomaterial approach has become apt, especially for enhancing social presence in a somewhat isolating digital learning landscape, where many courses have had to shift as a result of the COVID-19 pandemic. In particular, social presence can be enhanced by sociomaterial approaches that promote student interest and satisfaction in an online or distance learning environment, and recognize student vulnerability through acts of self-disclosure (Leong, 2011; Zhao, Sullivan, & Mellenius, 2014).

The sociomaterial approach acknowledges various potential sources for learning. For this presentation and study context, the sociomaterial focus will be on academic vocabulary, given that words had been a recurring learning aim indicated in the student feedback. Hence, the aim of this presentation is to identify sociomaterial assemblages pertinent to academic vocabulary. Specifically, this presentation will answer the question, “What are possible learning sources for academic vocabulary among graduate students?” In a graduate-level writing module, students were invited to contribute words found in academic texts or used in other non-academic interaction, without necessarily knowing their meaning or usage. Words were shared on an online Excel spreadsheet. For each contribution, students had to list a word (or a string of words), the context where the word appeared, the text or discourse site where the word was found (academic and non-academic), the student’s name, and the date of contribution. Up until September 2020, a total of 136 items were contributed. The items were contributed by seven students, with one contributing 89.7% (n=122) of the total. All contributions came from academic sources.
The students’ contributions yielded 133 type-tokens (strings of words separated into individual tokens; repetitions of tokens removed). The tokens were examined in two steps. First, tokens were analyzed with Compleat Web VocabProfiler (Cobb, n.d.), which compared tokens with general service and academic word lists (e.g. Towns, 2020). Second, students described their contributions in terms of significance of tokens and the sources of origins, and the reasons for sharing. Findings from the first step reported that most of the contributions were neither part of the general service nor academic word lists (84.21%), indicating highly specialized words. Findings from the second step revealed several processes of establishing one’s social presence. Students’ contribution of words highlighted their desire for their own writing development. Students also aspired to make sense of words through unconventional routes, that is, to see whether other forms of interaction could facilitate understanding. In these processes, the instructor’s role was to create learning opportunities based on students’ contributions of words. These include language tasks, but also interactions where students could openly share about their encounters with academic words.

These findings illustrated the importance of students’ reading materials as a primary source for academic words, which also had the spatial affordance supportive of students’ presence. Nonetheless, the findings revealed the minimal impact of other sociomaterial assemblages. As such, it might be necessary for the instructor (and other faculty members) to draw students’ attention to potentially valuable learning opportunities, even in non-academic sources.

References


To Blend Or Not To Blend: Is That Really The Question?

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Sub-theme
Pedagogical change

Keywords
Blended learning, instructional design, heuristics approach, teacher cognition

It is well-acknowledged by now, both in the literature and educator communities in higher education, that the question of whether to blend learning or not, is perhaps not so relevant anymore. As Alammary et al. (2014) aptly note, “the question now is not whether to blend or not; it is how to design an effective blend” (p. 440). However, the question of how to design an effective blend is not an easy one, especially for novice educators as well as experienced ones who are relatively new to blended learning, even before COVID-19 caused disruption to lives in all respects. Today, not only has the disruption posed an increased challenge to educators by reducing the option of face-to-face learning as a blending mode, it has also not reduced the imperative to blend as complaints are increasingly heard of learners experiencing ‘screen fatigue’.

This paper explores pedagogical change in a time of disruption. Motivated by the problem of how to design an effective blend, it describes and evaluates the use of a planning tool or heuristic framework for guiding thinking and decision-making to support blending design in a language teaching/learning context. The heuristic framework (Neumeier, 2005) was first applied to the design of a case study unit in an undergraduate critical thinking and writing course, and then further applied to adapting face-to-face learning for zoom-enabled synchronous engagement when classes became disrupted due to the pandemic. The use of a heuristic tool to guide teacher cognition and shape blending activity is informed by a view of design as reified practice (Saunders, 2000), or a set of procedural decisions derived from educators who have experienced designing an effective blend and consolidated such experience into a practicality ethic that would aid novices. Such a heuristic tool stimulates “a process of reflexive questioning during which key procedural dimensions... are addressed, leading to an accelerated induction to key aspects of [blending] design” (p.9). The choice of Neumeier’s (2005) framework was informed by a need for a theoretical model of technology-enhanced learning that was responsive to language/communication teaching (Tang, 2017).
The experience of heuristic-supported blending in this paper suggests its usefulness for designing around learning experiences that are varied in mode, integration, content and purposes, teaching methods, and engagement. Such usefulness extends to ways that impact on learning and keep pedagogy in sight. The reflexive questioning process, aided by heuristic use, also increased teacher cognition about creating patterns of variation in the learner experience that can be critical to what makes students’ learning language learning. This process led to changes in module design that promote metacognitive training and process-oriented feedback in case study thinking and writing. Feedback from learners on online lessons designed in this way indicated that learning was efficiently achieved, and learner engagement was enhanced. Students reported increased autonomy and motivation arising from learning that was well-integrated, targeted, and purposive. However, such appreciation may need to be qualified with an expressed preference for face-to-face interactions over their computer-mediated synchronous alternative in the presence of available options, and reservation about the scalability of the present blending design to teaching large classes. The findings of this paper hold significance for the adoption of heuristic frameworks by novice educators and those who are relatively new to blended learning, to shape blending activity and for the selection of subject-sensitive frameworks for increased impact.

References


Using a virtual and augmented reality mobile application to teach structural systems to non-engineering students during the COVID-19 pandemic

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Sub-theme
Engagement with online materials

Keywords
Virtual reality; 360 content; educational technology; mobile application; structural systems

STEM-related subjects need the coordination of cognitive and motivational strategies for students to understand and appreciate concepts (Kaptan & Timurlenk, 2012). Most of the concepts taught in STEM education are abstract, and it is difficult to teach in a passive setting (Cimer, 2012). Ejiwale (2013) stated that the lack of ways to provide students with a connection to real-world problems is one of the barriers to a successful implementation of STEM education. Immersing students in active learning through authentic tasks or activities, and encouraging them to explore and discover, can help students acquire the necessary skills to be applied in their future workplace (Cheng et al., 2019).

Virtual Reality (VR) is a promising learning tool for a better immersion experience and greater engagement (Mikropoulos et al., 1998). VR provides an environment where it is possible to visualise abstract concepts which cannot be presented in the real world (Passig et al., 2016). VR can also help to enhance learners’ understanding by presenting information in a visual form which can increase the understanding of relationships between concepts (Larkin & Simon, 1987).

Augmented Reality (AR) provides an immersive experience by blending the virtual and real world (Klopfer & Sheldon, 2010). In an educational setting, AR enables students to interact with virtual objects while allowing great fidelity to real-world environments. Students’ engagement and interactions are therefore augmented (Dunleavy et al., 2009). AR has been applied to teaching various engineering and non-engineering subjects in institutions of higher learning (IHLs) (Akçayır & Akçayır, 2017; Martin-Gutiérrez et al., 2015). Many applications have proven to be effective in enhancing students’ learning experience in different ways (Bazarov et al., 2017; Bulagang & Baharum, 2019; Glowatz et al., 2017).
At the same time, the impact of the COVID-19 pandemic presented various challenges for the education sector. Closure of schools during the lockdown prevented students from attending lectures. Many educators struggled to convert their materials into an online format. Various technologies have been adopted to provide alternative mediums for students to learn. However, failure to implement the right design and learning tools would negatively impact students’ learning outcomes.

In this paper, we describe a mobile application named “Virtual and Augmented Reality for Structures” (VARS), which integrates virtual and augmented reality technologies to improve the learning experience of non-engineering students in a typical STEM module called “Structural Systems”. This application allows students to learn remotely and independently—which is particularly applicable for learning during the COVID-19 pandemic.

The VARS application has benefitted over 160 undergraduates majoring in Project and Facilities Management (PFM) from the Department of Building. Controlled experiments were used to assess the effectiveness of both the VR and AR functions in the VARS application. Students in the experimental group were assessed after they had completed learning activities in VARS, while students in the control group were assessed before using VARS. After using AR, the experimental group achieved significantly greater assessment results than the control group. This shows that the AR function in VARS successfully helped non-engineering students achieve better learning outcomes for this module. Most students agreed that both the VR and AR functions in VARS assisted them in achieving the desired learning outcomes and was effective for their learning. Further analysis provided recommendations for developing a similar mobile application for learning in IHL contexts.

References


Online teaching interventions and effective pedagogy: A case study of a flipped seminar on critical reflection for nursing studies

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Sub-theme
Pedagogical change

Keywords
Nursing education, critical reflection, online teaching and learning

This paper reflects on the disruptions experienced during the second stage of a nursing pedagogical research project due to COVID-19. The project, supported by the Teaching Enhancement Grant (TEG), is an interdisciplinary collaboration between nursing disciplinary experts from the Alice Lee Centre for Nursing Studies (ALCNS) and academic literacy experts from the Centre for English Language Communication (CELC). The project centers around a teaching intervention aimed at improving critical reflection writing in nursing clinical practice. The pandemic required the face-to-face teaching intervention to be designed for an online format and delivered via Zoom. The paper will focus on adaptations made to the teaching intervention to facilitate online learning.

Previous research has shown that constructivist approaches to online learning which position learners as co-constructors of knowledge have resulted in the absence of explicit knowledge, disadvantaging students accustomed to more explicit teaching methodologies (Chen & Maton, 2020; Chen et al., 2007). This is particularly pertinent to nursing undergraduates who are used to engaging with more theoretical content and practical application (such as clinical placements) (Ramos-Morcillo et al., 2020). In this paper, we discuss how we attempt to engage with these issues by creating pedagogy that is strongly grounded in explicit theoretical approaches while providing students with opportunities for independent learning and engagement with content.
Our team designed the teaching intervention and pedagogical material following the first stage of the project which included the analysis of 155 student pre-intervention assignments drawing on theoretical frameworks that make visible salient linguistics resources (Systemic Functional Linguistics/ SFL) and knowledge practices (Legitimation Code Theory/ LCT). The purpose of the analysis was to uncover the differences between high- and low-scoring student texts in order to design teaching material that makes these differences visible to students. In addition, to the student text analyses, two focus group discussions were carried out with nursing lecturers in order to understand their rationale for including critical reflection assignments in the nursing curriculum. The insights from the first stage of the intervention informed material designed for the teaching intervention. Two outcomes of the first stage included the creation of a detailed assessment rubric that was used to create a critical reflection toolkit that was shared with the nursing lecturers. The toolkit consists of academic readings emerging from the first stage of the project (Brooke, 2019; Tilakaratna et al., 2019), and annotated samples of high- and low-scoring student texts that students needed to read in preparation for a single Zoom seminar conducted by CELC staff. Our aim was to feed forward the content on critical reflection writing in nursing before engaging students in the Zoom session, which aimed to consolidate their learning and was primarily facilitated through structured discussion groups in Zoom’s breakout rooms.

This presentation will engage with some of the questions that emerged when we had to shift a face-to-face session online and will draw on the critical thinking materials and extracts from transcripts of the Zoom session described above. In particular, we argue that the focus on technology, rather than the pedagogical frameworks and content that underpin online delivery, has obscured the way in which knowledge is transmitted online. Ultimately, we argue that similar to face-to-face delivery, the success of online delivery depends primarily on the strength of underlying pedagogical frameworks and less on the mode of delivery, and we model how this is possible through the approach taken in our project.

References


Integrating basic, clinical and systems sciences: A transformative change to design an interdisciplinary pharmacy curriculum

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Sub-theme
Curricular change

Keywords
Curricular integration, interdisciplinary curriculum, systems science, work-integrated learning

Aging populations, health informatics, artificial intelligence and technological innovations are disrupting the health systems in the world (Frenk et al., 2010) in a way that forces health professionals to step up, adapt and evolve to face these challenges (Fig 1). The pharmacy profession in Singapore is not spared; pharmacists must effectively demonstrate their value-add and patient-centred roles as they deliver care and navigate through the dynamic health system. The traditional pharmacy education where students are taught the sciences, pharmacy practice and therapeutics in silos will not prepare them adequately to face the increasing complexity at the workplace. A new paradigm shift in re-engineering the education and training processes is warranted to enable pharmacists to be better equipped for the workforce.
In the face of these challenges, the NUS Pharmacy Department conducted a needs analysis to inform the design of a new curriculum. The needs analysis took place in late 2018 where structured interviews with key opinion leaders of the pharmacy profession, and focused group discussions with alumni and students were carried out. Data collected was coded and analysed thematically. Consistent themes emerged that our graduates lacked understanding of the larger healthcare ecosystem, hence limiting their ability to provide optimal patient care. The employers found the graduates knowledgeable but weak at applying their knowledge. Students found it challenging to see the meaning of what they were learning and found difficulty in interconnecting a multi-disciplinary curriculum. Students also related that the structured experiential component towards the end of the programme was valuable but should happen earlier in the programme. With this as the backdrop, a curriculum design group (CDG) was established to develop a new programme to address the needs of both learners and employers.

The present curriculum is structured such that basic sciences are taught in the junior years and clinical sciences in the senior years. Subjects are taught in discrete modules throughout the four years. The CDG started with the end in mind, describing the graduate of this new programme as a healthcare professional competent in managing drug therapy and navigating in a dynamic health system. Therefore, a competency-based pharmacy programme (Katoue & Schwinghammer, 2020) that integrates basic, clinical and systems sciences is identified as the theoretical framework for designing the new programme (Gonzalo et al., 2017). The CDG adopted the Understanding by Design framework (McTighe & Wiggins, 2012) and worked with the faculties and pharmacists to identify the big ideas across disciplines. These big ideas are integrated in themed modules across the years to the interdisciplinary level of the integration ladder where the subjects are merged (Harden, 2000; Husband, Todd, & Fulton, 2014). The experiential learning
component is extended over the four years to help students apply theoretical studies with work experience during their clinical placements (Berndtsson, Dahlborg, & Pennbrant, 2020) (Fig 2).

![Figure 2: A conceptual model of the synergistic relationship between experiential and classroom learning (Gonzalo et al., 2017)](image)

The pedagogies for teaching and learning are changed with lecturers being less of knowledge providers but instead co-creators of the knowledge base alongside students. Students will participate in team-based learning (TBL) workshops co-facilitated by a scientist and a pharmacist in which integration of the basic, clinical and systems sciences are emphasized in application cases.

The outcome of the CDG’s efforts culminated in a new B.Pharm.(Hons) degree programme that was launched in AY 2020/21. An evaluation of the programme will follow, and it will involve triangulation of the students’ perceptions and observations of the preceptors at the workplace. The impact of the programme will be measured against all four levels of the new world Kirkpatrick Model (Liao & Hsu, 2019) for learning.

**References**


Managing Changes in Instructional Methods: Insights From Educators

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Sub-theme
Pedagogical change; engagement with online materials

Keywords
Education technology; teaching support; faculty reflection

The adoption of Educational Technology (Ed Tech) in higher education has greatly accelerated due to the ongoing pandemic (Williamson et al., 2020). With technology, the breadth of tools now available has aided educators in adapting to changes to the current teaching and learning environment. In this paper, our primary aims are to understand how educators have adapted to changes in their classrooms and to distil the key learning points of managing technology for teaching. Using the College of Alice & Peter Tan (CAPT) as a case study, we administered three surveys at various time points. The first survey was at the end of the previous semester. These findings suggested that most educators (91%) have had experience using online conferencing tools (e.g. Zoom) but less so of other Ed Tech tools for lesson delivery (e.g. MS PowerPoint recording ~27%) and assessment (e.g. LumiNUS quiz ~27%). In response, a CAPT online teaching workshop was organised to support educators in the adoption of technology, to complement courses provided by the university’s Centre for Development of Teaching and Learning (CDTL). A second survey was conducted at the end of this workshop. The findings showed a wider willingness to adopt Ed Tech tools in the lead-up to semester. Educators reflected that they are more likely to use tools for lesson delivery (e.g. MS PowerPoint recording ~90%) and assessment (e.g. LumiNUS quiz ~80%), accompanied by an increasingly positive online teaching experience (3.4 to 3.9, out of 5). Educators also highlighted various areas of teaching support needed before the semester, including equipment and technical support (70%), and peer support (50%), that guided the College’s response. Throughout the semester, the College provided a budget for the purchase of conferencing equipment (e.g. webcams) and a dedicated staff to provide technical support. The final survey was administered at the end of the semester. This follow-up survey will examine the efficacy of these supporting mechanisms and will delve deeper into what educators would perceive as challenges with online teaching and their strategies to cope with these challenges. The overall findings of the case study will enrich the broader discourse on the adoption of Ed Tech in higher education.
References

From module to MOOC: Designing an interdisciplinary online course on the novel theme “Microbiomes & Sustainability”

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Sub-theme
Pedagogical change; engagement with online materials

Keywords
MOOC, interdisciplinarity, complex or wicked problems

To encourage students to think about the complex problems facing society, I introduced Microbiomes & Sustainability as a new topic into one of the core modules offered by the NUS Graduate School for Integrative Sciences & Engineering. The relevance of microbes and their communities (microbiomes) to sustainability is due to the fact that for more than 3.5 billion years, microbiomes have shaped the Earth and its inhabitants. Recent discoveries have led scientists to believe that a holistic understanding of the role of our planet’s microbiomes is key to addressing the challenges we face in supplying food, energy and clean water, while maintaining and improving the health of our population and ecosystems—actions which are crucial to achieving sustainability.

As this is a complex topic that no single discipline can address, I wanted students to think about how we might harness microbiomes to achieve sustainability in an interdisciplinary manner. The definition of interdisciplinarity that I provided my class was that of Repko and Szostak (2017, p.21). They defined interdisciplinarity as a “process of answering a question, solving a problem, or addressing a topic that is too broad or complex to be dealt with adequately by a single discipline, and draws on the disciplines with the goal of integrating their insights to construct a more comprehensive understanding”. Complementing this definition is their Broad Model for interdisciplinarity, which is designed to facilitate integration of disciplinary insights. In a recent Reflection on Practice, I argued that this Model would promote interdisciplinary thinking and collaboration amongst our students by making both the definition and process of interdisciplinarity explicit (Rashid, 2019). In a subsequent article (Rashid & Lim, in press), my co-author and I showed that the Model, when implemented in blended learning modes, promotes interdisciplinary
thinking, collaboration, and problem-solving. For example, students put the Broad Model into practice by suggesting how their own disciplines would be relevant to their assigned Sustainable Development Goal (SDG). Certain Broad Model-related themes emerged from their forum discussions, indicating that they had understood the definition of interdisciplinarity and applied the Model successfully. For most students, one key benefit of the forum discussions was learning how to explain disciplinary jargon to classmates from other disciplines.

Given the positive response from our students as well as the urgent need to raise awareness about this topic, I collaborated with colleagues from other departments to develop the topic into a Massive Open Online Course (MOOC). In our presentation, we reflect on our journey as MOOC developers. Firstly, we will describe how the MOOC version of the topic improves upon the modular version. Secondly, we will share how my recent research findings guided the development of the MOOC, and we will argue for the need to consult interdisciplinary education literature when designing interdisciplinary courses. Thirdly, we realised the primary importance of making the MOOC’s take-home message clear for ourselves before attempting to convey it to students. The key take-home message eventually agreed upon was not immediately obvious but emerged only after discussions that leveraged on our respective disciplinary perspectives. Lastly, making lecture slides was extra challenging because of the limited open-access visual material available for such a new topic. These constraints motivated us to be more creative with slide design than we would have been otherwise.

Our interdisciplinary philosophy is closely aligned with NUS’ push towards interdisciplinary education and research. After all, we are living in a world of complex or “wicked” problems, which are ill-defined and defy single-discipline solutions. Students of the 21st century need to equip themselves with the knowledge to look beyond disciplinary boundaries, situate their expertise in broader contexts, and integrate knowledge and skills from different disciplines. Hence, there is a strong and urgent need for MOOCs that can foster such interdisciplinarity.

References

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Teaching Design Thinking with Fully Online Interaction in Undergraduate Education Context

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Sub-theme
Engagement with online materials, pedagogical change

Keywords
Design Thinking, online teaching, learning engagement

The concept of Design Thinking plays an important role in design (Julier, 2013; Kelley & VanPatter, 2005; Michlewski, 2015; Cross, 2011; Fry, 2011; Kimbell, 2015; Martin, 2009). It is therefore not surprising that Design Thinking is now taught in many companies and universities (Korn & Silverman, 2012).

In undergraduate education, the Design Thinking module is developed according to a framework such as the double-diamond (UK Design Council, 2007) as presented in Figure 1. Each stage consists of theoretical and practical components. While the theoretical components are taught with little variation between stages, the practical components are taught differently. Within the framework (Figure 1), “Discover” stage involves students going out to conduct fieldwork, “Define” stage involves students discussing and critiquing in design studios, “Develop” stage involves students ideating in design studios and prototyping in workshops, and the “Deliver” stage involves students testing the prototypes with users.
While the theoretical components have been delivered online for quite some time in various institutions (Lloyd, 2013), the practical components had been delivered face-to-face until very recently.

The partially online Design Thinking course we offer in the Innovation & Design Programme (iDP) during the regular semester was converted to a fully online one during the Special Semester (Table 1). To enable this, we chose “Redesigning Teaching and Learning Online” as the Special Semester’s project theme, a more specific topic compared to the more general theme “Enhancing the Mobility Experience in the City”, offered during the regular semester.
Table 1

Settings of a fully online and partially online design thinking course

<table>
<thead>
<tr>
<th>Settings</th>
<th>Fully Online Course</th>
<th>Partially Online Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theoretical component</td>
<td>Lectures on Zoom</td>
<td>Online reading and video</td>
</tr>
<tr>
<td></td>
<td>Online assignments</td>
<td>Online assignments</td>
</tr>
<tr>
<td></td>
<td><strong>Practical component:</strong></td>
<td></td>
</tr>
<tr>
<td>- Discover stage</td>
<td>Online interviews (Zoom, phone)</td>
<td>Face-to-face interviews</td>
</tr>
<tr>
<td></td>
<td>Online observations (Zoom)</td>
<td>Face-to-face observations</td>
</tr>
<tr>
<td>- Define stage</td>
<td>Online discussions (MS Teams, Zoom, WhatsApp)</td>
<td>Online discussions (MS Teams, Zoom, WhatsApp)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Face-to-face discussions</td>
</tr>
<tr>
<td>- Develop stage</td>
<td>Digital ideation (Mural)</td>
<td>Face-to-face ideation</td>
</tr>
<tr>
<td></td>
<td>Digital prototyping (PPT, video prototyping)</td>
<td>Physical prototyping</td>
</tr>
<tr>
<td>- Deliver stage</td>
<td>Online testing (Zoom, phone)</td>
<td>Physical testing</td>
</tr>
<tr>
<td>Logistics:</td>
<td><strong>Module length</strong> 6 weeks</td>
<td>13 weeks</td>
</tr>
<tr>
<td>- Project contact time</td>
<td>24 hours</td>
<td>24 hours</td>
</tr>
<tr>
<td>- Team size</td>
<td>4 students</td>
<td>4 students</td>
</tr>
<tr>
<td>Engagement between students and instructors</td>
<td>Online consultations</td>
<td>Online consultations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Face-to-face consultations</td>
</tr>
</tbody>
</table>
A survey was conducted to compare how students perceived their learning engagement (Smith et al., 2005) in both settings. Students were asked to rate their experience using the 5-point Likert-scale (Table 2).

Table 2

Students’ perceived engagement

<table>
<thead>
<tr>
<th></th>
<th>1:</th>
<th>2:</th>
<th>3:</th>
<th>4:</th>
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<tr>
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<tr>
<td>Online</td>
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<td>Online</td>
<td>2:</td>
<td>Online</td>
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<td>so much worse</td>
<td>worse than</td>
<td>as good as</td>
<td>better than</td>
<td>so much better</td>
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<tr>
<td></td>
<td>face-to-face</td>
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</tbody>
</table>

Average score of fully online (N=15): 3.20

Average score of partially online (N=28): 2.07

We also observed students’ quality of work. This was done by asking three former teaching assistants who were asked to rate students’ quality of work and classify them into the following levels based on a rubric (Table 3): “Expert”, “Practitioner”, “Apprentice” and “Novice”. 
Table 1

Rating students’ quality of work

<table>
<thead>
<tr>
<th>Quality</th>
<th>Fully Online Course (5 teams)</th>
<th>Partially Online Course (6 teams)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expert (score: 4)</td>
<td>3 teams</td>
<td>2 teams</td>
</tr>
<tr>
<td>Practitioner (score: 3)</td>
<td>2 teams</td>
<td>3 teams</td>
</tr>
<tr>
<td>Apprentice (score: 2)</td>
<td>0 teams</td>
<td>1 team</td>
</tr>
<tr>
<td>Novice (score: 1)</td>
<td>0 teams</td>
<td>0 teams</td>
</tr>
<tr>
<td>Average Score</td>
<td>3.6</td>
<td>3.0</td>
</tr>
</tbody>
</table>

This study demonstrates that in converting the Design Thinking module to a fully online format, we could still achieve its intended learning outcomes and provide a meaningful learning experience to students. The latter could still fulfill the module’s learning objectives even without face-to-face fieldwork, whether it was engaging with users online during the “Discover” stage, doing physical prototyping during the “Develop” stage, or conducting physical testing during the “Deliver” stage. This study suggests that this module can be taught with more online components in the subsequent semester, although it might not be fully online when general design themes are used.

Acknowledgement

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References


An energy audit project for sustainable living: Impact on student learning and household electricity consumption

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Sub-theme
Re-thinking of assessments

Keywords
assessment, energy management, peer learning, energy audit, sustainability

Context: With the increased importance of sustainability in cities, increased attention has been focused on empowering students to be aware of and reduce their energy use. This has encouraged studies investigating engagement of students (Hopkins Erin, 2016) through curricula and modules in Sweden (Lidgren, Rodhe, & Huisingh, 2006), the United States of America (Emanuel & Adams, 2011), and the United Kingdom (Kagawa, 2007). However, studies pertaining to the Asian context is lacking in literature. Furthermore, the COVID-19 pandemic has made it challenging for students to execute energy audit projects in companies. Hence, this study aims to build upon current literature by providing insights into the efficacy of an energy audit project in the Asian context. Specifically, the project represents a re-thinking of assessment from the conventional paper-based continual assessment to an actual energy audit project that synergises with the learning objectives of the module.

Hence, this study aims to answer the questions:
1. Were the home energy audit projects helpful in improving student’s learning, and
2. Were there eventual reductions in electrical consumption?

Methodology: An energy audit project requiring students to employ the Plan-Do-Check-Act (PDCA) framework was developed based on the ISO 50001 standard—an international standard for Energy Management Systems to reduce energy use and associated carbon emissions. The motivation to re-think the use of paper-based quizzes to an actual project was motivated by Bigg’s Constructive Alignment (Biggs, 1996) and Shulman’s Pedagogical Content Knowledge (PCK) (Shulman, 1986). In our study, 58 undergraduate students attended the Energy Management module in the second half of 2019. Students formed groups and selected 2 households from among their group members to implement the PDCA
framework. To further aid learning, Kolb’s experiential learning (Kolb, 2014) and peer learning (King, 2002) were adopted where students were provided with a dry-run presentation and received feedback from their peers and the lecturer. Subsequently, a survey was administered to understand the effectiveness of the project. The survey was modified from the Undergraduate Research Student Self-Assessment (URSSA) and Classroom Undergraduate Research Experience (CURE) instruments (Denofrio et al., 2007; Weston & Laursen, 2015) to fit the context of the module.

**Results**: The final exam marks revealed that students fared better for the ISO 50001 segment than other topics. Results indicate that 70% of the cohort scored more than 80% for the PDCA component, which is higher than the 50% that scored more than 80% for other topics (refer to Figure 1). The questions were of similar difficulty levels.

![Figure 1: Cumulative mark distribution in the Final Exam for questions on ISO 50001 (orange line) and other topics (blue line).](image-url)
21 out of 24 households had a reduction in energy use (Figure 2). Reasons for the increase in energy use for the 3 households and further discussion of Figure 2 will be discussed in the presentation.

![Figure 2: Range of change in energy use post-intervention for the 24 households.](image)

Subsequently, 36 students out of 58 students responded to the survey with the following results:

1. 100% agreed that the energy audit project made them aware of their energy use.
2. 97.2% agreed that the project would lead them towards adopting energy saving practices.

Additional discussion on the qualitative and quantitative elements in the students’ feedback will be presented.

**Conclusion:** By rethinking assessments into projects that encapsulate the learning objectives of the module, there was 1) an improvement in the teaching and learning of the ISO 50001 concept, and 2) decrease in the students’ household’s energy use. The findings of this study might be helpful in developing practical assessments that not only increase learning, but also leave a sustainable impact in students’ lives. In addition, it is possible to revise the context of the assessment (i.e. office versus student household) to mitigate restrictions due to COVID-19.

**References**


Implications of Adopting the Online Synchronous Teaching for a Concept-heavy Engineering Module During the COVID-19 Pandemic

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Sub-theme
Pedagogical change

Keywords
Face-to-face teaching; online teaching; COVID-19; higher-order thinking; engagement of students

A concept-heavy core module, “Professional Development I: Standards in Mechanical Engineering”, was developed to prepare final year Mechanical Engineering students of the “Practising Professional Pathway” to be professionally ready for the industry. This module focuses on three different disciplines—“Sustainable Energy”, “Smart Manufacturing”, and “Medical Technology”. About 200 students enroll in this module every semester, and they are divided into three groups for the three disciplines. After completing each discipline in four weeks, the groups are swapped to another discipline. After developing the module in AY2019/20, I was involved in teaching “Sustainable Energy”. The module included student-centric open-ended group projects, where students had to develop energy-smart air-conditioning systems. Such projects give students opportunities to apply their existing engineering knowledge to solve real-world engineering challenges on energy sustainability (Merrill, 2002). Before the COVID-19 pandemic, students could visit the air-conditioning plants, understand the operation and control strategies, and collect the necessary trend logged data. Students took the lead in driving conversations during face-to-face sessions and directed their higher-order thinking to develop energy-smart solutions (Goodsett, 2020; Zohar & Dori, 2003; Lipman, 2003). I was not involved in teaching, but participated in coaching, inspiring and mentoring the small groups, listening to their thinking and discussing questions they initiate. The assessment included: (a) closed book class test constituting 20% of the module’s total score, (b) technical report constituting 30%, and (c) oral presentation/defence comprising 50%.

After the COVID-19 pandemic, the online synchronous teaching approach was adopted using Zoom (Parisi et al., 2020; Rasheed et al., 2020; Mishra et al., 2020; Yin & Lee, 2019). Site visits to the chiller plants were cancelled. To compensate for the learning gaps, several video clips on the air-conditioning plants’ operation and control strategies, with appropriate animations, and chiller plant trend logged data were uploaded on LumiNUS. In the first week, all students attended the online synchronous discussion sessions on the working principle and new knowledge of air-conditioning plants. Poll Everywhere was used to engage students in discussions and check their knowledge. The sessions were recorded using Panopto and uploaded...
on the “Multimedia” section of LumiNUS. Students were divided into groups and assigned into different Zoom breakout rooms to continue their conversations and participate in higher-order thinking activities. I randomly visited different breakout rooms to listen to the conversations and discuss students’ questions or address conceptual deficiencies, if any. The closed book class test was changed to open-book format. A question bank was created and the lecturer used “Randomize question options” for different sections of the “Quiz” feature in LumiNUS to conduct the open-book online class test. Zoom sessions were arranged for the oral presentation/defence.

Understanding the causes and corresponding effects is crucial for the development of energy-smart design and operation of air-conditioning systems to fulfil the group project requirement for the module. Assessment results showed that students’ average marks for cause-and-effect questions increased from 71.2% with standard deviation of 14.6 (face-to-face approach), to 78.6% with the standard deviation of 15.3 after adopting the online synchronous teaching approach. Based on the T-test conducted, $p = 5.3 \times 10^{-6} < 0.05$ indicates a significant difference in the level of understanding of the cause-and-effect concepts between student groups who attended the face-to-face and online lessons. The calculated value of Cohen’s $d$ is 0.494, which translates to small effect size between the two average marks. An anonymous survey was conducted to perceive students’ reception of the online lessons. 87.5% of students affirmed (indicating “Strongly Agree” or “Agree”) that the online teaching approaches provided a wonderful learning experience for handling real-world energy projects. The quality of solutions developed by students was closer to expected industry standards.

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Designing Assessment Tasks for Feedback Recipience in Asynchronous Online Learning: Reflections on Design and Student Responses

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Sub-theme
Re-thinking assessment, engagement with online materials

Keywords
Asynchronous learning; feedback; feedback recipience; self-assessment; single-point rubric

There is a robust body of research on feedback for learning. Feedback is often cited as one of the most powerful factors impacting student learning (Hattie, 2009; Hattie, 2012; Hattie & Yates, 2014; Wisniewski et al, 2020). These same studies, however, suggest that the impact of feedback can be highly variable, reinforcing the conclusion that feedback is a complex construct, not a one-size-fits-all instructional practice (Wisniewski et al, 2020).

However, William (2011) highlights that feedback is only effective if it is “used by the learner in improving performance” (p. 120). Jonsson’s (2013) review of 103 studies on the use of feedback classified frequently-reported obstacles for using feedback. His study identified a lack of perceived usefulness of the feedback, incongruence between the feedback provided and students’ preferred type of feedback, and students lacking knowledge of how to use feedback or the vocabulary required to understand the feedback. Winstone and her colleagues (2016) propose interventions to support students to use their feedback more effectively. They highlight four “recipience processes” that underpin engagement with feedback: self-appraisal; assessment literacy; goal-setting; and engagement and motivation.

A challenge for instructors, then, is to facilitate students’ engagement with feedback and develop their feedback recipience processes. An additional challenge of asynchronous online learning which requires open-ended critical writing tasks is providing robust, helpful feedback to students such that they can engage with it to improve their learning.
In this paper, we investigate the following questions:

1. How can instructors design open-ended, asynchronous, online assessment tasks with embedded feedback processes?
2. What do participants report about their learning from this type of assessment task?

We present our asynchronous, online academic reading workshop for computer architecture research, designed for final year undergraduate and first-year graduate students. We are evaluating this workshop as part of a broader study on developing academic literacies in computer science, and the results reported in this paper are only from participants who consented to participate in the research.

The workshop’s final assessment was intentionally designed to develop feedback recipience processes. Participants had access to an annotated exemplar of the assignment. They were asked to do the following: write a reflective task which demonstrated their understanding of the workshop content and enabled them to reflect on their own reading processes; assess their own work using a single-point rubric (Ragupathi & Lee, 2020); and annotate their writing assignment to highlight ways in which they fell short of, met, or exceeded expectations. The instructors then reviewed the self-assessment and annotations, and provided narrative comments to support or extend participants’ thinking. Table 1 identifies which of Winstone et al.’s (2016) feedback recipience processes are aligned with features of the task.
Table 1:

<table>
<thead>
<tr>
<th>Feedback Recipience Process</th>
<th>Task Feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-appraisal: Making judgments about oneself</td>
<td>● Task required reflection on reading processes</td>
</tr>
<tr>
<td></td>
<td>● Annotation of written task</td>
</tr>
<tr>
<td>Assessment literacy: Understanding the grading process</td>
<td>● Provision of annotated exemplar</td>
</tr>
<tr>
<td></td>
<td>● Self-assessment using single-point rubric</td>
</tr>
<tr>
<td>Goal-setting: Ability to set goals, use strategies to meet those goals, monitor and evaluate effectiveness of those strategies</td>
<td>● Task required reflection on individual goals for reading and strategies used</td>
</tr>
<tr>
<td>Engagement and motivation: being open to receiving feedback</td>
<td>● Teacher feedback is based on self-assessment, not written task</td>
</tr>
</tbody>
</table>

Survey results suggest that participants found the final assessment challenging and time-consuming. Student assessment responses were coded based on the assessment criteria and Winstone et al.’s (2016) feedback recipience processes. Participants wrote about choosing reading strategies according to their goal for reading, monitoring their reading strategies for effectiveness and switching if necessary, reflecting on their reading approach, and understanding the paper.

In this paper, we review our design process, as well as participant feedback from our survey and analysis of student work. The results from this small study suggest practices that instructors can use to develop feedback recipience when designing open-ended asynchronous assessment tasks.
References


Interacting with 3D molecular structures using NuPOV to teach organic chemistry

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Sub-theme
Engagement with online materials, pedagogical change

Keywords
Digital education, self-directed learning, visualization, augmented reality, organic chemistry, freshman course

Introduction

Many scientific subjects contain concepts that involve spatial elements (Jang et al., 2017; Wright, 2007). In organic chemistry, concepts such as reaction mechanisms that rely heavily on spatial visualisation skills are often presented and taught via a 2D medium such as pen and paper (Dood et al., 2018). This method has certain limitations. By explaining 3D molecular interactions using 2D schemes and structures, it is difficult for educators to impart spatial visualization skills to students, and students may find it difficult to grasp these concepts. Various educational institutions have created Augmented Reality (AR) mobile applications to address this issue in teaching organic chemistry reactions (Argüello & Dempski, 2020; Eriksen et al., 2020). However, these apps lacked user interactivity, making it difficult to visualize molecular changes that occur during a reaction (Tasker, 2016).

Our project aimed to overcome these challenges by introducing a mobile application called Nucleophile Point of View (NuPOV) to teach the concept of nucleophilic addition to organic chemistry students. NuPOV makes use of the AR feature in modern smartphones to visualise the 3D molecules and their associated
orbitals, and allow users to interact with the molecules. These features allow students to understand the molecular changes during nucleophilic addition and also build spatial visualisation skills—one of the cognitive skills necessary for mastering organic chemistry (Tasker, 2016), fostering them to be independent, self-directed learners.

**Research Question**

The main research question addresses whether the app benefits students’ learning, improves their confidence level in solving questions, and changes their learning aptitude and interest.

**Methodology**

NuPOV was introduced to all freshman taking Organic Chemistry I (CM1121). One topic students learn about is the theory and mechanisms for nucleophilic addition. Using NuPOV on their mobile devices together with traditional 2D diagrams on PowerPoint slides, students can visualise 3D molecular structures and their orbitals, and interact with them by aiming the nucleophile on the electrophile using a “cannon”, and then “firing” the nucleophile using their fingers towards the electrophile. The app also informs users if the proposed angle of attack and the orientation of the nucleophile towards the electrophile will be successful. A successful reaction results in the app simulating the nucleophilic addition reaction, allowing the user to observe how the molecules undergo a change in their structures to produce the final product. Through this mechanistic approach, students will be able to visualise and understand how nucleophilic addition works.

**Basis of Survey Items to Inform Practice**

Self-assessment surveys were carried out before and after the usage of the app. The survey items measure the three dimensions of confidence in understanding, solving questions, and helping peers. Results indicate an improvement in student learning confidence, the potential of sharing in their social learning environment, and in the changes in learning strategies.

The items on learning aptitude and interest measures whether there is a drop in effort in learning, and changes in learning strategies and approaches after using the app. Results indicate that lesser effort is needed, the adoption of better learning strategy, and enjoyment of learning is enhanced.
Results

After using NuPOV, students felt more confident in understanding the concept of nucleophilic addition without further assistance from course instructors. Majority of the students felt more confident in tackling harder questions on nucleophilic addition. Our project demonstrated that NuPOV, with its visualisation and user interactivity features, can help students build their spatial visualisation skills in visualising reaction mechanisms when used with traditional 2D media.

<table>
<thead>
<tr>
<th>Measured Variable</th>
<th>Question Topic</th>
<th>Change in score</th>
<th>Average Change (+/-)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Confidence in their own understanding</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 0 0 10 38 28 7 4 0</td>
<td></td>
<td>0.50575</td>
</tr>
<tr>
<td>Self- Efficacy</td>
<td>Confidence in solving difficult questions</td>
<td>0 0 0 5 24 37 17 3 1</td>
<td>0.50805</td>
</tr>
<tr>
<td></td>
<td>Confidence in teaching peers</td>
<td>0 0 1 8 38 30 7 3 0</td>
<td>0.49425</td>
</tr>
<tr>
<td>Learning Aptitude</td>
<td>Not requiring help in the topic</td>
<td>0 0 1 4 20 37 15 10 0</td>
<td>1.04598</td>
</tr>
<tr>
<td></td>
<td>Willingness to read difficult courses</td>
<td>0 0 8 27 24 21 6 1 0</td>
<td>-0.08046</td>
</tr>
<tr>
<td>Interest</td>
<td>Enjoy CM3121</td>
<td>0 0 7 20 35 20 4 1 0</td>
<td>-0.08448</td>
</tr>
</tbody>
</table>

Figure 1. Students' feedbacks after using NuPOV
Figure 2. Summary of findings on students’ perceived confidence

Figure 3. Summary of key findings on students’ perceived learning aptitude and interests on Organic chemistry after using NuPOV
**e-HECC Theme**

In line with the e-HECC theme, the current study shows the importance of using the app to improve student’s learning through improved visualisation via its 3D AR interface. The app allows instantaneous feedback, thus reducing face-to-face interaction needed to clarify doubts.

*Figure 4.* Traditional 2D format to illustrate 3D Nucleophilic Addition mechanism
Figure 5. Demonstration of NuPOV in various mobile devices and orientations

Acknowledgement

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This work has been published in the peer-reviewed Journal of Chemical Education:

Interacting with Three-Dimensional Molecular Structures Using an Augmented Reality Mobile App

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COVID-19 emergency e-learning and beyond: Educators experiences and perspectives

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Sub-theme
Curricular change, pedagogical change, re-thinking of

Keywords
Physical distancing, e-learning opportunities, e-learning challenges, e-learning adoption

Introduction
While e-learning was previously seen as an optional or fashionable way to deliver lectures, conduct tutorials and provide skills training, it became the lifeline for higher education during the COVID-19 pandemic (Murphy, 2020). As university leaders have thought about e-learning prior to the pandemic, it is not surprising that recent developments were perceived as an opportunity to move the e-learning agenda forward (Tesar, 2020). University educators are key to making e-learning a core element of tertiary education, as they are the ones to implement it. In this qualitative study, we explored the experiences, perceptions, practices and future adoption intentions related to e-learning of Public Health educators at NUS.

Methods
We conducted in-depth interviews with faculty of the School of Public Health, NUS from May to July 2020. Faculty members were eligible if they a) have had teaching responsibilities in an undergraduate module after 7th February 2020 when physical distancing measures were introduced, and b) had to convert at least one undergraduate physical session into an e-learning session due to these measures. An interview guide was used during the interviews conducted in Zoom. Following line-by-line coding of verbatim interview transcripts, thematic analysis using an inductive approach was applied to develop themes and subthemes. The Saw Swee Hock School of Public Health Departmental Ethics Committee (SSHSPH-016) approved the study.
Findings

Of the 16 eligible faculty members, 14 were recruited and interviewed. Data saturation was reached after 11 interviews. Findings were grouped into five categories containing themes and subthemes. Prior to physical distancing measures, educators had little or no e-learning experience, and voiced a strong preference for on-site teaching. The short notice to switch to e-learning halfway through the semester in February and March 2020, and the lack of e-learning experience created stress and anxiety. Educators responded by rapidly making efforts that allowed for teaching to continue, conceding that some quality standards had to be neglected. Uploading pre-recorded lectures was considered a safe first step. While striving to increase quality, some educators iteratively refined their teaching which created “chaos” and discomfort.

Educators approached assessments with leniency considering various negative effects of the pandemic. Despite many challenges, educators acknowledged reduced apprehension towards e-learning after the emergency e-learning experience. Reflecting upon their experiences, educators acknowledged both the opportunities and challenges of e-learning. In terms of opportunities, they mentioned that e-learning comes with flexibility, enabling students to learn independently. They also spoke about increased reflection upon their teaching and how this can improve practice. Some also highlighted the reduction of some barriers to student-educator interaction. However, educators also commented on difficulties creating social, emotional and cognitive engagement, the challenges of catering to diverse student needs (different backgrounds and capacities), and a reduction of holistic learning experiences which usually result in specific academic skills as well as less tangible competencies and tacit knowledge. Considering both opportunities and challenges, educators envisioned that some forms of e-learning will feature in their future teaching if practicable and in line with educational goals. They intend to use blended learning approaches, but highlighted that support enabling the implementation of technology-based and pedagogy-informed teaching is necessary to actualise intentions.

Conclusion

Despite the strong preference for on-site teaching, and after gaining experiences with teaching online, educators acknowledge the potential of e-learning approaches to enrich their practice. A preference for blended approaches was apparent to leverage on the strengths of e-learning and physical sessions, and at the same time, overcome inherent limitations. Support that enables effective and practical incorporation of e-learning components into teaching practices is needed.

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Personalised touch on learning support changes students’ learning behaviour

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Sub-theme
Pedagogical change

Keywords
online-based course, self-directed learning, individual support, foreign language learning

Traditionally, language learning has strongly favoured face-to-face (F2F) interaction over other modes, in order to achieve communicative competence through social interaction. However, due to the outbreak of the COVID-19 pandemic in 2020, all language modules at the National University of Singapore (NUS) had to be converted to virtual mode from April that year.

The anticipated challenges of online courses include limited interaction with, and among students, which in turn could potentially impact the learning outcomes. To mitigate the potential limitation, I turned my focus to the re-emphasis of two course aims: enhancing self-directed learning, and providing individual support.

For a few years now, I have encouraged self-direction in my students’ learning through the implementation of flipped courses. However, some students were quite resistant to moving out from their comfort zones. This semester, an entire virtual course, LAK4201 “Korean 5”, put students in settings where they were without easy access to an instructor and had to be self-directed in their learning. With self-directed learning, it does not mean instructors neglect students in their learning; rather, it means instructors provide adequate support to the students to ‘learn’ how to manage their acquisition process. For this reason, I have added a few digital communication channels to provide individual support to students in a timely manner. Essentially, I dedicated more effort to preparation work via pre-recorded e-lectures before a synchronous lecture, and added digital channels to accommodate individual interaction with student. Consequently, this course structure complements the two important roles of an instructor: providing support, and nurturing self-directedness in learning. The final course design is shown in Figure 1.
In this research, I focus on students' behaviour in the various communication channels. Students taking the course utilised these channels (in Figure 1) actively to seek personalised feedback on their academic performance. For instance, for optional assignments, 20 students out of 57 submitted audio-recordings on Flipgrid, and 43 students submitted written posts on Padlet. Compared to only 15-20% of voluntary participation in such activities for F2F courses, it is evident that students value personalised feedback more in online courses.

Comments from the required reflection assignments for the course, submitted on Microsoft Teams, provided further evidence that students appreciated the individualised support. In their reflections, students reported on their metacognitive activities, cultural awareness, cross-linguistic transfer, and self-directed activities. For instance, they reported exploring various multimedia resources to resolve uncertainties related to the course content, and shared the findings in their reflections. Often, students were found researching for information beyond the course requirements, especially on cultural aspects of the topic, and in their reflections they shared their cultural understanding in relation to personal experiences. This shows that students taking LAK4201 were actively searching for information for meaning-making, and active meaning-making postulates academic success in an online environment (Mayer, 2009).

Additionally, other interesting observations gleaned from the reflections included comments expressing appreciation, and being able to organically identify a learning community amongst their course mates. An example of an appreciative comment:

I enjoy writing a reflection every week. Although it is not easy, I know it helps me improve my Korean in many ways. I was really impressed with the teacher reading and commenting on all the reflections by 57 students individually.

Another comment on the learning community mentioned that, “I saw one friend asked [sic] a very good question (that I have not thought of) in Microsoft Teams, so I want to re-write it in my reflection, because I want to remember it.” Clearly, such comments demonstrate that students can recognise and appreciate
individualised support, and a virtual learning community. Although there remains challenges and restrictions to online teaching and learning, this approach offers unique opportunities to foster self-directedness, an appreciative attitude and the potential to organically cultivate a learning community. I hope to replicate such behaviours back in an F2F classroom.

**References**
Beyond pedagogy: Factors to consider for MOOC development

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Sub-theme
Engagement with online materials

Keywords
MOOC development; MOOC pedagogy

MOOCs have been celebrated and put down (Koutropoulos & Zaharias, 2015) but they continue to garner attention (Bozkurt et al., 2016) as they are able to reach a large audience, increase the visibility and brand of educational institutions (Hollands, & Tirthali, 2014) and even assist in educators’ professional development (Stöhr et al., 2015). It has been acknowledged that MOOCs require a lot of money (Haywood, & Macleod, 2014; Kopp et al., 2014), time (Sneddon et al., 2018) and work (Bartoletti, 2016). They are complex to develop and require both educational knowledge and software knowledge (Bartoletti, 2016; Sanchez-Gordon & Luján-Mora, 2018). It has also been argued that it takes team effort to develop a MOOC as this requires multiple expertise including subject expertise, pedagogical knowledge, learning design, instructional technology and even marketing (Bartoletti, 2016; Drake et al., 2015; Hollands & Tirthali, 2014; Seidametova, 2018; Spyropoulou et al., 2019). NUS has been experimenting with MOOCs since 2006 and recently partnered with edX, a global online learning platform, to allow our staff and students to enrol in edX MOOCS via LumiNUS. Undergraduates can count MOOCs as an Unrestrictive Elective (UE) and even use MOOCS to pursue a DYOM (Design-Your-Own-Module) (NUS News, 2019). Our experience with developing one of the first MOOCs NUS offered on edX (NUS News, 2019) resonates strongly with the above observations. As MOOCs remain a viable option for learners in NUS and beyond, it is important to conceptualise the best approach to MOOC development.

A review of MOOC literature suggests a large focus on case studies (Sneddon et al., 2018), MOOC pedagogy (Bartoletti et al., 2015), and some focus on the administrative and technical aspects of producing and maintaining a MOOC (Gamarge et al., 2015; Hollands & Tirthali, 2014; Kopp et al., 2014; Lackner et al., 2014; Seidametova, 2018; Smith et al., 2017; Zhu, et al., 2018). Drawing on a meta-analysis of MOOC development literature and our own experience of developing the edX MOOC, this presentation posits that while pedagogy has always been the backbone of a course, whether online or offline, successful development of a MOOC lies in the convergence of all three aspects—pedagogical rigour, administrative support and technical support. (see Figure 1)
The decision to produce a MOOC requires careful consideration of the content and MOOC pedagogy. Not only do MOOC developers need subject knowledge to develop a curriculum, they need to identify content which is suitable and attractive to an international audience of varying backgrounds and interests. More importantly, the pedagogical rigour underpinning the actual course design (e.g. videos, readings and quizzes) is dependent on an understanding of MOOC pedagogy. MOOC participants are also self-directed learners who may practise selective learning (Kleiman et al., 2013). Hence, learner-content interaction (Moore, 1993) is very important and more emphasis needs to be placed on producing high-quality videos. The use of technology is instrumental, not only in terms of media design and video production but also in platform maintenance and use. In addition, administrative demands such as instructor workload, copyright permissions, intellectual property rights, contracts, revenue sharing, marketing, student registration and the creation of guidelines for credits for MOOCs (Hollands & Tirthali, 2014; Kopp et al., 2014; Lackener & Ebner, 2014; Seidametova, 2018) play an essential role in the MOOC development process.

This presentation situates the three domains of pedagogy, administration and technical support in the larger MOOC development framework underpinned by teamwork and partnership. We argue that effective MOOC development requires an understanding of how each of these three domains affect the others. We believe that an interplay of all three domains are needed. The proposed MOOC development framework in this paper aims to provide pragmatic and actionable guidelines instrumental to future MOOC development endeavours in NUS and beyond.

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Departing from lectures: A case of interactive process-oriented guided inquiry learning

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Sub-theme
Pedagogical change

Keywords
Process-oriented Guided Learning Inquiry, approach to learning, learning outcome

Large classes are typically taught in a lecture format where learning materials are disseminated and students submit their final assignments based on self-developed understanding. To create a shared understanding of the learning materials wherein students actively interact with, make inferences to and co-create knowledge, a student-centric method grounded in social constructivist theory (Churcher, 2014) called Process-oriented Guided Inquiry Learning (POGIL) was employed in an undergraduate class. In POGIL, students work collaboratively during class in groups of four on a specifically designed activity, under the guidance of a tutor, to answer critical thinking questions that enable them to progressively build understanding on a topic towards the end of the session.

Interactions are scaffolded in three phases: (i) exploring patterns from the learning materials, (ii) developing new concepts and ideas to solve a novel problem, and finally (iii) developing generalisation applications and principles beyond the given problem. As per the ICAP framework (Chi & Wylie, 2014), interactive activities provide deep learning opportunities, more than constructive, active, or passive sessions such as a lecture setting.

The presentation will share the findings of a study conducted by the authors in Academic Year (AY) 2019/20 to investigate the impact the interactive pedagogy of POGIL on students’ cognitive performance, approach to learning, and learning experience in a 150-strong class in undergraduate Architecture. A quasi-non-experimental explanatory mixed method study was conducted where standard validated tools such as the revised two-factor study process questionnaire (R-SPQ-2F) (Biggs et al., 2001), and the learning climate questionnaire (Bartram et al., 1993) qualitatively measured students’ approach to learning and learning experience respectively. The three-stage assessment measured students’ cognitive performance, one at the end of the POGIL session (immediate performance), within a time interval of one week (near performance), and after a gap of a few months (far performance). All the assessments
measured performance using rubrics at various cognitive levels of understanding, applying, analysing, evaluating, and creating, as per the revised Blooms’ Taxonomy (Anderson et al., 2001; Bloom et al., 1956). The qualitative data was derived from interviews conducted with 30 student respondents at the end of the module. The four two-hour POGIL sessions had 20-minute sub-sessions which were scaffolded progressively by leading questions.

The findings of the study reveal that students taught with POGIL pedagogy performed better than those taught with active learning strategies on immediate, near, and delayed cognitive performance tests (t=3.719, p=0.000, d=0.50). Students also showed a greater increase in adopting a deep approach to learning and no substantial increase in the surface approach to learning. Most students reported that overall the POGIL activity had a positive impact on their learning experience, promoting a collaborative atmosphere which fostered meaningful discussions and dialogue within the module, and an attitude of collaboration outside of the module. The study highlights the challenges and provides suggestions for implementing such a pedagogy in a large class.

Endnote

1. The ICAP framework defines cognitive engagement activities on the basis of students’ overt behaviours and proposes that engagement behaviors can be categorised and differentiated into one of four modes: Interactive, Constructive, Active, and Passive. According to this framework students engagement increases from passive modes to active activities to constructive learning and is highest in interactive modes.

References


PechaKucha Sessions
Medical Grand Challenge: Moving from face-to-face to online

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Sub-theme
Community of learning

Keywords
Innovation, healthcare solutions, inter-faculty student collaboration, student-led online event, planning

Introduction
Technology has become a key part of modern healthcare. To develop useful solutions for existing healthcare problems, it is important for healthcare professionals to learn about the elements and phases of innovation in their core syllabus to leverage on current technologies. Additionally, healthcare delivery systems often face multi-dimensional problems that require solutions spanning political, biomedical and technological disciplines (Duong et al., 2016). Therefore, promoting learning and innovation among medical students should begin early.

The Medical Grand Challenge (MGC) is a student-led medical innovation programme started by the Yong Loo Lin School of Medicine in 2017. MGC targets undergraduate students from various faculties to engage them with the three phases of the innovation process: identify, innovate and implement. With the assistance of clinical mentors and an accompanying seminar series, participants work through the year, beginning in January, on a project to solve a clinical need. This culminates in a Grand Finale night in August/September.

Due to the COVID-19 situation, many face-to-face events had to be moved online. This presentation will share the process of converting MGC into a virtual format and some of the feedback obtained, particularly on key areas to focus on during planning.
Methods

Seminars were conducted online using Zoom. Previously, physical workshops were held and participants had the opportunity for direct interaction with invited speakers and start-ups. However, with the move to Zoom platform this year, the MGC student organising team sought alternative means to maintain the standard of each workshop. For example, ‘Fireside Chats’ were incorporated for invited speakers to share their expertise and discuss relevant topics surrounding an over-arching theme. Another example is the use of Zoom’s chat function to facilitate our Q&A segment after each Fireside chat or speaker sharing. This encouraged active learning and interaction between all parties.

The Finale Night was held via Zoom webinar to approximately 200 attendees. 14 shortlisted teams were each given 6 minutes to pitch their projects and address the judges’ queries. As it was a novel move for Finale Night to be held digitally, the MGC student organising committee took the following steps to ensure its smooth running on the event day.

The student organising committee conducted dry runs to familiarise different stakeholders with the flow. On the day itself, they managed the Zoom platform to ensure that presenting teams were able to transition smoothly to a panelist role to pitch their project. The student organising committee also managed the judging panel by creating breakout rooms for the judges to discuss their scores and utilized an online form, which they have real-time access to, to collate judging scores.

After the event, online surveys were completed by the participating teams and judges to obtain their views on the MGC by providing their feedback through open-ended questions.

Results

Students and judges generally felt that the MGC was well organised, considering that it was held online for the first time. The judges commented that the trial runs were useful in ensuring the smooth running of the Finale Night. However, several areas for improvement were raised. This included uploading of seminar recordings for future viewings and improving the process of communication, particularly, avoiding last-minute changes in the pitching format.

Significance

A large event like MGC with multiple sub-events showcasing medical products during the challenge phase can be effectively done on a digital platform. However, careful prior planning and close coordination between stakeholders (both internal and external) and leadership support are keys to a successful
execution. The lessons learnt (e.g. thorough planning, effective communication) will be applied in post-COVID MGCs.

References
Unrestricted, Collaborative Open-Book Assessments as a Viable Assessment Format for Online Learning

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Sub-theme
Re-thinking assessments

Keywords
Collaborative testing, Collaborative learning, Open-book assessments, Randomised questions, Online assessments, Online learning

Ever a topic of interest among educators, the question of how to best conduct assessments is once again in the spotlight as we navigate a global pandemic. In many places, it is now impossible to organise in-person assessments, which poses additional difficulties for ensuring assessments are fair and reflective of a student’s learning. The purely technological response to this challenge—such as software that locks down browsers or flags suspicious behaviour (ProctorU, 2020)—certainly finds its use in some situations. However, such tools may be vulnerable to exploitation by savvier students and could further marginalise disadvantaged students (Swauger, 2020). We believe, therefore, that a more holistic response must harness not only the power of technology, but also that of pedagogical insight.
As seen in Figure 1, our proposed approach comprises two parts. Our centerpiece is the Unrestricted, Collaborative Open-Book Assessment (UCOA)—a novel way of combining the strengths of two existing alternatives to the traditional assessment format. Firstly, UCOAs are open-book assessments without restrictions: test-takers may consult any printed as well as digital and online material. This shifts the emphasis away from content memorisation and towards the students’ resourcefulness and how they apply the knowledge (Moore, 2018). Secondly, UCOAs are collaborative assessments: students may discuss with one another before submitting their answers. This opportunity to participate in peer discussion might benefit students by providing immediate feedback should someone in a group reveal a misconception (Gilley & Clarkston, 2014), as well as allowing them to sharpen their communication skills (Kapitanoff, 2009; Sandahl, 2010).

However, cheating is potentially a major concern for UCOAs, which is where the second piece of our proposal comes in. In our implementation of UCOAs, we seek to individualise the question paper for each student. We start with one common question bank consisting of many multiple-choice questions (MCQs). Each question contains (1) a core component, which is kept the same for all students, and (2) variable fields, which we later replace (using Python) with randomly generated numbers or texts that are also randomly drawn from a suitable library (example in Figure 2). Afterwards, the question papers created by this method are programmatically pushed to the University’s learning management platform (LumiNUS). This way, the same concepts will be tested across the board, even if the specific details vary. Instead of copying answers, students will have to discuss their reasoning and problem-solving strategies.
Our effort to bring UCOAs to a real classroom is currently progressing along at its initial stage, with preliminary findings suggesting a positive perception of UCOAs by the students. We gathered 75 responses from a Physics-themed general education class in NUS. When asked about hypothetically taking a UCOA instead of the usual individual closed-book exam, 88.6% of respondents indicated that the discussion during a UCOA would “Likely” or “Very Likely” have a positive impact on their learning. 71.4% of respondents felt the use of randomly generated values in a UCOA would be better than fixed values. Meanwhile, 71.8% also indicated they would feel less anxious taking a UCOA, which might prove especially valuable in the context of the ongoing pandemic.

Moving forward, we hope to test and refine our implementation of UCOAs, eventually developing a tool that other educators can employ to create individualised MCQ papers for assessing learning in various disciplines.

References


Using Quotes to Increase Community and Student Engagement During COVID-19

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Sub-theme
Community of learning; engagement with online materials

Keywords
Student engagement; online quotes; educator approachability; COVID-19; online learning

Context: The use of quotes in teaching, though few, have reported positive results across various disciplines. In the teaching of literature, the beauty of combining words to crystallise a universal truth was found to be effective (Morache, 1987). Moving from poetic stanzas to mathematical theorems, Fleron (1998) describes how quotes have transformed his journey from a student to a mathematics educator. In medicine, the maxims and monologues of Sherlock Holmes have been employed as poetic devices for medical aphorism (Levine, 2012). These examples highlight how the use of quotes captured and engaged the recipient’s attention.

However, COVID-19 has impacted student morale significantly through cancelled internships and exchange programmes. Furthermore, students had to manage disrupted classes as the mode of learning shifted from physical to online classes, with little contact time with the educator. In view of this, this study aims to further investigate the role of online quotes in engaging students to learn, and also fostering community through increased approachability of the educator.

Methodology: Quotes were shared with students using the university’s online learning management system LumiNUS via announcements. These quotes were retrieved from freely available databases and were selected to 1) fit the context of the announcement, and 2) increase awareness of the COVID-19 situation. This differed from the earlier study where quotes were selected to focus on the announcements’ context only (e.g. an announcement on practice tutorial questions would have a quote advocating the importance of practice) (Tay, 2020). A sample of the quotes used in the current study can be found in Figure 1.
The class the author taught peri-COVID (i.e. during COVID) was a small class of 26 in Semester 2 of AY2019/20 as the COVID-19 situation unravelled. In view of the small class size, analysis of qualitative student feedback will be used in the discussions. Responses to the interview questions were collected offline via email due to safe distancing measures, and clarifications were also made through email. The email platform was utilised over Zoom as use of Zoom was not yet prevalent at the time.

Figure 1. Sample quotes used during peri-COVID teaching in Semester 2 of AY2019/20.

**Mid-February 2020:**
DORSCON level was raised from Yellow to Orange

*My two secrets to staying healthy: wash your hands all the time. And, if you can't, use Purell or one of the sanitizers. And the other is hot peppers. I eat a lot of hot peppers. I for some reason started doing that in 1992, and I swear by it* (Hillary Clinton)

**End-March 2020:**
Face-to-face classes with more than 25 students had to shift to e-learning

*[To understand] how it feels to be in hospitality during this [COVID-19] pandemic - Remember when the Titanic was sinking, and the band continued to play? Well, we’re the band.* (The Pantiles in Tunbridge Wells)

**Mid-April 2020:**
Students prepare for the exams

*There’s no way to become great overnight, but in the marathon of success, it takes a lot of intention to see you through each day of the journey.* (Lewis Howes)

*You don’t drown by falling in the water; you drown by staying there.* (Edwin Louis Cole)

**Results:** Results of the email interviews revealed that the use of quotes had four effects on students’ learning, as shown in Table 1. The excerpts are reproduced “as is” without edits.
Table 1

Excerpt of quotes obtained from the small class highlighting the effect of online quotes in their learning and engagement. Items in bold highlight key findings from the excerpts.

<table>
<thead>
<tr>
<th>Quotes encouraged to students</th>
<th>I think it is not a bad idea to use quotes as it may serve as an encouragement and as a form of information sharing (Student 03)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I think it is nice to have a/ several quote(s) to live by as the quote(s) can be like a guiding principle or a source of motivation. So I think it would be great to continue using quotes for future lectures and modules because these quotes may help to encourage or motivate students to get through the semester. (Student 06)</td>
</tr>
<tr>
<td>Quotes increased approachability of the educator:</td>
<td>It helps to add a certain ‘human’ factor to the lecturer. It shows the amount of effort that the lecturer puts in to each lecture and announcements made etc, hence making the lecturer more approachable. (Student 04)</td>
</tr>
<tr>
<td></td>
<td>I feel that the inclusive of quotes by the professor to cheer/motivate the students makes him more approachable as it shows that he genuinely cares about the welfare of students, not just the academics of the student. The fact that he took extra effort to research relevant quotes put a smile on my face (some quotes are entertaining) and warms me as the professor is probably very busy, but he still took time to research for us! (Student 05)</td>
</tr>
<tr>
<td>Quotes led to anticipation:</td>
<td>I remember discussing with [Student A] and [Student B] during your research method module on what kind of quote will you share with us on the topic that was taught. (Student 07)</td>
</tr>
<tr>
<td></td>
<td>It has led to a sort of anticipation, wanting to see what interesting quotes you would use. (Student 08)</td>
</tr>
<tr>
<td>Quotes expanded their general knowledge:</td>
<td>The quotes did expand my general knowledge. This is because I did not know any of the quotes before the module, but it was very insightful to find out that they came from respectable admirable people. (Student 11)</td>
</tr>
<tr>
<td></td>
<td>They do expand general knowledge. The quotes are not only good- to-know, but as mentioned previously, the quotes regarding the current situation raise the awareness on what is currently happening. Overall, the quotes are a generally good read and it’s great to know more quotes now. I can impress people with this general knowledge (haha). (Student 14)</td>
</tr>
</tbody>
</table>
Of significance was the feedback from Student 12, who shared how the quotes have impacted not only her learning, but also her life. The email correspondence is presented in Figure 2 with the student's permission.

![Email](image)

**Figure 2.** Email from a student stating how the quotes not only got her more engaged in her learning but also impacted her life. Permission was obtained from the student to share the email.

**Significance and Conclusion:** In the peri-COVID teaching environment, results from qualitative analysis of the interviews with 26 students revealed that the quotes helped with building a sense of community in terms of increasing approachability of the educator, students experiencing a greater sense of anticipation for upcoming quotes, and also engaged students in their learning by encouraging them and expanding their general knowledge. The absence of subscription fees, software and hardware costs also facilitated widespread use of this practice. The efficacy of using quotes is evident in the literature from different disciplines including literature, mathematics, and medicine, and through this study, the author hopes that the efficacy of using quotes to enhance student motivation and engagement in a peri-COVID teaching environment was highlighted.
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Mentoring in the Time of COVID-19: A Narrative Review on Interprofessional Mentoring

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Sub-theme

Pedagogical change

Keywords

Mentoring; interprofessional mentoring; interprofessional education; undergraduate; postgraduate

Novice mentoring in palliative medicine (PM), has relied on creating personalised and enduring relationships between senior and junior clinicians to provide holistic and longitudinal psycho-emotional support to mentees (Clark, 2011; Kashiwagi et al., 2013). However, COVID-19 restrictions on face-to-face meetings, travel and the re-deployment of senior clinicians have caused much of this support to be halted (Horowitz, 2020; Minder & Peltier, 2020). This is especially concerning as it occurs at a time when personalised, emotional support is needed more than ever, given the potential adverse psychological impact of the pandemic (Tan et al., 2020) in a PM setting already facing high attrition and burnout rates (Tan et al., 2018).

In response to these changes caused by the COVID-19 pandemic, support for PM trainees is increasingly seen to come from other healthcare professionals within the PM team such as nurses and medical social workers instead, signifying the emergent role of interprofessional mentoring (IPM) in PM (Yeam et al., 2016). Yet IPM remains poorly understood. This is a problem amidst ongoing concerns that mentoring as a whole is prone to poor structuring and oversight (Kaltner et al., 2017; Vissers et al., 2013) as well as likely
reduced oversight by host organisations during the pandemic.

With IPM increasingly being employed in PM, there is an urgent need to better understand and characterise IPM so that it does not fall foul of similar concerns, and to better support its implementation. We proposed a narrative review (NR) to map and explore connections within accounts of IPM in Internal Medicine, given the absence of mentoring data in PM, with our most important finding being the stages of mentoring in IPM.

The NR revealed that mentoring stages provide a consistent point of reference for various mentors that certain skills, goals and competencies have been met. Having movement along the mentoring stages, determined by meeting specific mentoring goals, allows for flexibility to account for the individual needs of stakeholders and their circumstances. The mentoring stages contain “Mentor Training”, “Initiating IPM”, “IPM Process”, and “Assessing IPM Outcomes”, but in truth, these stages may be simplified into two portions.

The first portion, the initiation stage, includes the preparation of mentees and mentors for their mentoring responsibilities, the matching process (Bellman, 2003; Levine et al., 2017), and the pre-mentoring meetings that set expectations and guidelines (Toh et al., 2018). The second portion of the mentoring process refers to the nurturing of the mentoring relationship and provision of timely and personalised support to attain overall mentoring objectives. Here, the mentoring relationship comprises sub-stages replete with individual goals. How the various sub-stages that make up this portion are measured is an immediate concern as host organisations overseeing these mentoring relationships will require this data to provide direct support in a timely manner. Throughout these portions, it is the host’s responsibility to structure, train, match, support and assess mentees, mentors, and their mentoring relationships and mentoring outcomes. The host is also responsible for creating a safe environment for mentoring (Wahab et al., 2016; Yap et al., 2017).

In conclusion, we identified the essential aspects of IPM. This involved more than one mentor from different specialities within the PM team, sometimes concurrently to provide personalised appropriate, specific, timely and holistic support. Ultimately, knowing these essential aspects can lead to the development of an enduring and personalised, goal sensitive, context-, mentee-, mentor-, relational-, mentoring approach-, mentoring environment-dependent mentoring relationship that develops in distinct mentoring stages within a structured mentoring approach and nurturing mentoring environment (Toh et al., 2018; Wahab et al., 2016).

The disruptions to novice mentoring brought by the COVID-19 pandemic have allowed us to reconsider the traditional senior-and-junior clinician relationships that underpin novice mentoring, and explore the potential of interprofessional relationships. Developing programmes that support IPM could play a key role
in delivering personalised, accessible, timely and appropriate support for junior clinicians not just in PM, but other team-based disciplines in healthcare as the pandemic continues to blaze on.

References


Student Perceptions of Synchronous Online Learning

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Sub-theme
Community of learning; engagement with online materials

Keywords
Synchronous online learning; perception

With the COVID-19 situation, many universities are forced to go fully online, and students have had to adapt to online learning both asynchronously and synchronously. Asynchronous online learning can take place when students interact with videos, quizzes, and forums; and synchronous online learning can be conducted through video conferencing and chats (Park & Bonk, 2007). In the past, distance learning occurred mainly through asynchronous means (Chou, 2002; Hrastinski, 2008b). However, with improved technology and bandwidth capabilities, implementation of synchronous online learning is growing (Kinshuk & Chen, 2006). Synchronous learning has been perceived to be more social and learners have reported the ability to ask questions and get answers immediately despite being separated geographically (Hrastinski, 2008a). Educators are also able to display teacher immediacy behaviours synchronously online (Park & Bonk, 2007).

With all these positive reports about synchronous online learning, this study aimed to find out how NUS students perceived online synchronous learning, specifically through video conferencing tools. It draws on Moore’s theory of transactional distance (1993)—dialogue/interaction (i.e. learner-content, learner-tutor, learner-learner, learner-interface), structure and learner autonomy—to understand and explain student perceptions of online synchronous learning.

A survey was conducted in early March 2020, at the beginning of the worsening COVID-19 situation in Singapore, when tutors were still given an option to conduct either face-to-face or online lessons. Convenience sampling (Etikan et al., 2016) was employed and the participants consisted of first-year undergraduate students from the Faculty of Arts and Social Science (FASS) who were taking a compulsory academic writing course. The email invitation to participate in the survey was sent to all 664 students enrolled in the course, and a total of 338 students responded to the survey.
This survey focused on four main areas:

1. Student preference for online or face-to-face lessons in light of the COVID-19 situation.
2. Their perceived comfort levels of synchronous and asynchronous learning.
3. Their views on the achievement of learning outcomes in synchronous online learning.
4. The benefits and potential issues with online synchronous lessons.

In general, respondents had a positive view of online synchronous learning because of its convenience and accessibility. It was also preferred because of the COVID-19 situation. However, their perceived comfort levels of synchronous learning via video conferencing tools seemed dependent on the level of available technical support and accessibility to appropriate physical environments.

The findings also suggest that the perceived effectiveness of synchronous online lessons depend on the student’s expectations of the lesson in terms of passive or active learning. A student who expects to listen to a tutor deliver content online may believe that the learning outcomes can be achieved through learner-content interaction. However, students who expect active learning through interaction had mixed views on whether the key learning outcomes can be achieved. In general, respondents felt that the interaction with tutors on an online platform was similar to that of face-to-face lessons, but they were concerned about deeper learner-instructor interaction. Respondents were also concerned about the lack of learner-learner interaction and whether it could lead to more complex discussions. An unexpected finding was that students liked the use of text to interact with others during synchronous online lessons, with some reporting a reduction in stress during participation. Lastly, the attention of students and tutors online was perceived to enhance or reduce learning. However, it was argued that attention and the ability to mitigate distractions was very much dependent on the learner’s choice, or learner autonomy.

This PechaKucha emphasises students’ expectations as a key variable to whether they perceive online synchronous lessons to be effective. This implies that tutors who champion active learning and deep discussions will need to be more intentional in creating opportunities and the environment for meaningful learner-tutor and learner-learner interaction online.

Endnote:

Teacher immediacy behaviours refer to verbal and non-verbal behaviors that lead to “greater affective and cognitive learning” (Gorham, 1998).
References


Reflections on conducting asynchronous tutorials using Microsoft Teams

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Sub-theme
Community of learning; pedagogical change

Keywords
Asynchronous tutorial; Microsoft Teams

In this presentation, I reflect on recent experiences with conducting asynchronous tutorials using Microsoft Teams in an introductory linguistics class—a change that I had introduced primarily in response to the need for online teaching brought about by the COVID-19 pandemic.

Prior to this change, tutorials for this class were conducted in-person, once a week, and involved tutor-led discussions of problem sets that students were expected to attempt, either individually or with their classmates, prior to the session. Students would be graded for class participation. While this model provided a physical community that connected students with one another and with the tutor in the classroom, tutors, particularly those with less experience, consistently faced issues regarding the assessment of class participation: some students would dominate the discussions while others felt left out. Some introverted students would also avoid seeking clarifications in such a public setting.

The disruption to face-to-face teaching and learning by the COVID-19 pandemic provided an opportunity to re-think this previously entrenched approach to conducting tutorials. There were also new concerns raised by the digital medium. Given that tutors already had difficulties managing class participation in a physical classroom, the problem would likely be compounded if we were to try to replicate this model in a synchronous online setting. Moreover, due to remote learning there was a possibility that the students, particularly the freshmen, would be disengaged from the learning environment and community.
With the (re-)creation of a community of learning in an online learning environment as one of the key considerations (see e.g. Angelino et al., 2007 and Liu et al., 2007 for the importance of learning communities in online learning), I decided to break the students in each tutorial group into ‘micro-teams’ of three to four members, where micro-team membership would be maintained throughout the semester. Students worked within their assigned micro-team, unsupervised, to submit written solutions to the problem sets. This was operationalized through Microsoft Teams: a team was created for each tutorial group, and within each team, dedicated private channels were created for each micro-team. Only micro-team members and the tutor had access to their private channel, making it a bespoke space for the micro-team to work in. Within each private channel, students were able to leave real-time messages on a permanent message board, initiate video calls, and create/edit documents. Every week, students would create a new word document within their private channel and work together on the week’s problem set. Since the private channels are accessible at all times, students had the added flexibility of whether to use the scheduled tutorial time to work on the problem sets. After each week’s deadline, tutors provided tailored feedback on each micro-team’s solution which addressed their specific strengths and weaknesses. Students were able to further engage their tutors by tagging the tutor with questions on the message board.

During the presentation, I provide screenshots illustrating how students made use of this virtual space to create communities of learning that not only connected them with one another, but also with the tutor in a more personalized way than could have been afforded in a physical classroom setting. I reflect on some of the disadvantages of this model and consider whether I would continue with this model even after the pandemic.

References


A systemic scoping review of e-mentoring in medical education

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Sub-theme
Community of Learning, engagement with online materials, ethical mentorship

Keywords
Electronic-mentoring, medicine, mentoring, medical education

Background
Mentoring in medicine has shown to enhance the professional and personal development of both mentors and mentees (Polley et al., 2020), and to boost the reputation of their respective host organisations (Tan et al, 2017). However, curbs on in-person meetings following COVID-19 ‘lockdowns’ and social distancing measures have compromised traditional mentoring programmes that rely entirely on these meetings to establish and nurture mentoring relationships. As mentoring programmes turn to online and electronic communication technologies to support and enable medical mentoring (Du Mont et al., 2015), the lack of best practices and established guidelines for electronic programmes is worrisome (Cheong et al., 2019).

Therefore, this systematic scoping review (SSR) was proposed to map the prevailing practice to enhance understanding and inform designs of future e-mentoring programs.
Methods

Independent searches of 6 bibliographic databases (PubMed, Scopus, Cochrane, ERIC, Google Scholar, EBSCO) and 3 grey literature databases (Web of Science, Mednar, OpenGrey) were carried out. ‘Negotiated consensual approach’ was used to identify articles to be analysed (Sambunjak et al., 2010). Without any prior calibration of themes, 3 teams of at least 3 researchers worked extensively to analyse the 64 full-text articles using the ‘split approach’. This consists of concurrent and independent tabulated summaries with concurrent use of thematic and content analysis (Wong et al. 2013; Popay et al. 2006; Braun et al. 2006; Hsieh et al. 2005.) This was employed without any prior calibration of themes to enhance the trustworthiness of the analysis.

Results

4147 titles were identified and 64 full-text articles were included into this study. Content and thematic analysis revealed five similar themes/categories including the characterisation, stages, assessment and the pros and cons of e-mentoring and the host organisation (host).

E-mentoring can be characterised as a mutually beneficial relationship that develops along well-described competency stages (Chong et al., 2020). This is made possible via the use of both synchronous and asynchronous online communication between the host organisation, senior clinicians, and junior doctors (Sagi et al., 2018). It circumvents geographical barriers (Hla et al., 2002) and the constraints of in-person meetings, allowing mentees to achieve their personal, academic and professional goals (Augestad et al., 2013).

However, the notion of e-mentoring as a stage-specific, competency-based process means that it extends beyond simply meeting specific objectives—underscoring the need for a consistent mentoring approach replete with timely, personalised, holistic and longitudinal support and clear codes of practice (Akinla et al., 2018). Furthermore, a blended approach of both electronic and face-to-face means of communication between mentor and mentee is associated with the most optimal outcomes—which may not be possible during the current pandemic (Coates et al., 2004).

Conclusion

During a pandemic, where face-to-face interactions are limited, mentoring relationships built solely on face-to-face meetings and interactions will likely suffer and impede the academic, professional, and personal growth of both mentor and mentee. E-mentoring provides an answer to this question as a platform to maintain these interactions and preserve mentoring relationships.
To secure e-mentoring’s place in medical education, further study into the role of e-mentoring in a blended approach, the nature of e-mentoring and the assessment of e-mentoring relationships and programmes are required.

While this SSR was conducted for mentoring in the context of medical education, it is recognised that mentoring is neither exclusive nor limited to the boundaries of medicine. The proposed e-mentoring framework could be applied to the content of other professions despite the innate differences in the nature of the various stakeholders and mentoring content.

References


Creating Meaningful Learning Opportunities During COVID Lockdown

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Sub-theme
Curricular change, engagement with online materials

Keywords
Pandemic; disruption; pathway; resilience; adapt

Background/Rationale
Globally, the COVID-19 crisis caused significant disruption to medical students’ learning. However, continuity of training and preparing them adequately for their future practice remains essential. In particular, disruptions of local and overseas elective postings have created a major challenge to provide wider exposure of learning to students.

To mitigate this impact, the Yong Loo Lin School of Medicine (NUSMed) developed a new initiative called the Pathway programmes. Students could choose from one of six pathways offered. The Centre for Medical Education (CenMED), as a core unit in NUSMed, anchored two pathways from 2 March to 8 May 2020: (1) Medical Education (STAR—Skills in Teaching And Research), and (2) Medical Innovation and Entrepreneurship (MIE).

The STAR pathway exposes medical students to concepts and principles in Health Profession Education (HPE), with a focus on the scholarship of teaching and learning (SoTL), so as to groom them as future clinician educators.

The MIE pathway aims to ignite their spirit of innovation and entrepreneurship so that these attributes would lead them, as future doctors and innovators, to find practical solutions to resolve healthcare challenges.
Methodology

CenMED designed the curriculum for both STAR and MIE, and topics were delivered using a flipped classroom model which students had to self-regulate their learning using existing resources in edX and online modules before attending interactive workshops on ZOOM.

To better facilitate students’ learning, Entrada (a learning management system) and Microsoft Teams were used asynchronously to communicate with students.

As a capstone to the pathway experience, an online grand finale of project presentations was held on 8 May 2020 to provide a scholarly platform for students from different pathways to pitch their innovation projects. Table 1 shows the list of projects developed by the respective pathway students.

Table 1

<table>
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<th>List of projects developed</th>
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<th>Medical Education:</th>
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<tr>
<td>1) Senior-Teach-Juniors (STJ)</td>
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<td>2) Case-based Learning: Qualities of an effective facilitator</td>
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<tr>
<td>3) Exploring flipped classroom methods in undergraduate pre-clinical medical curriculum</td>
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<tr>
<td>4) Current practices of self-directed learning among medical students in NUS YLLSoM during clinical years—A mixed-methods study</td>
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<th>Medical Innovation &amp; Entrepreneurship:</th>
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<td>1) MASKeteer</td>
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<td>2) GrocHos</td>
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<tr>
<td>3) The Hobby Cube</td>
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<tr>
<td>4) Mobile app for supermarket overcrowding</td>
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At the end of the programme, students were invited to voluntarily share their feedback and experience via an online survey. The survey’s intent was to identify strengths and limitations to improve the pathways for future runs.
Key Findings

As shown in Figures 1, 2, and the comments below, students indicated that the learning experiences have widened their worldview in medicine and they enjoyed the pathways very much.

Figure 1. Survey findings regarding students’ overall satisfaction of the MIE pathway experience.

Figure 2. Survey findings regarding students’ overall satisfaction of the STAR pathway experience.
“For me, the main strength of this innovation pathway was that it allowed me to broaden my horizons beyond the usual medical curriculum as we were given opportunities to venture into the business and innovation fields in terms of knowledge (via online platforms like edX) and our thought processes (i.e. when we were challenged to innovate during the course of this pathway).”

“Through this pathway, I was able to learn more about education and what goes on behind-the-scenes in planning the medical curriculum. It gave me insight to how the medical curriculum/education curriculum is structured. I feel that learning about this is useful as a medical student, and I wish that I were exposed to these concepts earlier on.”

There were a few limitations that emerged, such as:

- The short lead time to develop the curricula, due to the rapidly evolving COVID-19 situation, led to difficulties in recruiting a diverse group of faculty. This affected the content delivery as well as mentoring of students, especially in MIE.

- Insufficient lead time to develop a rigorous process to evaluate students’ performances.

**Significance of the Study**

This experience highlights how a school effectively responded to the pandemic situation in a timely manner to ensure a safe, effective, and continuous learning environment.

Another highlight of this experience is the importance of educators, administrators and students’ commitment, responsibility and resilience, which was on display during this time of crisis in order to develop a quality education product.

We hope this example serves as a good reference for adapting to a crisis situation and the importance of maintaining continuity of the learning environment, which would better prepare institutions of similar settings for future pandemics.
Re-thinking open-book take-home exams to create meaningful assessments: Examples in environmental engineering

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Sub-theme
Re-thinking of assessments

Keywords
E-assessment; formative assessment; pedagogical change; re-thinking of assessments; summative assessment

Over the years, there has been an evolution of philosophy about the role of assessments from assessments of learning to assessments for learning, with an underlying question: can assessments fulfil both the role of grading/ranking students and represent a learning opportunity on their own (Laveault & Allal., 2016)? Though assessment for learning is often equated to formative assessment as opposed to summative assessment, there is also an interface between both. Clearly there is an interest in creating summative assessments that support and expand student learning (Laveault & Allal, 2016).

With the COVID-19 pandemic, e-assessments have become compulsory for everyone. Closed-book exams replaced by open-book exams taken from home have led to a dramatic increase of plagiarism cases reported in NUS. This has shown the most obvious limitations of simply translating a pen-and-paper exam into a digital one without re-thinking the whole philosophy of the assessment. Instead, if done properly, the opportunities of digitisation to create more meaningful assessments are real (Mimirinis, 2018). A well-designed open-book exam with access to the internet can make it possible to engage students across multiple dimensions to sort out students who engage in surface learning from those who engage in deeper learning, and help recreate an authentic environment that closely mimics realistic workplace conditions (Shand, 2020). Such exams can fulfil a formative role as well when students acquire new knowledge and competencies, and increase their level of confidence that they can indeed apply their knowledge to a real situation. In turn, this has shown to produce a positive impact on intrinsic motivation (Hondrich et al., 2018).

Within this framework, this presentation is not intended to be theoretical or dogmatic. It should be seen as a simple case study in an environmental engineering context on how assessments can be adapted to make the most out of a special situation to create fresh, innovative and meaningful assessments. I will draw on my personal examples across several modules taught at different levels:
ESE2001 (Environmental Challenges in the Anthropocene): a core module for Year-2 B.Eng. Environmental Engineering students that provides an insight into how we affect the natural environmental processes that take place in the air, soil and water. For this module, I will show two examples on how I asked students to apply their knowledge to a new situation using the internet as a resource. This helps them improve on the following learning outcome: “Approach complex environmental issues in an integrated manner”.

ESE5001 (Environmental Engineering Principles): an introductory module for M.SC. Environmental Engineering students. I teach them solid waste engineering. For their exam given in the middle of the circuit breaker period, I invited students to reflect on the situation at the time and the (expected) environmental consequences of the pandemic, with special focus on waste generation.

ESE5205 (Sludge and Solid Waste Management): For this technical elective, students were invited to write a mini-proposal to achieve the goals of the Zero Waste Masterplan launched by the National Environmental Agency (NEA) in September 2019. This is aligned with the learning outcomes of this module to approach complex issues from an engineering and managerial point of view, challenge preconceived notions, propose viable solutions to complex problems and situations, argue their ideas in written and oral form and defend their point of view.

ESE5204B (Physico-Chemical Treatment of Hazardous Chemicals): This course designed for the Graduate Certificate in Environmental Sustainability was taught entirely online in June 2020 during the circuit breaker. I will show how I was able to maintain the laboratory component of the course in this special situation and how the digital tools learnt for this specific purpose were then reused creatively during the e-exam.

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https://doi.org/10.1080/0142159X.2019.1693527
From disruption to possibilities: Moving face-to-face lessons to online while keeping the learning experience in mind

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Sub-theme
pedagogical change

Keywords
Online learning, e-facilitation, digital fluency, learning experience, learning design

Emergency remote teaching as a stop gap has helped business continuity, however many questions arise around the learning experience on offer.

In the last six months, universities and training providers have scrambled to provide academic continuity through emergency remote teaching. Several new approaches have surfaced, with mixed results. Perhaps it is relevant to highlight that emergency remote teaching is a stop gap. The demand for virtual learning has increased and will likely remain so. As such, designing a virtual learning space embodying what works from a learner’s and trainer’s perspective is ever so critical.

When COVID-19 induced lockdowns disrupted face-to-face (F2F) delivery, education providers quickly resorted to adopting various web conferencing tools to support teaching and learning. NUS SCALE faced a similar challenge. This moment provided an opportunity to design and implement solutions, not just for business continuity, but also to finally embark on virtual learning for overseas learners.

For the F2F to online learning transition to materialise, we evaluated various platforms as well as trainer and staff readiness to embark on this transition. Instead of quickly finalizing the tools and technologies to be used for remote teaching, our approach began with assessing and building the readiness of educators to design, develop and deliver blended learning courses incorporating purposive synchronous and asynchronous learning activities.

The above objective was met by designing and delivering a workshop which in itself was an experience of a hybrid learning classroom. A hybrid learning class caters to face-to-face and virtual learners in real time. Our week-long workshop comprised of asynchronous pre-workshop activities and synchronous learning time for learners to experience blended learning in all its nuances. Microsoft Teams, an NUS-wide enterprise tool, was the chosen platform for this workshop while Kolb’s experiential learning model (Kolb, 1984) was the backbone of the learning design strategy. The design and delivery of the learning activities was informed by the ‘Interactive, Constructive, Active, Passive’ (ICAP) framework (Chi & Wylie, 2014).

The workshop intentionally put trainers in the shoes of learners to instill empathy and reflection from a learner’s perspective. This empowered them to design and deliver online learning experiences for their Continuing Education and Training (CET) learners. This was not just tools’ training as learners experienced blended learning in all its nuances such as participating in a classroom and pedagogically designing and delivering a lesson.

In this Pecha Kucha session, I share my experience of designing, conducting and facilitating a workshop on hybrid learning with Microsoft Teams. Firstly, there is a key difference between a ‘tool’ and a ‘learning space’ from a learner’s and trainer’s perspective. Tools are a part of the learning space, but not the learning space. Secondly, I will share considerations around designing lessons to optimize the learning space for virtual learning and teaching. Thirdly, I will surface key implementation insights gained post-
workshop. These include but are not limited to: onboarding, the role of trainer and learner in a virtual learning space and the criticality of close collaboration between academics and non-academics.

Online learning must be informed by the readiness of learners and trainers. This begins with onboarding and continues through to the post-course evaluation. While educators are able to use technology in the classroom, this may be challenging when it comes to designing and delivering online and blended learning sessions. Teaching with technology requires an educator to don many hats: pedagogical, social, managerial and technical. This workshop tried to work in these elements to enable participants to gain an appreciation for blended learning in all its nuances. Going into the workshop, one might have expected to learn the features of a platform and be able to replicate face-to-face sessions in an online environment. However, coming out, there was a realisation that beyond a fluency with tools, creating a conducive online learning environment requires reformed lesson plans as well as continued collaboration with non-academics.

References


The Impact Of Death And Caring For The Dying On The Personhood Of Medical Students: A Systematic Scoping Review

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Sub-theme
Community of learning, personhood, medical education, pedagogical change

Keywords
Medical student; dying patients; personhood; ring theory of personhood; undergraduate medical education

Background
In light of the COVID-19 pandemic, medical students have been entering healthcare systems in settings with limited resources and reduced support from senior clinicians. Along with this uncertain environment, many students are likely to have their first exposure to death and dying as medical educators continue to struggle to incorporate palliative care into curricula. A better understanding of how medical students respond to death and dying will inform educators and clinicians on how to support them.
Methods

To better understand the impact of death and dying on medical students, a novel approach to systematic scoping reviews (SSRs) is proposed to map prevailing literature in an accountable and reproducible manner. Nine members of the research team carried out systematic and independent searches of six bibliographic databases (PubMed, ERIC, Embase, Psycinfo, Cochrane, and Web of Science). The reviewers worked in three independent teams. One team summarised the included articles. The other teams employed independent thematic and content analysis respectively. The findings of the three approaches were compared. The themes from non-evidence based and grey literature were also compared with themes from research-driven data.

Results

7619 abstracts were identified, 149 articles were reviewed, and 52 articles (33 peer reviewed and 19 grey literature articles) were included in the final analysis. Both thematic and content analyses were consistent in their findings and this was also reflected in the tabulated summaries. The four themes identified were: the emotional, psychological, and behavioral impact; impact on attitudes; impact on interpersonal relationships; and the impact on personal and professional development. These themes correspond to the Innate, Individual, Relational, and Societal domains in the Ring Theory of Personhood (Figure 1).

Discussion

Caring for the dead and dying has implications on the entwined rings of the personhood of medical students, and dissonance in identity may result when there is dyssynchrony between the rings, as presented in Figure 1.
Evidence of adverse repercussions on medical students, viewed from the lens of their personhood underlines the need for holistic and longitudinal support in the medical school curriculum. These supportive interventions should encompass effective role modelling and counselling, and ensuring that any problems faced would be addressed promptly, particularly within the evolving COVID-19 situation. To do so, there must be a structured support mechanism and effective training.

In light of the adverse repercussions on medical students and drawing from lessons learnt in ‘peace time’, we proffer suggestions to address the needs of medical students entering and/or returning to clinical care. This is presented in Figure 2.
Figure 2. Suggestions to address needs of medical students entering and/or returning to clinical care.

Conclusion

The findings of this SSR should be a rallying cry to ensure that medical students are effectively supported. The silver lining in these unprecedented times may be a chance to correct years of poor preparation. For now, a phased return to clinical practice presents an opportunity to integrate debriefing sessions and discussions that are structured into the curriculum. We have much to learn but the current adverse circumstances may just be the impetus to make the change, in line with e-HECC 2020’s theme—“Re-examining learning, research, and teaching in challenging contexts: From disruption to possibilities”.

References

Re-designing a Lab-based Module for Remote Teaching

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Sub-theme
Engagement with online materials

Keywords
Online learning, lab, breakout activities, learning-by-doing, active learning

The abrupt shift from face-to-face to full online classes due to COVID-19 disruptions has drastically impacted teaching and learning, especially for laboratory-based modules where student learning mostly comprise hands-on learning experiences. In CN1101A “Chemical Engineering Principles and Practices”, a whole new approach was devised to adapt to changing needs, shifting CN1101A to a fully online experiential learning module. The intended learning outcomes has thus shifted to a heavier emphasis on understanding core engineering principles, now that honing lab skills is not possible in a fully online module. Every week, students go through a 4-hour Studio session, conducted on Zoom, exploring the core concepts of the day via simulation, given scenarios and/or thought experiments (as opposed to lab experiments previously). Before students enter the weekly Studio, they have to watch the pre-Studio video of the week. Each pre-Studio video comprises two parts, a pre-recorded experiment and a mini-lecture. The pre-recorded 3-minute videos have been edited to give students an animated overview of the experimental setup, procedure/process and objectives, while the 7-minute mini lecture covers core engineering concepts, which will be elaborated on during the Studio session.

During the 4-hour Studio session, students start by participating in a 5-minute bonding session where they are encouraged to do freestyle drawing on a given topic (e.g. places you have travelled to/favourite movie characters) on Zoom’s whiteboard while waiting for all the students to join the lecture. The 30-minute mini-lecture which follows introduces the day’s core concepts, followed by a cycle of breakout activities and activity debrief every 30 to 40 minutes. Each group in a breakout session consists of four students, and each Studio session has four breakout groups. Each breakout activity during the studio (consisting of multiple breakout activities) would focus on only one core concept, and students work on the concept during studio. These activities can be computer simulations, mathematical modelling on MS Excel and equation derivations/applications, and are facilitated by the professors/lecturers in charge of the groups. This notably differs from a single 4-hour lab session where students conduct experiments and answer a given set of questions from the textbook. Upon completing all the activities, a debrief would be conducted for the
class wherein students are given opportunities to share their conclusions as the instructor goes through the relevant concepts, either by doodling on the screen or typing in their input on Zoom’s chat function.

The session ends with a summary followed by questions-and-answers (Q&As). The Q&As not only cover questions asked during the Zoom session (either in video or in chat), it also extends to the usual email queries, and questions on their one-stop resource platform, Padlet. The Padlet site allows students to (i) download their lecture/Studio materials; (ii) view any announcements; (iii) ask questions; and (iv) submit their slides after their weekly presentations. Using Padlet has greatly facilitated online learning, especially since students can access these resources from both their mobile devices and the website. Students are free to post any module-related questions and read through questions and answers posted by their classmates. Students are also free to answer each other’s questions in a forum-style discussion on Padlet.

Attempts to make online Studio sessions more fun and interactive include cracking jokes (where appropriate), sharing real life applications of engineering concepts (in forensics, biomedical, chemical industry etc.) and “live” doodling/drawing of schematics/equations during the Zoom session. As with regular classes, the sessions are interactive, with students frequently asking questions during class, and responses being typed in the Zoom chats. Active class participation has been observed to be very high throughout this module. Whilst hands-on learning activities are still not possible, it is encouraging to note that active learning continues via these online learning sessions, with students getting more involved and engaged as they go through the module.
Applying team teaching in the context of an undergraduate environment chemistry course

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Sub-theme
Pedagogical change

Keywords
Team teaching, online engagement, collaboration, remote teaching, classroom setup, transdisciplinarity

Introduction

In many universities and educational institutes, passionate educators constantly reflect on their teaching to find ways to make their lessons fun and engaging for their students. In 2020, the COVID-19 pandemic caused many large classes traditionally conducted in a face-to-face (F2F) manner (Figure 1) to move to online platforms to stem the spread of the virus. As online teaching became the de-facto mode of instruction for many educators, a number of them struggled to find ways to continue making their lessons engaging. The adoption of team teaching is one way to sustain student engagement in these challenging times.

Team teaching is a process where two or more educators plan lessons and collaborate with each another during teaching sessions. For team teaching to work, educators should be open-minded to new teaching ideas, set common understandings, and build a strong working relationship with one another (Kaplan, 2012). A major benefit of team teaching is that team teaching fosters a strong student-teacher relationship. A strong student-teacher relationship encourages students to be more motivated to work hard and perform well, and allows educators to have a sense of trust and confidence in setting high expectations for their students (Davis & Dupper, 2004; Willie, 2000). Educators can also focus their attention on smaller groups (Morin & Osewalt, n.d.), thereby allowing students to obtain timely feedback and consolidate their learning quicker by being exposed to multiple lecturers’ perspectives on the subject matter (Anderson & Speck, 1998; Morin & Osewalt, n.d.).
As online teaching is here to stay, we sought to experiment a transdisciplinary teaching model by building on our prior experiences in team teaching in our respective domains. In this sharing, we document how online team teaching was applied in the Environmental Chemistry module (CM3261) for a segment in Toxicology & Infectious Diseases, conducted by lecturers from the Department of Chemistry and Department of Pharmacy (Figure 2). We share the lessons learnt, our overall experiences, and how these will potentially be translated into the pedagogical design and implementation for future classes.

Setting

CM3261 consisted of 37 third and fourth-year chemistry undergraduates. Team teaching was implemented via Zoom’s conferencing feature. The use of face shields during team teaching was adhered to per university guidelines. Taking some inspiration from various Hollywood talk shows, the lesson was designed to foster interactions between students and teachers via webcams and the chat function, and among students using breakout rooms to complete group assignments. These made the class more fun and engaging while fostering stronger student-teacher bonds in the process.

Figure 1. The new-normal: F2F classes with delocalised students in a lecture theatre.
After introducing real-world patient cases illustrating the significance of antibiotic resistance, the lesson subsequently explored how human impacts on the environment contribute to antibiotic resistance and how this is a major challenge facing mankind. By allowing students to develop a holistic understanding of the complexity of human actions on the environment, the underlying chemistry and the real-world implications in healthcare, our approach to team teaching exemplifies the highest level of integration (i.e. transdisciplinarity) on Harden’s ladder (see Figure 3) (Harden, 2000).
Significance

Our experience serves as an example to inspire other educators to adopt team teaching for sustaining student engagement in online environments, and to embrace a transdisciplinary approach to teaching and learning.

Acknowledgement

We would like to thank all those who have enabled and supported this team teaching session at CM3261: Peng Xinnan, Han Jia Yi, and my colleagues at ALS10X0 for inspiring us to team teaching, as we still do in these courses. Our thanks to NUS Libraries, in particular, NUS Science Library for the space, equipment, and unwavering support towards digital innovation in education.

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A systematic scoping review of ethics training programs from 1990 to 2019

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Sub-theme
Community of learning, Pedagogical change, Curricular change

Keywords
Adapt, Longitudinal, Spiralled

Introduction:
Increasingly complex moral and ethical issues in clinical practice, evolving legal standards of practice, public expectations upon the medical profession and escalating financial and liability concerns, have seen variations in the content, pedagogy and integration of ethics education in medical school training. At its heart, medical students must recognise, understand and apply moral and ethical reasoning in a clinically appropriate and practical standard to be effective and professional doctors. As curricula contend with structural limitations posed by the COVID-19 pandemic, we consider the most effective core topics and means of teaching and assessing ethics in medical schools.

Methods:
We utilised Krishna’s Systematic Evidenced Based Approach (SEBA) designed to study and amalgamate diverse and socioculturally informed aspects of different ethics education approaches across different
medical curricula. With the initial systematic scoping review (SSR) on teaching ethics suggesting that ethics education is a competency-based process structured around clearly defined stages, a second SSR of assessments of ethics knowledge and skills in medical schools was carried out. Both SSRs involved PubMed, ERIC, Embase and PsycINFO databases for articles published between 1st January 1990 and 31st December 2019. To enhance the transparency of the analysis, independent content and thematic analysis of the subjects taught, assessment methods employed and the structure of ethics programs were carried out.

Results:
79 articles on medical ethics training and 51 articles on assessment methods were included. With training and assessments seen to occur concurrently, the themes from both SSRs were considered in tandem and included the goals, stages, enablers/barriers to teaching ethics, and the assessment tools employed.

Conclusion:
These SSRs confirm the need for a longitudinal competency-based approach to ethics training and assessment. This underlines the need for the further design of multidimensional and robust teaching and assessment tools to be used within a structured ethics training program—one which takes into account formal, informal and hidden curricula. Moreover, this must be horizontally and vertically integrated into the medical curriculum, reinforcing relevant and fundamental concepts to be understandable and relatable to clinical practice.

Progression along this longitudinal tract hinges on longitudinal assessments of knowledge and skills acquisition. Portfolios could bring the tools used at each stage together to give a holistic and longitudinal perspective of the learner’s development. This will facilitate their professional identity, through informing the learner of their improvements, gaps and rate of development. Definite milestones must be defined in lieu with appropriate remediations. These would help cement the development of an ethically sensitive, clinically relevant, culturally appropriate, self-reflective and confident clinician.

Moving forward, greater investment of resources to research and assessment of the impact of training processes is crucial. The organisation plays the biggest role in facilitating the growth and progress of ethics training processes and it is only through mobilising our resources, manpower, research and foresight that we will be able to produce future-ready and ethically-sound doctors of tomorrow.
The core principles of structuring the curriculum of medical ethics are applicable in multiple aspects beyond medical education. Institutions, be it medical schools or hospitals, must continually adapt and reflect to stay current and relevant to the needs of society.

In summary, the teaching and assessment of ethics must adapt to the cultural and contextual needs of society. As illustrated by the COVID-19 pandemic impacting the delivery of education in institutions in general, the process of medical ethics education must involve integrating the structural and functional limitations present, yet be constantly reinventing, improving and keeping fundamental ethical concepts perspicuous at its core.
Blended learning using Centre for Medical Education Scholar (CenMED Scholar) during COVID-19

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Sub-theme
Pedagogical change, engagement with online materials

Keywords
Blended learning, CenMED Scholar, faculty development, online, medical and health professions education, just in time learning

Background/rationale
The Centre for Medical Education (CenMED), NUS Yong Loo Lin School of Medicine recently developed CenMED Scholar—a learning management platform to train busy clinicians and educators located across wide geographical locations at different training sites to provide Just-In-Time (JIT) learning.

The COVID-19 pandemic forced a shift in the delivery format of workshops and courses from face-to-face to virtual. Rather than an entirely online workshop conducted over Zoom or Microsoft Teams, CenMED introduced an online blended learning approach for its faculty development programme. Traditional blended learning is found to have a synergistic effect on face-to-face and online learning. Additionally, this format retains interpersonal communication and fosters flexibility in learning. (Heydari et al., 2019).

Besides conducting the workshops through an online platform, we also tapped on CenMED Scholar to provide participants with pre-learning materials before attending the online sessions with the facilitators. This platform was also deployed for the Pathway programmes for students' learning.

Transformative learning theory underpins our faculty development program. (Mezirow, 1995). Faculty members come with their own understandings and beliefs on the best ways to teach medical and health professional students. Our training focuses on developing/changing their teaching-learning assumptions and beliefs based on well-evidenced practices. CenMED Scholar allows busy clinicians and basic science educators participants to incorporate the new information provided “just-in-time” in a convenient way. Knowledge gained through this online interaction allowed participants to better understand teaching-learning practices and find ways to implement it in their own curriculum and pedagogy. Knowledge gained through this online learning is then expanded when learners interact online via Zoom with other participants.
and the facilitators. This allows them to better understand teaching-learning practices and find ways to implement these practices in their own curriculum and pedagogy.

This presentation aims to share the process of utilising CenMED Scholar for blended learning and the feedback received.

**Methodology**

To maximise the use of the limited online interaction time with the facilitators, workshop materials previously used, including pre-readings, videos, case studies etc. were uploaded as Reuseable Learning Objects (RLOs). These RLOs were used to form the respective modules in a course. Participants were given individualised access codes 2-4 weeks prior to each workshop to access the materials.

Learners could also access other resources available on the platform, including recent recordings of the CenMED Webinar series on COVID-19, and archives of NUS-Priority Research In Medical Education (NUS-PRIME).

A total of 55 RLOs were created on CenMED Scholar between June to September 2020.

Post-workshop feedback regarding the platform was collated via an online questionnaire (3 out of 7 questionnaires have been collated with the rest in progress).

**Key Findings**

85.4% of respondents rated the online learning experience as “good” or “excellent”.

A total of 144 participants across 7 workshops attended and accessed the materials in spite of increased clinical demands across various healthcare institutions to manage the pandemic. Figure 1 and Table 1 show the engagement levels of participants across various professions and their eagerness to engage in inter-professional learning.
Based on qualitative comments from the 3 questionnaires, CenMED Scholar as a Repository of Learning was relevant, easy to navigate and well organised:

“The pre-readings on CenMED scholar were very helpful. It would be good if all the reading material could be loaded onto CenMED scholar rather than have additional readings via email.”

Suggested improvements include minimising repetitive content, and streamlining to a single e-learning system as suggested in the “Qualitative Research Methods in Health Professions Education” workshop:

“There were 2 links that were given to 2 different online learning modules, I thought some of the content between both modules was slightly repetitive.”

**Significance of the Study**

CenMED Scholar provided a dynamic platform to complement the facilitated sessions. It increased the learning efficiency of the workshops by front-loading materials.
Using a blended learning format involving pre-learning materials and online “face-to-face” sessions with the facilitators is an option worth considering.

This also allows busy clinical participants to improve their teaching skills, and time-constrained learners from both local and global to participate, thereby increasing the potential opportunities for inter-profession interactions and learning.

Use of RLOs in multiple courses improves the Return of Investment when developing programmes.

References

Rethinking grading in higher education amid COVID-19: Reflections from an undergraduate student

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Sub-theme
Re-thinking of assessments; Community of learning

Keywords
Discretionary grading, pass/fail grading, satisfactory/unsatisfactory (S/U) grading

The COVID-19 pandemic has brought unprecedented ruptures to the Higher Education arena. Responses and adaptations by Higher Education Institutions (HEIs) have been largely spontaneous and multifarious. Among the variegated policies implemented in this trying time, consistent attention is paid to grading. Many American universities, citing the uncertainties brought by online learning experiments and the immense emotional distress during the global pandemic as justifications, have implemented and extended some form of discretionary grading policies.

I define discretionary grading as what has been called pass/fail, satisfactory/unsatisfactory (S/U), or credit/no credit grading and the like. Discretionary grading means students attend a class as usual and complete its required assignments and examinations, yet students only need to obtain a passing grade or a grade indicating satisfactory performance (usually at least a C or a C minus). The grade obtained will not be counted toward students’ Grade Point Average (GPA). However, very few institutions of higher education outside of the US have implemented (or even have discussions on) discretionary grading policies before the pandemic. Other than recent implementations in HEIs in Hong Kong and Singapore, discretionary grading policies are most common in American colleges (McMorran et al., 2017). Particularly, discretionary grading in the context of graduate professional schools (especially medical, nursing, and dentistry schools) is very widely studied (Melrose, 2017; Jham et al., 2018; Spring et al., 2011). Most professional schools practice discretionary grading and most top universities allow their students to take certain modules of their choice discretionarily, though restrictions vary.

As such, it is imperative to understand what traditional grading vis-à-vis discretionary grading policies necessitate—and there is no better time to discuss their implications for learning in Higher Education. I wish to offer a perspective of an undergraduate student and invite some initial discussions and reflections on discretionary grading policies and grades in general that would continue to develop after our conference.
I suggest that grades might serve managerial and organisational functions that are often unrelated and even injurious to students’ learning. (Tocci, 2010; Schinske & Tanner, 2014; McMorran et al., 2017; Soh, 2010). For instance, Tocci (2010) argues that the letter grade system we have today might be a development from a set of random contingencies that we might not take for granted; while Kohn (1993; 1999) argues that grades are degrading and they reduce students’ interests in learning.

I also highlight that the debates around the impacts that discretionary grading policies have on learning outcomes and emotional well-being are largely unresolved. The open debate partly results from the discrepant and misaligned understandings and definitions of learning outcomes and emotional well-being adopted by different researchers (Spring et al., 2011; McMorran et al., 2017; Reddan, 2013). What seems to be more certain, however, is that grading policies can (1.) increase students’ intrinsic motivation to learn (Melrose, 2017; White et al., 2009) and (2.) create non-competitive and collaborative learning environments (Dahlgren et al., 2009; White & Fantone, 2009; Schinske & Tanner, 2014). Hence, not only should there be more systematic and comparable research on discretionary grading policies, but there is also a pressing need to reflect on what learning outcomes and values universities are pursuing and promoting, what they should be and why, as well as how they should be measured.

To sum up, discretionary grading policies in response to COVID-19 have provided a timely avenue to critically reflect on what grades are and what they do to students’ learning. More attention should be paid to creating conversations on meaningful grading and assessments among university administrators, professors, and of course, students.

References


Adopting DISC profiling to enhance classroom communication

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Sub-theme  
Community of Learning

Keywords  
DISC Profiling, Enhancing Student Communication, effective student feedback

The DiSC Personality Model was developed based on the work of psychologist William Marston published in Emotions of Normal People (1928) Individuals underwent a personality testing instrument to “categorise” them into 4 dimensions of personality espoused by Marston (Price, 1952). Each distinct personality type has their own strengths, weakness and manner in which they view the environment around them as well as manner in which they communicate with each other. The DiSC tool has been used in corporate settings to help corporations and leaders achieve better understanding of their members (Slowikowski, 2005). There have been real world examples of its effectiveness in helping organisations achieve their set goals of sales and various targets after the implementation of DiSC within the organisation (Sugerman, 2009).

Studies have also been conducted providing sufficient evidence of DiSC as a robust measure of personality style and a tool that can be confidently used to improve communication in the workplace (Peoplekeys, 2015). To resolve internal and external conflicts, successful teams must have strong communication skills in dealing with different personality types (Slowikoski 2005).

This presentation seeks to bring the audience an understanding what DiSC is, and how we can translate the effectiveness of the model from a workplace setting into the classroom, specifically in the context of NUS. The presentation likens the relationship between an educator and his students to a team that is working together to achieve greater synergy. It will explore how we can translate the usefulness of the DiSC personality profiling instrument to assist the educator to better communicate and give effective feedback based on individual students’ personality type.

Each of the 4 unique DiSC personality profiles (Table 1) will be explored through the use of visuals to allow the audience to better relate to each personality type. Thereafter we will dive into key
recommendations on how educators should deliver feedback to their students based on each personality type (Table 2), as well as how educators can work with individual students to put together an effective plan addressing areas of concern for individual personality types. For example, a peer assessment (Li, Lui & Steckelberg, 2010) may be more effective with “S” and “I” students as they place higher importance in the views of others around them, while a “C” student will prefer specific details given their conscientiousness and precision. For the purpose of this presentation, only the 4 main personality types (described in Table 1.) will be covered and not personality blend, which takes into consideration that there are at times grey areas with a primary (stronger) and secondary (lesser) type within each individual’s personality.

The presentation will conclude by sharing the overall population breakdown of the 4 personality types; i.e: 3% are classified as “D”, 11% “I”, 69% are “S”s and 17% are “C”s (Peoplekeys, 2015) as well as various online DiSC profiling tools available to explore and implement within classrooms.

Orientations

Table 1: Different DiSC orientations
Table 2: Considerations when providing feedback

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An analysis of the characteristics of portfolio and its intended outcomes in post-graduate medical education

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Sub-theme
Re-thinking of assessments, community of learning

Keywords
Portfolio, Portfolio learning, Reflections, Post graduate medical education, junior doctors

Background:
A portfolio is a collection of artefacts that are able to demonstrate user competency, learning outcomes, (Kitchen, 2012; Tailor et al., 2014) and personal and professional development (Ryland et al., 2006; Tailor et al., 2014). This feature positions the portfolio as a valuable counterpart to traditional modes of assessment and learning (Ryland et al., 2006). In particular, there is a need for dynamic evaluations in medicine as competency and expertise demonstrated by a post-graduate doctor in a clinical context cannot be accurately assessed via traditional means (Tailor et al., 2014). For the post-graduate, the portfolio provides concrete evidence to further establish his or her credentials as a doctor. There is a general consensus on a portfolio’s value, evidenced by increased portfolio use across various healthcare institutions. Of particular interest would be the portfolio’s role in promoting reflection among professionals (Nagler, 2013). For reflections to gain further traction and utility, it is prudent to identify best practices that will enable maximal returns, as well as the reflective pitfalls to avoid. This framework can be generalized to other users who strive to reap the benefits of consistent and thoughtful reflection.
Aims: This scoping review seeks to learn more about the reflective potential of portfolios and the key tenets of a successful reflective piece.

Methods: With a constructivist approach and a relativist lens, the novel Systematic Evidenced Based Approach (SEBA) will be enlisted to analyse data and synthesis.

Key findings and discussion: A total of 12300 abstracts were reviewed, out of which 708 full text articles were further evaluated, finally, 79 articles were included. The main themes include portfolio platform and design, portfolio implementation, portfolio assessment and evaluation of its use in post-graduate medical education. Other key searches include junior doctors, residents, specialists and doctors in general. For one, portfolios promote the habit of self-reflection among doctors. Reflecting on experiences heightens awareness and analysis of one’s strengths and weaknesses. Having reflections in a portfolio facilitates cross-evaluation from a mentor where doctors can expect to receive feedback from an experienced and fresh perspective (Alisa et al 2013). As a result, action can be taken to improve or amplify these areas, which culminates into longitudinal personal and professional development (Ogundipe, 2008). These reflections demonstrate progress and growth, which are valuable tools for formative assessments of doctors in the clinical setting. In communal terms, doctors are encouraged to share their reflections in group meetings, learning from the experiences of others. (Tochel et al., 2009). A deliberate amalgamation of factors including a positive user attitude, a well-designed reflective framework (Swanwick et al., 2010) and guidance from a mentor (Swanwick et al., 2010) hold the key to delivering these desired outcomes. Conversely, fear of the medical-legal implications of these reflections are a concern to some doctors (Tochel et al., 2009). A lack of time and extra workload (Wakeling et al., 2019) are commonly cited among those who feel like reflections are not beneficial.

Conclusion:

Reflections in a portfolio is a worthy pursuit. Effort should be placed in developing frameworks that negate the negative while enhancing the benefits of the portfolio. Notably, there have been attempts at developing reflective frameworks. However, they might be less relevant in today’s digital climate (Gordon et al., 2013). Beyond the portfolio, the art of writing a good reflection can be extrapolated to other domains for individuals who seek growth and improvement.

References


The future of discovery: A case for interdisciplinary learning in higher education

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Sub-theme
Rethinking academic field silos

Keywords
Interdisciplinary learning

The outbreak of COVID-19 and subsequent school shutdowns have highlighted that societies worldwide must re-imagine education for a changing, globalised world in the twenty-first century. Amidst the considerations around how to adapt classroom pedagogy for online learning, higher education institutions are presented with a unique opportunity to reconsider how students learn best together. In this presentation, I draw upon academic research, as well as the emergence of educational centres and fellowship programmes to show that discovery—and thus the advancement of human society and knowledge—is best realised through interdisciplinary learning. Echoing academics such as Francis Gavin, writers like David Epstein (2019), as well as international discourse from gatherings such as the World Economic Forum (Bruce-Lockhart, 2020), I argue that higher education must not be confined to its subject-specific academic disciplines, but rather, encourage interdisciplinary learning with a renewed sense of urgency.

This case is built on two premises: first, that interdisciplinary learning is an optimal way to learn. This is because interdisciplinary learning forces adaptability, increases possibility by prolonging specification and thus, leads to a greater chance of discovery and understanding (Epstein, 2019, p. 72); second, that interdisciplinary learning is not only better, but critical to today’s changing job market and overall human progress. This is because technological advancement continues to change the employment landscape, with over half of existing jobs today being replaced by machines in the next five years (Bruce-Lockhart, 2020). This demands that university graduates have a breadth of knowledge, can adapt within fast-paced work environments, and are better suited to pick up new skills. In other words, higher education becomes less about learning one subject and more about equipping students with tools to be adept at lifelong learning.

My evidence draws upon empirical data collected through surveys of students and graduates of Yale-NUS and the National University of Singapore. Students and graduates were asked about their higher education experience and its relevance to their current professional work and/or plans for the future.
Ultimately, I seek to show that interdisciplinary learning equips the upcoming generation with lateral thinking skills. In the wake of a global pandemic, there is a need now, more than ever, to reimagine education in order to adapt to circumstance and allow people to contribute more meaningfully to society throughout their career.

References


Team-based learning implementation in e-learning settings: A mechanical engineering case study

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Sub-theme
Pedagogical Change

Keywords
Team-based learning; e-learning pedagogy; disruptive pedagogies; engineering education; collaborative learning

The curricula of NUS Bachelor of Engineering programs are designed and administered in accordance with the Washington Accord – a multi-lateral accreditation agreement of tertiary-level engineering qualifications (International Engineering Alliance, 2014) to promote good practices in engineering education, since Singapore became a signatory country in 2006. Therefore, classical engineering syllabuses like mechanical engineering place great emphasis on core, discipline-specific training (NUS-ME, 2020) to satisfy delicate requirements of the accord. Due to the maths- and physics-centric in nature, classical engineering education is commonly conducted using teacher-centered approaches (Catalano & Catalano 1999; Abanador et al. 2014) in conventional classroom settings (Holvikivi, 2007; Mason et al. 2013). But such traditional pedagogy is occasionally challenged due to low student-teacher interaction (Rambocas, 2017) and thus not suitable for students who are more inclined towards inquiry-based learning (Leung, 2019). To overcome these shortcomings, Team-based Learning (TBL) that operates on a contrasting philosophy appears to be a more robust pedagogical strategy.

The core of TBL is built upon effective collaborative learning in a small team of learners driven by two factors: 1) interpersonal support; and 2) teamwork management (Ficapal-Cusi & Boada-Grau, 2014). Through these factors, team members are more enthusiastic in acquiring new knowledge and such collective enthusiasm can lead to a broader coverage of course contents than conventional classrooms (Johnson et al. 2000). Moreover, by setting common goals for the team through group assignments encourages strategic distribution of tasks within the team where the joint effort in applying new knowledge can eventually leads to the success of the team (Edmondson, 1999). With these characteristics, TBL has been found to improve overall learning efficiency (Michealson et al., 2004), expedite acquisition of discipline-specific contents and knowledge (Swanson et al., 2019) as well as promote the development of critical attributes such as problem-solving skills, effective communications, abilities to work collaboratively, etc. (Burgess et al., 2019). Although TBL has been successfully implemented to a broad range of engineering education (Murzi, 2014),
they are mostly restricted to face-to-face formats in classrooms. Amidst the COVID-19 outbreak, an attempt was made to apply TBL in e-learning settings for the teaching of a 100% CA ME course “Industry 4.0 & Standardization”.

As shown in Figure 1, the course structure spans over four phases with its core rooted deeply in the essential TBL elements proposed by Michaelsen and Sweet (2008), namely grouping, accountability, facilitation and development. In Phase-1, course materials including videos, whitepapers and articles are made available online to students prior to team formation. They are subsequently instructed to cover specific materials on the fundamentals and sit for an online multiple-choice individual readiness assurance test (e-iRAT) in Phase-2. Next, project teams are formed based on a mixed distribution of e-iRAT results, gender and ethnicity to ensure high levels of diversity within the teams (Michaelsen & Sweet, 2012). Once the teams are formed, the scope and criteria of the online team readiness assurance test (e-tRAT) are described and defined in Phase-3 to direct roles and responsibilities allocation in the team. The e-iRAT and e-tRAT are designed according to the 4 S’s framework (Michaelsen & Sweet, 2008) to promote self-learning and team development, where both serve as sequential preparatory effort to apply course concepts and domain-specific knowledge of an engineering context in Phase-4. With the complex nature of the subject of interest, three stages of facilitation are performed instead of two in a classical TBL cycle (Gullo et al. 2015). Through video conferencing with individual teams, each session reflects on a prior assessment and facilitate preparation for the next to enhance learning experience. This adaptation of TBL methodology receives an overall approval rating over 80%.
References


Re-examining the thoughtful integration of technology through a critical digital literacy lens

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Sub-theme
Curricular/pedagogical change and engagement with online materials

Keywords
Critical digital literacy, technology integration, curriculum design, higher education

The COVID-19 pandemic has pushed the deployment of information and communication technologies (ICTs) to the forefront of higher education. In NUS, thoughtful integration of technology has been strongly emphasised and rewarded (Centre for Development of Teaching and Learning, n.d.). Indeed, thoughtful integration of technology is an important reminder for us educators not to fall into the “technosolutionism” paradigm that sees educational technology becoming “focused on fixing education’s problems—namely, cost and access—rather than enhancing education’s potential” (Bass, 2018, p. 34).

This PechaKucha presentation aims to address the idea of thoughtful integration of technology in the module ES2660 “Communicating in the Information Age” from the lens of critical digital literacy (Hinrichsen & Coombs, 2013; Pangrazio, 2016). More than just using technology to enhance teaching and learning, it posits that the integration of technology plays a part in cultivating digital literacy in learners. In this light, it seeks to re-examine the focus of technological integration and emphasises the need to re-balance between a competencies-based digital literacy approach built around hard IT skills, such as coding, and a capacities-based digital literacy approach focused on “distinctively human capacities” such as “creativity, critical thinking, systems thinking, entrepreneurship, cultural agility” (Bass, 2018, p. 37).

The functional approach to cultivating digital literacy emphasises the development of operational skills over “the practices and intellectual traditions of the disciplines“, as highlighted by Hinrichsen and Coombs (2013). In doing so, it overlooks the need to develop students’ academic skills and practices that form their capacities to critically question issues related to their discipline/profession and leverage their skills and knowledge to address bigger societal challenges such as inequality or climate change (Bass, 2018).
Building on Freebody and Luke’s (1990) four-resource critical literacy model, Hinrichsen and Coombs (2013) propose the following five-resource critical digital literacy framework adapted for higher education:

1. Decoding – practical and operational engagement
2. Meaning making – narrative complexity in the digital
3. Using – producing and consuming digital texts
4. Analysing – becoming discerning practitioners
5. Persona – identity issues and the digital

Emphasising reader roles, learner processes as well as text construction in the digital context, this framework is reflected in the curriculum of ES2660, which is built on Ennis’ (2013) taxonomy of critical thinking dispositions and abilities, and Fink’s (2003) taxonomy of curriculum design for higher education. Not only are ES2660 students expected to analyse and evaluate varied digital texts and media, but a major component of the module also requires them to articulate their interpretations and judgements of the texts in the form of a digital narrative, extemporaneous and prepared speeches, and a written reasoned response to a discipline-related issue they identify. The presentation aims to show how these activities, among others, operationalise the five resources in the model. The fifth resource, persona, or the presentation of self, is of particular relevance and significance as learners engage in digital interaction and exchange within their virtual classrooms, foregrounded by the pandemic and the new normal beyond.

Overall, we believe that in the process of inculcating critical thinking skills in computer science majors, the ES2660 curriculum also helps them realise the far-ranging impact of their profession on society. Most importantly, by approaching technological integration from the “humanics” standpoint (Aoun, 2018), we hope to encourage learners to transcend the technological world around them and critically question how they can push new boundaries and play a more constructive role as engaged citizens in the information age.

References


A scoping review of mentor training programs in medicine between 1990 and 2017

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Sub-theme
Curricular Change, re-thinking of assessments

Keywords
Mentor, mentoring framework, medical education

Novice mentoring dominates the mentoring landscape in Medical Education (Ikbal et al., 2017) and the benefits of effective mentoring are ubiquitous on multiple platforms. Mentoring has been found to enhance innovation and career progression, encourage research involvement amongst women and underrepresented ethnic minorities and boost publications (Cho et al., 2011; Johnson et al., 2015; Pfund et al., 2016). Clinicians who have been mentored are also more motivated, resilient, well-developed in their professional identities and feel better supported in their jobs than colleagues without mentors (Pololi et al., 2015). Clearly much of this success hinges upon a mentor’s ability to build mentoring relationships and environments, provide effective feedback and render timely, appropriate and personalised support.

However, despite its success and expanded use in medical education, clinicians are poorly trained in the art of mentoring (Smesny et al., 2017). Feldman et al., (2009) reported that less than 15% of mentors received formal mentor training. Unsurprisingly, mentors often fail to maximise mentoring opportunities (Blanchard et al., 2015). Acknowledging this gap, the authors of this scoping review asks what mentor training programs are available in undergraduate and postgraduate medicine and how they may inform the creation of a new, evidenced based framework for mentor training.
The reviewers adopted Arksey and O’Malley’s (2005) approach to scoping reviews to study prevailing mentor-training programs and guidelines in postgraduate education programs and medical schools. The focus was on novice mentoring approaches. 3585 abstracts were retrieved, 232 full-text articles were reviewed and 68 articles were included. When initiating a mentoring program, four main themes were identified: the structure, content, outcomes and evaluation of mentor training programs.

Structure: To ensure a consistent mentoring experience, support from the host organization (University/Hospital) is necessary in engaging, supporting and providing a platform for mentors and mentees to engage each other. Example of delivery modes include lunch time sessions, small group discussions, workshops and forums that can build on a basic framework of mentoring provided. Access to online materials and consultations for mentors to view in their own free time and space prove useful here.

Content: What are we teaching mentors? It can be divided into generalized and professional content. Generalized content include aligning expectations, codes of conduct, roles & responsibilities and mentoring philosophy. Professional content include specific career guidance, research support, communication skills and role modelling. This depends on the individual needs of mentors in their fields.

Outcomes: Not surprisingly, the outcomes we found of an effective mentoring program matches the proposed benefits. Mentors report increased academic productivity, boosts in grant successes and improved work satisfaction. Mentees report enhanced innovation and career progression, well developed professional identities and a sense of direction. The host organization may also benefit by boosting staff retention and improving patients’ outcomes which holistically heightens its reputation as a university/hospital.

Evaluation: A large part of training is based on the evaluation of mentors and of the program itself via subjective and objective measures at different stages of the training. Formal tests include the Mentoring Competency Assessment (MCA) (Johnson et al., 2015). Informal tests include self-ratings and peer reviews amongst other methods.

When mentor training is prioritized, its internal and external rewards reach far beyond medical education. Internally, both mentors and mentees feel a sense of satisfaction, increased morale and a motivation for self-improvement. Externally, universities and hospitals can expect to see enhanced patient outcomes and a rise in publications while promoting a sustainable continued learning environment.
Despite evidence that mentor training improves knowledge, skills and attitudes, the adoption of mentor training programs has not been well developed—particularly in clinical medicine and informal mentoring programs. We believe the findings of this scoping review will be of interest to educators and program designers in undergraduate and postgraduate settings and will help inform the design of future mentor training programs.

References


Teaching and assessing communication skills in the postgraduate medical setting: A systematic scoping review

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Sub-theme
Curricular change, Re-thinking of assessments

Keywords
Communication, Skills Training, Assessment, COVID-19, Medical Education

Background
Poor communication skills can potentially compromise patient care (Haskard et al., 2008; Rao et al., 2007). As accreditation bodies have only called for compulsory communication skills trainings (CSTs) in recent years, these trainings are relatively new to most hospital departments. The COVID-19 pandemic only served to highlight the critical need for CSTs to streamline workflow processes amidst stretched medical resources and major protocol changes. This systematic scoping review (SSR) aims to gather prevailing data on existing CSTs to identify key factors in teaching and assessing communication skills in the postgraduate medical setting. This is so that effective, evidence-based and context-specific CSTs applicable to the new post-COVID-19 era can be designed.

Methods
Independent searches across 7 bibliographic databases (PubMed, PsycINFO, EMBASE, ERIC, CINAHL, Scopus and Google Scholar) were carried out. A Systematic Evidence Based Approach (SEBA) was chosen
to capture a holistic view of the diverse approaches to CST. This SSR in SEBA saw three teams of researchers working independently and concurrently. The first team employed Braun and Clarke (2006)’s approach to thematic analysis, the second team employed Hsieh & Shannon (2005)’s Directed Content Analysis while the third team created tabulated summaries of the included articles. The three teams analysed the data independently, and subsequently compared the results of this ‘split-approach’ in a systematic manner to achieve consistency.

Results

17,851 abstracts were identified, and 126 articles were included and analysed. The ‘split-approach’ analysis revealed similar themes: problems with existing CSTs; guiding principles for curriculum design; teaching methods; curriculum content; assessment methods and outcomes measured; integration of curriculum; and resources, facilitators and barriers to effective training.

Discussion

The data gathered can be largely split into 3 categories: teaching, assessing, and structuring CSTs. The focus of the abstract will be on the teaching and assessment methods that are applicable in the post-COVID-19 era.

A major flaw in existing CSTs is the lack of curriculum structure, focus and standardisation. The planning and execution of a CST curriculum needs to be stepwise and competency based. Learners should be equipped with core and subsequently advanced, specialty-specific communication skills, first achieved through didactic teaching and, thereafter, through interactive learning. Assessment at the didactic stage can be via surveys and quizzes. In keeping with a spiral curriculum, the learner re-visits the skills through case presentations, role-plays and group discussions. Holistic assessment by faculty, simulated patients and peers on the learner’s performance plays a key role in consolidating knowledge. Proficiency is determined by the learner’s ability to demonstrate efficacy in their communication skills in real doctor-patient settings.

With physical distancing mandated during the COVID-19 pandemic, online platforms have shown to be an effective and appropriate substitute for didactic and interactive sessions (Noordman et al., 2011; Roter et al., 2004). Teaching sessions can be easily conducted via video-based modules, whereas direct observation of patient encounters can be video-taped and assessed. Online examination software may also be used.

To enable a successful and effective CST, the educational institute must clearly define the goals and objectives that will shape the structure of the programme and the outcomes for assessment. It also needs to
ensure the allocation of sufficient administrative and financial resources, as well as ensure the wellbeing of the stakeholders.

Beyond medical education, a spiral curriculum with longitudinal assessments will equip learners with the necessary skills and confidence to face a variety of complex communication scenarios in our dynamic healthcare landscape. Not only will good communication skills improve patient satisfaction and treatment compliance, it will also reduce physician burnout and the frequency of malpractice claims (Merckaert et al., 2005; Yudkowsky et al., 2004). This strengthens the overall doctor-patient relationship.

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Using portfolios in undergraduate medical education: A systematic review

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Sub-theme
Re-thinking of assessments

Context: A portfolio is defined as “a purposeful collection of student work that exhibits the student's efforts, progress, and achievements in one or more areas” (Hays, 2004). With a growing emphasis on the need to train empathetic and reflective doctors, there has been a shift in focus of assessment from the attainment and application of clinical knowledge to attributes of professionalism, development of soft skills and reflective thinking (Fida et al., 2018; Franco et al., 2016). However, these traits are not easily assessed through traditional forms of assessment such as written examinations and objective structured clinical examinations (OSCE) (Chaffey et al., 2012). Portfolios prove to be a promising alternative form of assessment and have become increasingly popular amongst medical schools in recent years (Dannefer et al., 2012; Arntfield et al., 2015). Still, there has been much doubt over the efficacy and feasibility of portfolios as a form of assessment due to their limitations and the difficulty of implementation. This paper seeks to understand:
1. nature and uses of portfolios, with particular focus on its use as a form of assessment,
2. Its benefits and disadvantages, and
3. The limitations and difficulties of implementing portfolios and how to best circumvent them.

**Objective:** A systematic review is proposed to explore the nature and uses of portfolios, with focus on its viability as a form of assessment, in the setting of undergraduate medical education.

**Method:** The Systematic Evidenced Based Approach (SEBA) comprising Direct Content Analysis and Thematic Analysis, based on a constructivist approach with a relativist lens, was used to evaluate the articles.

**Results:** The following databases were sourced for articles for the systematic review: Embase, PsycInfo, PubMed, Scopus, ERIC and Google Scholar. The search strategy yielded a total of 12,041 articles. With the removal of duplicates, 6818 abstracts were reviewed, 939 full text articles were evaluated and 70 articles were included in the final analysis. The 5 themes identified are:

1. Definitions of a UG portfolio
2. Designing a UG portfolio
3. Components of a UG portfolio
4. Portfolio as a form of assessment and
5. Advantages and Disadvantages of portfolios.

**Conclusion:** Portfolios play an increasing role in undergraduate medical education (Dolan et al., 2018). Portfolios can enhance learning through stimulating reflection (Dannefer, 2013) and critical thinking (Sheng et al.), while providing a platform for student-centred learning.

The portfolio has proven to be a powerful and valuable assessment method through this study. The flexible nature of portfolios allows its use in a wide range of contexts. It may be easily adapted to suit different requirements. The material chosen to be included in a portfolio may be for formative or summative purposes, and these may reflect qualitative or quantitative information about a student (Fida & Shamin, 2016). Besides being highly individualised, portfolios also allows assessment of progress over time. When implemented properly, portfolios provide greater ability to assess students holistically (Challis, 2001) compared to other traditional forms of assessment.
As the portfolio is a relatively novel method of assessment, there are several limitations and difficulties in its implementation. The portfolio process is resource-intensive (Burch & Seggie, 2015) requiring a significant amount of time to compile and to train assessors. A crucial balance needs to be achieved between individualisation and standardisation of portfolios, which will impact the authenticity, reliability and validity of portfolios (Haffling et al., 2010). Currently, receptiveness towards the use of portfolios is mixed. The success of portfolios as a form of assessment is highly contingent on appropriate implementations of it (Azer, 2018). Hence, there needs to be further research conducted to realise ways to circumvent issues related to the implementation of portfolios, and how to better incorporate them into medical education.

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Facilitating a learning community during a pandemic: 
Confession of a learning community facilitator

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Sub-theme
Community of Learning

Keywords
Learning communities, COVID-19, online community of learning, synchronous discussions, asynchronous discussions.

The constructivist approach views learning as “knowledge creation within individual minds and through social activity” (Cross, 2009, p. 31). Therefore, communities play an important role not just for student learning, but also in improving teaching effectiveness. Rosenholtz (1989) highlighted the importance of “support by means of teacher networks, cooperation among colleagues, and expanded professional roles” in improving teaching quality (Hord, 1997, p. 3). Cox (2004) described how the creation of faculty learning communities at a major American university was effective for faculty professional development.

In 2020, the National University of Singapore (NUS) made available a number of teaching enhancement grants to fund learning communities whose purpose is “to engage in focused and sustained discussion of specific aspects of university teaching that relate to a topic of mutual concern to the group” (National University of Singapore, n.d.).

TEG Learning Community projects have a one-year duration beginning 1 April 2020. These projects were quickly disrupted when Circuit Breaker came into force on 7 April 2020. At present, measures are put in place to ensure the safety and wellbeing of the entire NUS community, including social distancing and zoning to prevent intermingling among different segments of the campus community.

In this presentation, I argue that social distancing, though necessary in light of the COVID-19 pandemic, runs contrary to the spirit of learning communities. Teaching and academic exchanges—including learning community meetings—have been able to continue virtually, and technology may have, to some extent, allowed for greater flexibility. However, as Kim (2020) wrote when commenting on in-person attendance...
at academic conferences, “[k]nowledge and techniques are not the only things that scholars share; attendees have a chance to network, thereby connecting personal and academic advancement” (p. 287). In other words, Kim (2020) asserts the importance of face-to-face communication in academic culture that cannot be replicated in online environments. Just as some benefits of in-person attendance at conferences are lost when transitioning to virtual conferences, so also virtual learning communities—I would argue—are much less effective than in-person learning communities. In fact, many of the original and important outcomes of faculty learning communities that Cox (2004) outlined, especially with respect to faculty professional development, promoting faculty personal wellbeing and development of teaching expertise, appear to be lost when physical learning communities are substituted with online learning communities.

Khalili’s model of creating an online community of learning, although meant to address pedagogical challenges instructors face, may nonetheless be a helpful reference in thinking about how to best organise, facilitate and sustain learning communities during this pandemic. The model, which Khalili (2020) explains as an application of Gilbert and Dabbagh’s (2005) model of Meaningful Discourse and Garrison and Vaughan’s (2008) Community of Inquiry Framework, is best represented by Khalili’s own illustration (see Figure 1).

The lack of in-person interaction in learning communities may be best addressed by maintaining social presence through asynchronous communication. Microsoft Teams is one such platform utilised to encouraging meaningful discourse and maintain a community of inquiry. However, in my own experience, maintaining social presence through asynchronous communication in a faculty learning community is exceedingly challenging as colleagues may already have to juggle between various roles and responsibilities in other online, work-related communities. Other ongoing, emergency or unexpected but pressing commitments, as well as various personal and professional issues that learning community members face during this time of uncertainty, also pose challenges to their learning community.
This presentation is my personal reflection as a facilitator of an existing learning community at NUS. The PechaKucha presentation will describe the following:

- Disruptions to the Learning Community Project
- Modes of online communication (synchronous and asynchronous) and their effectiveness
- Personal challenges as a facilitator

References


Mentoring In Palliative Medicine In The Time Of Covid-19:
A Systematic Scoping Review On Combined Novice, Peer-Near-Peer,
E-Mentoring And Inter-Professional Mentoring

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Sub-theme
Community of learning, curricular change, engagement of online materials

Keywords
Mentoring; interprofessional mentoring; e-Mentoring; peer mentoring; near-peer mentoring

Background. The COVID-19 pandemic has had significant ramifications upon clinical education. Minimal face-to-face meetings, limited clinical support from redeployed mentors, and changing educational and training goals have compromised mentoring relationships and jeopardised existing mentoring programmes that mostly depend on face-to-face meetings. With many mentees lacking support and various mentoring projects suspended, there is urgent need to address prevailing limitations caused by the pandemic. The evidenced effectiveness and quality of combined novice, peer-, near-peer and e-mentoring (CNEP) and interprofessional mentoring (IPM), together with the proven benefits of interprofessional collaboration in Palliative Medicine (PM), have seen CNEP-IPM posited as possible solutions to current and possible constraints in conducting PM training amidst the pandemic. The key research question we aimed to address was: Is CNEP viable for IPM?
Methods. With little known about this form of mentoring, a systematic scoping review (SSR) was carried out, studying published accounts of IPM and CNEP. Independent searches of 7 bibliographic databases (PubMed, Embase, PsycINFO, ERIC, Cochrane, Google Scholar, Scopus) and 5 grey literature databases (GreyLit, OpenGrey, Web of Science, Mednar, OpenDissertations) were carried out. The Systematic Evidence Based Approach (SEBA) was adopted to enhance the trustworthiness, transparency and reproducibility of the SSRs. The SEBA process comprises five stages: 1) the Systematic Approach; 2) the Split Approach; 3) the Jigsaw Perspective; 4) the Reiterative Process; and 5) Discussion. The expert team was consulted at each stage of the SEBA process. Three independent teams of researchers then used tabulated summaries, thematic and content analysis of included articles to concurrently analyse the data using a ‘split approach’.

Results. A total of 15121 abstracts were reviewed, 557 full text articles were evaluated, and 93 articles were included. Concurrent content and thematic analysis revealed 4 themes/categories: characteristics and stages of IPM and CNEP mentoring, the roles of the host organisation, and assessment methods. The data garnered suggests that CNEP and IPM have similar mentoring stages—shared goals, codes of conduct, use of continuous assessments and a nurturing mentoring environment that is overseen by the host organisation—which are features consistent with the critical aspects of novice mentoring. Thus, the analysis successfully maps prevailing accounts of CNEP and IPM, and provides insight into the overarching similarities as well as unique features of both IPM and CNEP mentoring, forming the basis for the forwarding of a CNEP-IPM approach in PM.

Conclusions. This SSR evidences the viability of a CNEP-IPM approach and forwards an evidence-based framework for the design, implementation and evaluation of a CNEP-IPM mentoring program. The similarities and unique characteristics of CNEP and IPM complements and supports each other and novice mentoring in filling its gaps and limitations, making a strong case for simultaneously applying a CNEP-IPM approach in order to reap the most benefits from available resources. This paper’s findings also confirm that CNEP and IPM have evolved from novice mentoring roots, and thus a CNEP-IPM approach may be used to support novice mentoring relationships in the COVID-19 era and beyond, when access to senior physician mentors are expected to remain limited. Further research into the program design, mentoring process, mentoring relationship, and the validation of robust evaluation tools is still required to further improve the effectiveness of CNEP-IPM mentoring in PM.

References


Poster
Gallery
Team-Based Learning With Zoom Breakout Rooms To Improve Online Learning Engagement

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Sub-theme
Engagement with online materials

Keywords
Engineering education; team based learning (TBL); participant-to-instructor engagement; online learning; Zoom breakout rooms

The year 2020 might have witnessed the biggest leap in education in recent human history. Never before has there been a concerted global effort to digitise education. In Singapore, prior to the COVID-19 pandemic, many schools and educators have relied on traditional pedagogies that are teacher-led and lecture-based. One negative consequence is that “in the traditional classroom learning environment, participants are simply passive” (Singteach, 2010). While lecture-based teaching has been widely criticised due to its lack of participant engagement (Mennenga, 2013; Di Leonardi, 2007), a number of studies have documented team-based learning (TBL) as being a transformative instructional approach with team processes at its core (Sisk, 2011). The advantages of TBL include better academic performance, greater engagement, and greater participant satisfaction (Frame et al., 2015; Zgheib et al., 2016; Thomas & Bowen, 2011; Vasan et al., 2011; Sisk, 2011).

For engineering modules in Singapore, which comprise mainly calculations and physics-based learning, students always find it very ‘dry’ to learn, and they usually study in silos. An exploratory study to implement TBL in tutorial sessions of an Engineering Thermodynamics module was conducted by the author in 2018 and 2019 pre-COVID. The research have shown that TBL provided students with a better understanding of the academic content. 87% of the students also exhibited a positive attitude in working with their peers.

However, as COVID-19 infections escalated on a global scale, almost all schools in Singapore were forced to go virtual. McAvinia's (2016) review of the challenges and disappointments of online learning has shown that historically, virtual learning environments were predominantly used to “store and disseminate course materials, rather than being interactive learning environments, or providing classroom-like activities online” (Blin & Munro, 2008; Conole, 2004; Donnelly & O’Rourke, 2007; Palmer & Holt, 2009; Stiles, 2007). In
addition, there are “fewer institution-wide or systemic studies” measuring effectiveness (Bliuc et al., 2007; Guri-Rosenblit & Gros, 2011). Thus, there was an urgent need for educators to quickly adopt a teaching delivery method for home-based learning that was appropriately engaging.

Leveraging on TBL, a proven teaching pedagogy, the researcher conducted an exploratory study to implement TBL with Zoom breakout rooms in tutorial sessions of an Engineering Thermodynamics module during the COVID-19 pandemic period. A TBL sequence typically consists of participant preparation, readiness assurance, and application stages (Sibley & Ostafichuk, 2015). Students were randomly assigned to groups of five in the Zoom breakout rooms to complete the readiness assurance tests, which comprised multiple-choice questions (MCQs) displayed via LumiNUS Quiz. After participants have completed the tests, a mini-lecture expanding on the content learned was offered. By doing this online, it helped facilitate the development of participants from being passive consumers of knowledge into active producers of knowledge who were individually accountable and intrinsically motivated to contribute in the online class. Through the knowledge application process, participants actively asked questions of themselves and their peers as they co-created knowledge. These lessons, as Michaelsen (2008) noted, are due to learners having the opportunity during the TBL process to actively repeat the knowledge acquisition and application cycle several times in an interactive online setting.

A questionnaire survey was conducted to understand students’ perceptions of the intervention. The research indicated that the majority of the participants agreed or strongly agreed that TBL with Zoom breakout rooms were more engaging as compared to other online teaching modes practiced during the pandemic. The students were also positive towards working with their peers online. The results of the final exam also indicated that the learning outcomes were not compromised by the sudden shift to online learning, and in fact the number of students who scored in the lower grading tier (including “D+”, “D” and “F”) dropped to 4.73%; the comparison with the past few semesters is illustrated in Figure 1. However, more work remains to be done to adjust TBL in order to better fit in the module’s calculations and physics-based components in online learning settings.


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Blended learning approach for faculty development workshops during COVID-19

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Sub-theme
Community of learning

Keywords
blended learning, faculty development, online, medical and health professions education

1) Background

The COVID-19 pandemic has led to strict measures limiting large group gatherings. Despite these limitations, the Centre for Medical Education (CenMED) continues to prioritise faculty development and enrichment.

A rapid systematic literature review suggested that pivoting to online delivery modes made up 53% of educational development due to COVID-19. (Gordon et al., 2020) From April 2020, CenMED shifted from holding face-to-face workshops to a taking a blended learning approach. For the latter, participants were given access to CenMED scholar (a centralised collection of online resources), to complete their self-learning online modules. This was followed by 3 to 5 hour long interactive webinars via Zoom with resource persons and participants.

In this study, we aim to evaluate the participants’ feedback on blended learning and compare it to previous face-to-face workshops.

2) Methodology

Participants had to complete an online questionnaire comprising of 10 questions after the workshops. The self-administered questionnaire included open-ended questions to obtain qualitative findings on participant views regarding the use of Zoom, and closed-ended questions (5-point Likert scale) to
determine the perceived effectiveness of the workshop. Results were compared to those of a similar questionnaire conducted in 2019.

3) Key findings

From the 6 workshops identified, a total of 111 and 100 responses were obtained in 2020 and 2019 respectively. In both years, more than 75% of participants rated the content presented and usefulness of the workshops as “excellent” or “good”.

Across the 6 workshops conducted via a blended learning approach in 2020, more than 70% of participants rated the online interactive session as “excellent” or “good”. Qualitatively, there were 10 positive comments on the use of breakout rooms, stating that they were “interactive” and promoted “small group discussion”. One participant stated that it provided “more in-depth discussions to help integrate the information together”.

When asked on areas for improvements, 5 participants commented on the inclusion of more breakout sessions and 6 commented on the importance of the facilitator in such breakout sessions. One stated that the “facilitator [is] important in encouraging discussion and participation”. There were no comments suggesting the need for face-to-face interactions with a facilitator. Time was also frequently stated to be either “insufficient” or a “problem”.

Ratings on the participants’ perceived confidence in skills obtained from the workshop were varied. Comparing between 2019 and 2020, the difference in excellent or good ratings in 4 out of the 6 workshops were within 15%. However, there was a 27% increase in good or excellent ratings in Technology Enhanced Learning (TEL) workshop but a 31% decrease in the Use of Portfolio in Assessment and Learning (Portfolio) workshop. The quantitative responses failed to shed light on this observation, hence a comparison of the programs between the two years was conducted. Both workshops had shortened virtual sessions to keep participants engaged, yet the findings were highly contrasting.

4) Significance of the study

Our study suggests that the blended learning approach made minimal changes to the participants’ satisfaction levels. The breakout sessions were well-received as they provided a form of interaction between participants and facilitators. This suggests the importance of equipping our facilitators with the necessary skills to keep our participants engaged.
Our findings also suggested that for some workshops (e.g. TEL), a blended learning approach is relevant and appreciated by participants. For others (e.g. Portfolio), face-to-face interaction is preferred as it provides an opportunity for reviewing work done.

To conclude, while the blended learning approach continues to be suitable for CenMED to facilitate faculty development; there are specific workshops which face-to-face settings are preferred and vice versa.

References
Performance $= f(Engagement)$? A Preliminary Study on the correlation between class engagement and student grades

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Sub-theme
Engagement with online materials

Keywords
Zoom lecture engagement; attendance; participation; student-performance

Class attendance substantially affects learning and raises concerns about the real impact of attendance on knowledge acquisition (Romer, 1993; Crede et al., 2010; Traphagan et al., 2010). In online learning, in-class quizzes (Young, 2008) and discussion forums (Darby, 2020) are considered effective mechanisms for keeping students engaged and guiding their learning through formative assessments.

Online (a)synchronous teaching due to the ongoing pandemic has created opportunities to quantify and model aspects of student learning that were hard, if not impossible, to implement earlier—for example, tracking class attendance and participation. In this study, we correlate the students’ class engagement and performance. We hypothesise that class engagement promotes better student learning and better performance in students’ grades. The research question is:

Does better class engagement in online learning result in better student performance?

Method:
Here, we report our initial observations in two software engineering modules in the School of Computing at NUS (Table 1). In CS2113, students are engaged via pre-lecture short videos, a web-based textbook, and synchronous lectures focusing on hands-on activities. For CS3219, students attend weekly synchronous Zoom lectures covering theoretical and hands-on topics. The Zoom recordings of the lectures are made available for each session in both modules.
Table 1

*Modules involved in this study*

<table>
<thead>
<tr>
<th>Module</th>
<th>Level</th>
<th>Code</th>
<th>Class Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software Engineering and Object-oriented Programming</td>
<td>2000</td>
<td>CS2113/T</td>
<td>218</td>
</tr>
<tr>
<td>Software Engineering Principles and Patterns</td>
<td>3000</td>
<td>CS3219</td>
<td>126</td>
</tr>
</tbody>
</table>

We used the class participation data, comprising Zoom meeting data (see Table 2) for four lectures from the ongoing semester in each of the modules as an indicator of student engagement.

Table 2

*Zoom meeting report snapshot for one student*

<table>
<thead>
<tr>
<th>Name (Original Name)</th>
<th>User Email</th>
<th>Join Time</th>
<th>Leave Time</th>
<th>Duration (Minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anonymous Anthropoid</td>
<td><a href="mailto:anon@u.nus.edu">anon@u.nus.edu</a></td>
<td>08/27/2020 01:42:46 PM</td>
<td>08/27/2020 03:52:10 PM</td>
<td>130</td>
</tr>
</tbody>
</table>

In CS2113, we used the continuous assessment (CA) component (Poll Everywhere quizzes). For CS3219, we captured student participation in post-lecture forum posts (LumiNUS).

**Initial Results and Discussions:**

For CS2113, we took the average attendance (minutes) over the weeks and reported its correlation with the total score received in the in-lecture quizzes (Figure 1). We observed a positive correlation between the two. Students who attended the lectures for less than 30 minutes on average secured lower marks than those who attended the entire lecture.
Next, we analyze the class attendance in both modules for each of the four lectures and students’ performance in the CA tasks. About 80% or more attendees attended the full lecture in CS3219 (Figure 2). Students had to answer post-lecture questions on the discussion forums, and nearly all who attended the lecture did so. Figure 3 shows the total duration of student attendance for four lectures. About 75% of students attended more than half of the total lecture duration, averaging about 80 minutes per lecture. The data also shows that seven students have not attended any lectures.

In CS2113, over 77% of the cohort attended the full lecture (Figure 4). We computed the average scores for students who participated in the class for different time durations (Figure 5). For example, the average score of students who attended Lecture 5 for 90-115 minutes was 2.2/4 marks. Students who attended the full lecture secured higher CA marks.

**Other Observations:**

Students who consistently missed lectures were easily discernible from the Zoom meeting reports, giving lecturers the opportunity to initiate interventions at an early stage.

Some students are grade-driven rather than knowledge-driven, e.g., students who attempted the CA tasks to secure marks even though they missed the lectures. However, we need to gather more evidence before we make an concrete evaluations about this behaviour.

In conclusion, we have early evidence that there is a positive correlation between students’ class engagement and CA performance. Analysing the engagement-performance correlation allows us to
identify and intervene if students are not attending lectures or not doing well in the formative assessment. Also, presenting such concrete evidence may motivate students in subsequent cohorts to be actively engaged in their classes.

**Figure 2.** Lecture attendance in CS3219 and number of posts

**Figure 3.** Total attendance duration in CS3219

**Figure 4.** Lecture attendance in CS2113.

**Figure 5.** Scores (class average) obtained by students

Going forward, we plan to analyse Zoom meeting reports for all the lectures and correlate them with students’ end-semester grades. We also hope to find more insights into student learning behaviours.

Further, we hope this study forms the basis for longer term longitudinal research on improving class engagement to enhance student learning and knowledge retention.
References


Moving Student-led Teaching and Learning Activities Online in Unforeseen Circumstances: Student and Instructor Experiences on the Use of Technology

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Sub-theme
Community of learning, pedagogical change

Keywords
Reciprocal teaching; peer-learning; emergency remote teaching; online conferencing platform

To encourage active- and self-directed learning, we introduced student-led teaching, based on the idea of reciprocal teaching (Palinscar & Brown, 1984), in two third-year Life Sciences modules in January 2020. Specifically, students took turns to present assigned learning materials during classes. They were assigned to groups of three or four for the presentations and those not presenting had to ask questions in class. This collaborative-learning approach was to improve cognitive engagement of our students to enhance their learning outcomes (Chi & Wylie, 2014). When it came to the learning materials for LSM3224 “Molecular Basis of Human Disease”, we selected research articles and reviews that were relevant to the module. For LSM3226 “Medical Mycology and Drug Discovery”, student-led teaching involved students discussing their experimental data obtained from their mini-projects. We also provided question prompts to scaffold students in their reciprocal teaching.

Due to the COVID-19 outbreak, face-to-face lessons were suspended, and lessons were switched to emergency remote teaching (ERT, Hodges et al., 2020) using the online conferencing platform Microsoft (MS) Teams. We had a total of five face-to-face and four 4 synchronous online sessions throughout the entire semester.

After the semester, we conducted student perception surveys to understand their learning experiences, comparing the face-to-face classes with online classes before and after the outbreak. From the 10 responses out of a total of 29 students across both modules, five respondents thought there was reduced levels of engagement in the online sessions, although seven respondents felt that the online lessons were no more difficult to follow compared to face-to-face ones (Figure 1). The perceptions of interactions among classmates were spread across the scale. Majority respondents perceived having better opportunities for asking questions online. We also noted a higher number of questions posed by each student during the online sessions (Figure 2). This was not statistically significant and showed a small effect size (0.34).
respect to question counts as a whole class during the online sessions, there was also no statistically significant difference as compared to face-to-face sessions; however, a large effect size (1.22) was observed.

In their qualitative comments, students responded that through the chat functions, they were able to share materials easily and ask questions with greater confidence. Negative aspects highlighted by students included internet connectivity problems, distractions at home and a preference to communicate face-to-face.

![Student perception survey results.](image)

In terms of instructor perceptions of making an unexpected switch to online classes, as we were fairly tech-savvy, we did not face difficulties using MS Teams. We initially thought that it would be technically challenging for students. Also, with the lack of visual and non-verbal cues from students, we anticipated difficulties engaging them in the remote setting.

Surprisingly, the outcomes turned out better than expected. We observed students actively participating either verbally or using MS Team’s chat function to pose questions to their peers who were presenting, again, consistent with our records (Figure 2). Moreover, some students took the initiative to seek extra information and materials, and they shared their findings with the class in real-time. When students presented data from their mini-projects, we were able to visualise their thought processes behind the
Higher Education Campus Conference (e-HECC) 2020

in conclusion, the number of respondents was low because we had small classes, the overall experiences reported by the students in the face-to-face versus the online sessions were not as negative as we feared, though there were aspects that the students perceived negatively. The instructors observed student behaviours that were encouraging even though these might not match the students’ perceptions. Certain positive outcomes of our ERT experiences were likely due to our small class sizes and the reciprocal teaching format of our lessons. The screen-sharing and online platform likely enabled engagement and provided students with a safe environment to express themselves. Nonetheless, it is intriguing to observe different preference of learning styles though there needs to be a further understanding of student

![Bar chart showing count of questions asked by students in five face-to-face versus four online sessions.](image)

**Figure 2.** Count of questions asked by students in five face-to-face versus four online sessions.

<table>
<thead>
<tr>
<th></th>
<th>Face-to-face sessions</th>
<th>Online sessions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average count of questions asked per student</td>
<td>4.25 ± 3.3</td>
<td>5.35 ± 6.3</td>
</tr>
<tr>
<td>(n=21 students)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>t-test p-value</strong></td>
<td>0.527</td>
<td></td>
</tr>
<tr>
<td><strong>Glass's Δ Effect size</strong></td>
<td>0.34</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Face-to-face sessions</th>
<th>Online sessions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average count of questions asked by whole class</td>
<td>17.0 ± 8.0</td>
<td>26.8 ± 19.6</td>
</tr>
<tr>
<td>(n=21 students)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>t-test p-value</strong></td>
<td>0.377</td>
<td></td>
</tr>
<tr>
<td><strong>Glass's Δ Effect size</strong></td>
<td>1.22</td>
<td></td>
</tr>
</tbody>
</table>
learning experiences for a larger sample size during ERT so as to provide better learning outcomes.

References


Optimising the Use of Peer Assessment in the Teaching and Learning of Patient Presentation Skills

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Sub-theme
Community of learning

Keywords
Peer assessment, patient presentation, pharmacy skills, online learning

Abstract
Pharmacists, as part of their professional practice, are required to present patient information and therapeutic plans to colleagues and other healthcare providers (American College of Clinical Pharmacy [ACCP], 2014; Singapore Pharmacy Council [SPC], 2018a). As such, pharmacy students must demonstrate competency in such skills prior to registration, per competency standards set by the Singapore Pharmacy Council (SPC, 2018b).

At the National University of Singapore (NUS), undergraduate pharmacy students learn patient presentation skills in the module PR3137 “Pharmacy Professional Skills Development III”, in which technology creates an authentic learning environment where students review patient information using mock electronic medical records. Peer assessment has been used as a pedagogical strategy for teaching patient presentation skills since Academic Year (AY) 2017/18. It had been identified as an important facilitator of positive learning outcomes in higher education (Schneider & Preckel, 2017), and had been implemented in many pharmacy education contexts (Storjohann et al., 2015; Bartelme & Brown, 2016). When used for the teaching and learning of patient presentation skills, peer assessment promotes self-reflection, facilitates peer interaction, and allows individualised feedback (Han & Chan, 2020). However, the optimal way to use peer assessment to foster a community of learning and its impact on student learning have not been explored.
Methods

Traditionally in PR3137, each student submits a 10-minute patient presentation audio recording before the tutorial. They would then conduct one-to-one anonymous peer assessment of a peer's patient presentation using a standardised rubric after the faculty had discussed the patient case and therapeutic plans during the tutorial. They could submit the audio recording and anonymous peer assessment online through the University’s learning management system. Conducting peer assessment after the faculty-led discussion ensured that students were familiar with specifics of the patient case when assessing their peers. However, some students felt that the peer assessment did not add value because they already realised their mistakes from the tutorial.

In AY 2019/20, the class (N = 165) was randomly divided into two groups. Group 1 (N = 82) completed the peer assessment before the tutorial, reviewed the feedback and amended their presentations during the tutorial. Group 2 (N = 83) completed the peer assessment after the tutorial as in previous AYs.

Results

Group 1 did not find assessing their peers more challenging as compared to Group 2 (37% versus 45%, p = 0.3). In their qualitative comments, students in Group 1 generally mentioned that peer assessment facilitated self-reflection, identification of their own mistakes, and encouragement from knowing that their comments helped their peers improve, whereas students in Group 2 largely commented on reinforcement of knowledge from the tutorial. Students from both groups commented that peer assessment allowed them the unique opportunity to realise how their peers think, and to learn from their strengths and areas for improvement. Patient presentation marks collated from the end-of-semester summative assessment were comparable between the two groups (70% versus 71%, p = 0.8).

Significance

While this study reported on using peer assessment to teach patient presentation skills, it is also applicable to educators in general since peer assessment is widely used in various disciplines in higher education (Schneider & Preckel, 2017). The findings affirmed that peer assessment fosters a community of learning where students learn from and could contribute to the learning of their peers. Additionally, this study suggests that using peer assessment may be optimised when educators challenge students to assess their peers without faculty-led discussion, and allow opportunities for peer feedback to be implemented. In doing so, students receiving feedback are motivated to reflect on their own mistakes, and those providing the feedback are encouraged by their contributions to improving a peer’s work. Future studies may further explore how optimising the use of peer assessment may improve individual student performance in summative assessments.
References


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Academic coaching of medical students during COVID-19 pandemic

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Sub-theme
How do we effectively support students in engaging with materials in the context of digital education and online tools?

Keywords
Academic coaching, master adaptive learning, effective learning strategies

Background: Social distancing measures due to the COVID-19 pandemic required many medical schools to adapt existing on-site medical education activities to delivery via online platforms. The sudden switch to a new, unfamiliar model of learning led to additional challenges for students. We observed that students requiring academic support often had ineffective learning strategies, poor motivation, and suboptimal communication skills, all of which were magnified by home-based learning. In addition, several papers have documented the adverse psychological impact of COVID-19 on university students (Cao et al., 2020; Sundarasen et al., 2020). Therefore, it necessitates a structured, virtual academic coaching programme to engage these students and to address specific challenges that arose from our adapted educational programme. This abstract describes the structure of the programme and its preliminary outcome.

Methods: We adopted Master Adaptive Learning (MAL) as the conceptual framework for our coaching programme to enhance students’ capabilities as adaptive learners (Cutrer et al., 2017). The framework, consisting of four phases - Planning, Learning, Assessing, and Adjusting, are embedded within the programme. It involves a team of core teaching faculty and two academic coaches. In this system, (a) academic coaches undertake real-time tracking and analysis of students’ academic performance, and update core faculty, (b) appropriate faculty address content-specific matters, (c) academic coaches concurrently target students’ individual study habits and learning strategies, and (d) regular follow-up 30-minute meetings between academic coaches and students are scheduled for accountability, reflection, and feedback.

Specifically, the academic coaching component of the programme emphasizes (i) self-reflection (ii) specific, measurable, achievable, relevant, and time-based (SMART) goal-setting, (iii) development of comprehensive study plans with deliberate use of effective learning strategies including spaced, retrieval practice and elaboration, and (iv) self-care.
**Findings:** COVID-19 led to the digital transformation of teaching activities, demanding adaptive approaches in education. Our programme provided a strong support network for students during these challenging times. Teaching faculty supported the streamlined, collaborative approach as academic coaches offered timely oversight and early identification of students requiring support. Students in the programme favoured proactive support. Many acknowledged that individualized goal-directed study plans and follow-up meetings kept them accountable, reflective and motivated, and guarded against the use of ineffective learning strategies. With time, some students invariably experienced declining motivation and difficulties adhering to a study plan. At such times, it was important for coaches to help students reprioritize, troubleshoot and re-work study plans while encouraging a deliberate holistic approach that included self-care and mental wellness. Importantly, we observed noticeable improvements in their overall academic performance and started to see increasing numbers of students proactively utilizing programme resources to optimize their individual learning journeys.

**Significance of the study:** The two-pronged approach facilitated by core faculty and academic coaches allowed us to evaluate students holistically and provide a customized academic support plan. The regular and short-interval engagement with students during social isolation circumstances allowed them to feel safe reaching out for help. This model of academic coaching informed by theory supports students and empowers them with skills necessary for effective learning, adapting, and thriving in a healthcare environment challenged by uncertainty and ambiguity.

**References**


Student Engagement in Online Learning

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Sub-theme
Engagement with online materials

Keywords
In-class engagement, online learning, social presence, teaching presence

Rationale and Aims
Online learning had been gaining traction even before the COVID-19 pandemic abruptly forced schools worldwide to move their classes online (Martel, 2020). In 2019, 83% of higher education school administrators indicated that their institutions were seeing higher demand for online courses, and 49% anticipated raising their budgets for online programmes (Venable, 2020).

In fact, it would not be surprising if the popularity of online learning continues to increase beyond this pandemic. One reason for this is that online learning has significant benefits over physical lessons. For example, holding classes online offers a measure of flexibility to students with existing commitments that prevent them from attending in-person classes (Venable, 2020). Another reason is that educators are increasingly able to effectively facilitate students’ learning through online platforms due to the constant development of new technologies. In Bastrikin’s (2018) study, 85% of undergraduate and graduate students reported that their distance learning experience was at least as good as, or even better than, their classroom-based experience. As more courses are being taught online, it is crucial to gain a deeper understanding of their effectiveness.

Unfortunately, research focusing on online learning invariably suffers from the effect of self-selection, whereby students who choose to enrol in online classes possess certain attributes that are likely to make online learning a positive experience for them (Simon & Yatrakis, 2002). However, with many universities arranging for most of their students to attend online classes during this period, it provides a timely opportunity to study online learning without the self-selection bias.
Earlier this year, in a survey conducted in response to the COVID-19 crisis, university presidents rated student engagement as the largest obstacle associated with moving in-person classes online, with 81% of respondents rating the move as somewhat challenging or very challenging (Inside Higher Ed, 2020). As such, in-class student engagement has been chosen to be the focus of this study on online learning. More precisely, this study seeks to uncover possible determinants of in-class student engagement in the context of online learning—for instance, students’ ambient environment where they take their online classes; loneliness; and their perception of social presence and teaching presence in the class.

Methods

An online survey was administered to undergraduate students taking an organisational behaviour class at a large university in Asia (n=200). The course is being taught fully online due to COVID-19 social distancing measures. The survey comprised a mix of established, adapted, and self-proposed scales to measure the different constructs. It also included questions about the practical aspects of students’ classes so that we can derive real-life applications from this research.

Key Findings

Multiple regression was conducted on the standardised values of some variables with gender as a control variable. The results are shown in Table 1 below.
Table 1  
Results of regression analysis

<table>
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<tr>
<th></th>
<th>In-class Engagement</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Model 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B</td>
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<tr>
<td>Intercept</td>
<td>7.144E-15</td>
<td></td>
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</tbody>
</table>

**Controls**

<table>
<thead>
<tr>
<th>Factor</th>
<th>B</th>
<th>β</th>
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<tbody>
<tr>
<td>Gender</td>
<td>-.080</td>
<td>-.046</td>
</tr>
</tbody>
</table>

**IVs**

<table>
<thead>
<tr>
<th>Factor</th>
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<th>β</th>
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<tbody>
<tr>
<td>Loneliness</td>
<td>-1.194</td>
<td>-1.720**</td>
</tr>
<tr>
<td>Social Presence</td>
<td>2.143</td>
<td>1.777**</td>
</tr>
<tr>
<td>Teaching Presence</td>
<td>.204</td>
<td>0.121*</td>
</tr>
<tr>
<td>Webcam</td>
<td>.084</td>
<td>0.086*</td>
</tr>
<tr>
<td>Class Activities</td>
<td>.062</td>
<td>0.054</td>
</tr>
<tr>
<td>Ambient Environment</td>
<td>.086</td>
<td>0.050</td>
</tr>
</tbody>
</table>

Adjusted R² 0.677

N = 200, *p < 0.05 ** p < 0.01

The results show that social presence, teaching presence and having one’s webcams on (both students’ and instructors’) during lessons significantly increase in-class engagement. Loneliness, on the other hand, reduces engagement. Other factors, such as conducting class activities during online lessons via group activities, or using external technologies like Kahoot! or Archipelago did not significantly affect in-class engagement.
Some supplementary analysis was also done to capture students' attitudes towards online classes. The results are shown in Figure 1 below.

The results show that majority of respondents have high segmentation preference, which measures the degree to which students prefer to keep their home and academic life separate. It also shows that a majority of respondents think that online classes are more convenient than face-to-face ones, but they fail to be as effective as in-person classes. Overall, more students still prefer in-person to online classes.

**Significance**

Results from this study would allow course instructors to better understand the factors that affect in-class engagement in the context of online learning and thus take concrete steps towards improving the experience for students. Universities may also be able to better support students taking online classes by providing the necessary infrastructure to optimise their learning experience. Lastly, with this information, students can change their habits or behaviours to achieve their desired learning outcomes.
References


Teaching lab-based engineering remotely

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Sub-theme
Pedagogical Change

Keywords
Engineering, lab-based, systems thinking, large classes, tutor and teaching assistant training

The Faculty of Engineering introduced several new core modules for undergraduate students as part of a curriculum revamp. One such module is IE2141 Introduction of Systems Thinking and Dynamics which introduces the following new challenges:

a. Engineering students are used to carrying out analysis. This module will challenge them to think differently i.e. holistically and from a systems perspective.

b. Engineering modules usually have a lab-based component. The challenge here is to conduct labs without face-to-face engagement.

c. A large class-size of about 600 students in an e-learning environment.

d. Engineering faculty and teaching assistants are usually not familiar with systems thinking concepts and materials. Teaching assistants are especially important as students perceive them to be more approachable and accessible. (Lynch & Pappas, 2017).

In this paper, the author hopes to provide some answers to the above challenges:

a. A systems dynamics modelling methodology is introduced to ensure that students include most of the elements involved in systems thinking and simulation. This includes: defining the problem and purpose of the model, analyzing the stakeholders and boundaries, and coming up with the causal factors. The projects given were complex in nature without clear solutions (e.g. minimizing diabetes in Singapore). The aim is to help engineering students see beyond engineering solutions to also consider economic, social and environmental issues.

b. As lab sessions are software based, sufficient licenses have to be purchased for each student. Training sessions were held for teaching assistants to know when to pause and when to ask
questions. Students were also able to use their microphone or “Chat” function to ask questions. To preserve the flow of the session, additional teaching assistants were on hand to answer any “Chat” questions. Subsequently, break-out sessions using Zoom were held in groups of 5 to discuss more specific queries concerning the lab.

c. Various modes were used to cater to the class-size. For lectures, animated videos were employed. Surprisingly, students did not like the text-to-speech conversion possibly due to the foreign accent used. Additional e-sessions were scheduled after every few lectures to clarify the students’ queries and doubts. Labs and tutorial sessions were divided into groups of 50 for better e-classroom interactions. Additional sessions were also created to assist students with project-related problems.

To minimize frequently repeated questions, all required module information was provided at the start of the course. This included learning outcomes, lecture materials, assignments, and assessment rubrics. Having a list of FAQs is also helpful (Lemke, 2020). To facilitate marking, templates and rubrics were given for all assignments, and multiple choice questions in LumiNUS Quizzes to test student knowledge (Lake 2020). Project reports and e-video presentations requiring evaluation of skills learn and applied were the most time consuming to mark. The e-video presentations enabled students to improve their presentation skills by reviewing their performances multiple times before submission. This format allowed more time and flexibility for marking.

d. Briefing and training sessions were held for tutors and teaching assistants on the content and conducting of the module. Feedback was given to teaching assistants on the conduct of their lab sessions. This is especially important since many teaching assistants have little prior experience and knowledge of the content (Nikolic et al., 2015). Weekly announcements were made to both students and tutors/teaching assistants on the preparations for the following week. The LumiNUS Forum was a useful platform to answer questions. Additional teaching points were covered using LumiNUS’ Announcements feature.

As the module is on-going, key findings will only be available at the time of presentation. We hope that the findings will help inform on the conduct of:

a. systems thinking to engineering students
b. lab-based modules via e-learning
c. large classes via e-learning
d. preparing tutors and teaching assistants on unfamiliar topics
Evidence for the above will be collected primarily through surveys of the students and tutors/teaching assistants at the end of the module.

References

