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Transformation on the run—Digitising medical education during the COVID-19 pandemic

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Abstract

Introduction: The article is a succinct summary of events and process for emergency digitisation and transition to remote teaching during the COVID-19 pandemic. The challenges of such transition included the need for enhanced infrastructure facilities, compliance to directives from regulatory bodies, providing an equivalent learning experience in the virtual learning environment (VLE) and ensuring the end user capacity to utilise the VLE created.

Methods: To accomplish this task a suitable instructional design and transition model was utilised to create an integrated Moodle and Microsoft Teams platform as the VLE. The curriculum was recreated in the VLE through review of existing infrastructure and resources, deconstructing the demands of the curriculum, reconstructing the learning experiences of curriculum in VLE and innovating to improve. The end user training was also provided using the same VLE created, which ensured capacity building. Virtual Clinical Assessments (VCA) were created to ensure the completion of assessment tasks.

Results: The utilisation of the ACTIONS transition model resulted in the evolution of instructional delivery from a Web Enhanced approach to a customised Web Centric approach and implementation of Virtual Clinical Assessments. Students expressed their satisfaction in the learning experience through VLE, but were anxious about their clinical training and connectivity issues.

Conclusion: This transition demonstrated the need of future directions in terms of learner readiness to be more self-directed and self-determined, design thinking for transformation to a Web Centric curriculum, faculty readiness to change and develop the competency of Technological Pedagogical Content Knowledge (TPACK).

Practice Highlights

- ACTIONS model is an appropriate design and transition model.
- Exigent transition is an opportunity to augment the capabilities of VLE and innovate.
- Ensure the recreation of an equivalent virtual learning experience to the onsite learning experience
- TPACK has emerged as an essential trainer competency.

I. INTRODUCTION

The COVID-19 pandemic has been a catalyst for extraordinary transformation in medical education. Malaysia underwent a form of lockdown under the Movement Control Order (MCO). The MCO was initiated on 18th March 2020 for two weeks and extended several times until 9th June 2020, with changing levels of restrictions in phases. With the designation of their usual clinical learning environment

as a COVID Hospital, it was inevitable that medical students at the Universiti Malaya experienced major disruptions in clinical teaching.

The exodus of all students to their hometowns at the start of the MCO necessitated overnight conversion of teaching and learning processes into online delivery. With the emergence of the initial four weeks of the MCO as a fluid, unpredictable and undefined landscape, the

medical faculty formulated a range of teaching and learning modalities adaptable to different conditions.

These adaptations were made while maintaining compliance with requirements of various regulatory bodies and policy makers, including the Ministry of Higher Education, Malaysian Medical Council, the Malaysian Qualifying Agency and university governance. This process of assimilation within a rapidly evolving milieu was a formidable challenge. This article aims to provide a succinct summary of events and processes for emergency digitisation and transition to remote teaching during the COVID-19 pandemic. This summary will function as a model for transformation on the run to manage the implementation and delivery of higher education programme during a major crisis or disaster.

II. METHODS

As events preceding the implementation of the MCO unfolded, sequential meetings were held to brainstorm on the safety, mode of delivery in emergency transition, preparation for training of students and staff, and evaluation of the changes. The faculty of medicine seized the opportunity to plan and implement a comprehensive online learning experience during the MCO period. Designated teams explored the various technologies available to support learning and shared best practices in an explosion of webinars. It became evident that dedicated teamwork to deal with sudden and enforced changes was crucial for this transition to be effective.

A. Theoretical Framework to Support the Digital Transition

An exigent digital transition like this required an instructional design model to affect a transition that was sustainable and future-ready. There was also a need to ensure that learning objectives envisaged for a physical face-to-face curriculum delivery model could be achieved with digital transition. The most practical model for such a transition was the ACTIONS model by Tony Bates (as cited in Boettcher & Conrad, 1999). ACTIONS is an acronym for Access, Costs, Teaching and learning, Interaction and user friendliness, Organisational issues, Operational and implementation expenses, Novelty and Speed.

B. The Development Approach – Review, Deconstruct, Reconstruct and Innovate

Recreating the entire learning experience in the VLE required the following steps

1) *Review of existing e-resources and mapping them to curriculum:* The existing e-resources available at Faculty

of Medicine and Library were reviewed to analyse the need for additional resources. Contents of the e-resources were also mapped to the curriculum to understand the alignment of available resources with topics covered in different stages.

2) *Deconstruct the existing curriculum and detailing its demands:* The Universiti Malaya Medical Programme (UMMP) comprises five stages. Stages 1 and 2 (years 1 and 2) provide the preclinical and Stages 3. 1, 3.2 and 3.3 (years 3 to 5) provide the clinical learning experiences to students. The unique instructional demands of each stage were carefully analysed to clarify the possibilities and limitations of the VLE created. This step enabled categorisation of learning experiences which were suitable for delivery in the VLE and learning experiences which were not suited to a VLE with regard to the achievement of learning outcomes.

3) *Reconstruct the learning experiences of curriculum in VLE:* While contents of the curriculum were already available on a university learning management system (LMS) called Student Powered e- Collaborative Transforming UM (SPeCTRUM), the Moodle-based segment of the VLE, learning spaces had to be created within the Microsoft Teams segment to enable synchronous collaboration. The design principle adopted was to replicate physical facilities of Faculty of Medicine as closely as possible by providing virtual large and small group learning spaces (virtual classrooms) within Microsoft Teams. Each stage was denoted as a team. Designated channels were then created within each team for system-based blocks in preclinical stages and specialty-based postings in clinical stages. Small group teaching activity spaces including PBL rooms were created as separate channels within respective teams.

4) *Innovate and improve:* Although it was an exigent digital transition, the opportunity to innovate and improve could not be missed. Through deep linking of Moodle-based SPeCTRUM and Microsoft Teams, a seamless login and navigation experience was created. The learning spaces created in Microsoft Teams were provided with direct access to e-resources in the forms of ‘tabs’, simulating the existence of resource libraries within the learning spaces. OneNote was made available in these tabs as potential ‘white boards’. A complete transition to ‘flipped classes’ was also adopted by the faculty, replacing the traditional lectures.

C. Ensuring the Effective Utilisation of the VLE and Digital Instructional Delivery – The End User Training

Effective digital transition was enabled through utilisation of the VLE itself as the learning space for

training of end-users. Detailed user guides were prepared. A series of synchronous hands-on sessions were also provided. All training sessions were recorded and accessible in the VLE for future reference. Continuous one-to-one support was provided on request for end-users. This dynamic transition support became an opportunity for upskilling faculty members and administrators.

D. Evaluation of Learning Experiences of the Students

A 13-item questionnaire was developed to examine learning experiences of students. The development considered existing institutional expectations of teaching, standards for problem-based learning and online learning, and generic criteria for learning environments. In addition, two open-ended questions were created for students to express what they liked and what did not work well. One week after commencement of the VLE, students were invited to relate their learning experiences via this questionnaire. This early feedback from the perspective of end-users was vital to identify aspects of the newly-constructed VLE which required adjustments.

III. RESULTS

A. The Challenge Made into an Opportunity – The Digital Transition

The school faced a huge hurdle as these sudden changes required augmented capabilities, stretching the existing connectivity infrastructure to its limits. As Information Technology (IT) professionals addressed the obvious task of ensuring good connectivity for all faculty members, administrators and students, others worked to transform mindsets of the eager and less-willing to adapt to the new norm of providing emergency online teaching to the students.

Universiti Malaya had an existing web-enhanced blended learning approach which utilised SPeCTRUM to support e-learning. The pandemic compelled transition from a Web-Enhanced approach with a physical classroom as the primary site of instruction to a web-centric approach with a virtual online platform as the primary site of instruction. To effect this change, capabilities of the existing LMS were enhanced to provide experiences of asynchronous and synchronous communication together with collaboration possibilities in a robust Virtual Learning Environment (VLE).

The ACTIONS model facilitated the evaluation of issues including uniform access to the selected web-based tools, adaptability of existing teaching learning methods to the VLE, organisational constraints and support needed for implementation, reliability and future-readiness of the

VLE platform as well as the speed or ease with which the curriculum could be fully transitioned to a Web-Centric mode. Such planning resulted in the decision of deep linking and combining the capabilities of Moodle-based SPeCTRUM and Microsoft Teams as a VLE solution for the instantaneous digital transition.

B. Transition in Assessments

Assessment activities also had to be aligned with teaching and learning, taking into account guidelines of various regulatory bodies. During the MCO, existing written assessment components, which were in the form of single best answer (SBA) and extended matching type questions, were administered using online software in the SBA format.

Clinical end-of-rotations examinations posed a greater challenge. During the MCO, it was not possible to conduct examinations in the clinical environment with actual patients or a simulated clinical environment where both examiners and students could have face-to-face interaction with standardised patients. We therefore created Virtual Clinical Assessments (VCAs), writing clinical scenarios which could be used in a format similar to a structured oral examination online. Each VCA lasted 30 minutes with components of history-taking, physical examination, differential diagnoses, investigations and management along the lines of an "observed long case" clinical examination. Examiners or standardised patients were trained to role play for history-taking. De-identified clinical photographs were used for the physical examination component. Investigations such as biomedical images and laboratory results provided data for interpretation. An existing final-year examiner clinical assessment mark sheet with reference rubric was adapted for use, with components of history-taking, examination, clinical reasoning, management, knowledge, communication skills and professionalism. Specific trigger questions to assess these components were incorporated into each scenario. This assessment format could be utilised on a totally virtual platform or in a partially virtual assessment, combining face-to-face interaction with simulated patients/caregivers and clinical photographs or videos, complying with prevailing restrictions at different phases of the MCO.

C. Students' Experiences of the Virtual Learning Environment

Students recognised and appreciated the Faculty's efforts in establishing the online learning system for them to continue their studies. Students reported several aspects that worked well. These included pre-recorded teaching materials which allowed students to learn at their own pace. Students were also able to obtain adequate information and understood the information delivered

during the virtual problem-based learning sessions. They were also less inhibited to ask questions from behind the screen during synchronous sessions.

However, there were also some areas of concern. Some students encountered internet stability issues. They needed time to adapt to the online learning platform, such as learning how to avoid speaking at the same time during the problem-based learning sessions. While acknowledging the usefulness of videos for some clinical exposure, they yearned to return to hands-on practice of clinical skills and receive feedback on their performance.

D. Prioritising Safety

With the relaxation of MCO restrictions in June to a “recovery MCO” when final year medical students were allowed back, guidelines and protocols were established to ensure safety of students, staff as well as patients. Students returned in batches and were provided with instructions to self-assess their risks before travelling. Subsequent orientation was given to perform risk assessments whenever they checked into their hostel, other buildings within the university campus, and into the hospital. The Occupational Safety, Health and Environment (OSHE) and hospital infection control teams developed a software application for the purpose of tracking the entry of patients, students and staff into the hospital premises. Students were placed on a staggered schedule within their clinical rotation to avoid overcrowding of wards and clinics. Students and staff were constantly reminded to adhere to social distancing and safety guidelines from the Ministry of Health.

IV. CONCLUSION- FUTURE DIRECTIONS

The COVID-19 pandemic has enhanced the use of technology-enhanced learning and instructional delivery as a medium for education. To adapt to this paradigm shift and ensure future readiness, the following areas require immediate attention:

A. Student Readiness

Ensuring readiness of learners to become self-directed and self-determined as they move from higher secondary/ high school to University education. Students should also be supported to develop effective online learning approaches.

B. Academic Faculty Readiness and TPACK as a competency

Academic faculty readiness to facilitate learning among the generation Z learners needs to be ensured. This essentially means that faculty members need to develop Technological Pedagogical Content Knowledge (TPACK, Figure 1) (Koehler & Mishra, 2009), as an essential competency to be effective in technology integration to facilitate learning. TPACK essentially represents the fundamental understanding of faculty members on effectively facilitating the learning process using technology, using appropriate pedagogical approaches to meet the instructional demands of each discipline/ specialty. The importance of up-skilling and re-skilling academic faculty members to equip them with latest tools available for teaching and learning is getting emphasised here.

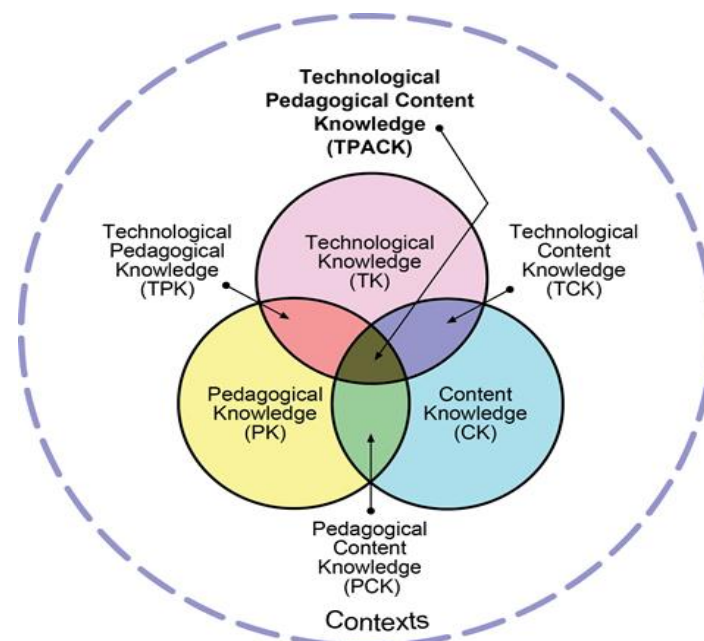


Figure 1: Technological Pedagogical Content Knowledge (TPACK). Reproduced by permission of the publisher (Koehler, 2011)

C. Infrastructure Development

Infrastructure planning, development and resource allocation to meet the future needs of technology-enhanced learning becomes a necessity to ensure the implementation of curriculum.

Notes on Contributors

Dr. Wei Han Hong involved in development of the concept, contributed to the creation of VLE through the inputs of curriculum requirements and ensured implementation, participated in the trials and troubleshooting of VLE, coordinated and contributed to the manuscript writing and approved the final version.

Associate Professor Dr. Vinod Pallath involved in conceptualising and development of the VLE, coordinated the development of VLE and lead the training of the faculty members through the VLE, contributed to manuscript writing and performed critical revisions to make the final version and approved the final version.

Dr. Chan Choong Foong involved in development of the concept, ensured the integration of quality requirements in the VLE, participated in the trials and troubleshooting of VLE, contributed to the manuscript and approved the final version.

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Declaration of Interest

The authors declare that there is no conflict of interest related to this manuscript.

References

Boettcher, J. V., & Conrad, R. M. (1999). *Faculty guide for moving teaching and learning to the web*. League for Innovation in the Community College.

Koehler, M. (2011, May 11). *Using the TPACK image*. TPACK.ORG.
<http://matt-koehler.com/tpack2/using-the-tpack-image/>

Koehler, M., & Mishra, P. (2009). What is technological pedagogical content knowledge (TPACK)? *Contemporary Issues in Technology and Teacher Education*, 9(1), 60-70.
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