

## SHORT COMMUNICATION

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# Enhancing E-Learning in the Clinical Sciences Phase of the Medical Programme

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## ABSTRACT

The COVID-19 pandemic served to catalyse and enhance the digital transformation of the clinical medical curriculum at the International Medical University (IMU). This transformation was implemented in three stages; Stage 1: enhancement of the learning management system, including development of lesson plans and review of learning resources; Stage 2: quality assessment of lesson plans; Stage 3: curation and creation of learning resources. This systematically implemented transformation received encouraging feedback from students

**Keywords:** *E-learning, Clinical sciences, Medical education, COVID-19*

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## INTRODUCTION

Technology-enhanced learning (TEL) employs information and communication technologies in teaching and learning (T&L). The benefits of TEL include flexibility and accessibility, eliminating the limitations of conventional face-to face T&L, leading to its incorporation in curriculum delivery in higher education institutes (1). The International Medical University (IMU) has developed a TEL framework that enables a smooth transition to 'blended learning' (Figure 1) (2). The design and application of pedagogic principles to e-content and adoption of emerging technologies is central to the successful transformation to digital health education (3). Innovative information and communication technology based T&L tools can be developed to meet learners' specific needs (3).

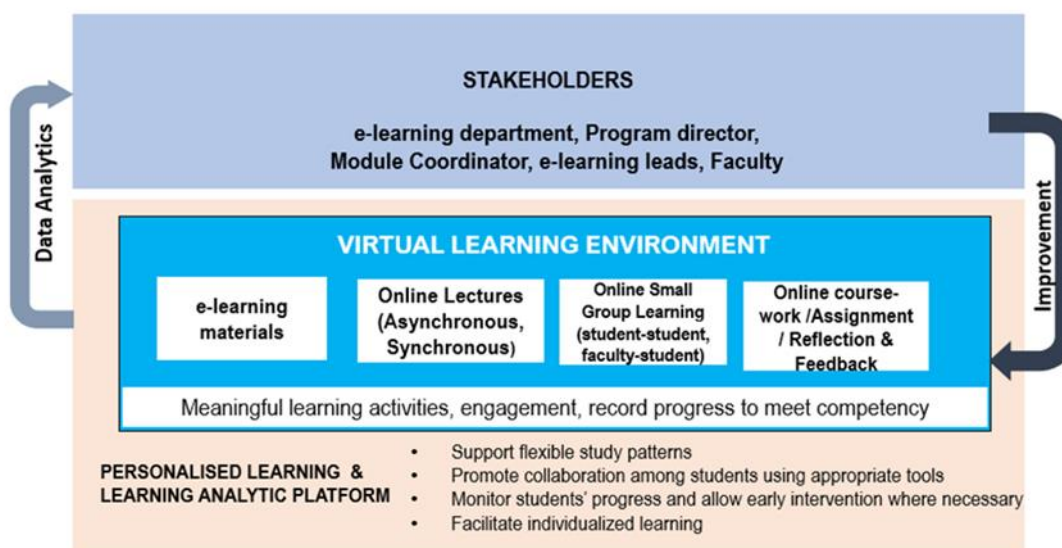


Figure 1

The clinical phase of the five-year IMU MBBS programme adopts a competency and outcome-based spiral curriculum (4). Essential components of the clinical sciences are delivered through discipline-specific clinical rotations (4). The Covid-19 pandemic and associated Movement Control Orders (MCO) resulted in the suspension of all face-to-face T&L activities, disrupting conventional practices of curriculum delivery and assessment of clinical students (5). To maintain effective curriculum delivery, it became necessary to expedite the enhancement of the existing educational programme and increase the use of remote learning. This necessitated support from the institution, IMU Centre of Education, learning resources department, e-learn unit, academic support services, faculty, and students. The enhancement required the application of the principles of e-learning and blended learning (6,7). Blended learning can be defined as 'the thoughtful integration of classroom traditional face-to-face learning experiences with online learning experiences'(8). For learning institutions, the key principles of online learning experiences include effective course design and planning, which typically requires the use of a learning management system (LMS), as well as strong online facilitation and support to encourage engagement among all stakeholders (9). E-learning can be defined as a 'structured course or learning experience delivered electronically' using an LMS (10). Again incorporating the key principles of online learning, e-learning plays an integral role in the effective deployment of blended learning strategies (8). This approach has two goals: to enhance experiential and hands-on T&L and to optimize the use of LMS for curriculum delivery and assessment.

The transition from conventional T&L activities to blended learning and e-learning often meets resistance (11). Several of the challenges encountered during the implementation and enhancement of e-learning processes were not unique to this institution. An integrative review by O'Doherty et al. (12) identified inadequate infrastructure, absence of institutional strategies and support, time constraints, poor technical skills and stakeholders' negative attitudes as key barriers to the development and implementation of online learning in medical education.

## ENHANCING E-LEARNING IN THE CLINICAL SCIENCES OF THE IMU MBBS PROGRAMME: THE EXPERIENCE

The process of e-learning implementation and enhancement at IMU was expedited in line with the University's e-learning framework and strategy (Figures 1 and 2) (2,13). A core team, the Clinical e-Learn Team (CeLT), comprised an e-Learn lead, secretary, instructional designer, and representatives of the Divisions of Medicine, Surgery and Family Medicine. This Clinical e-Learn Team (CeLT) was formed on the clinical sciences campus in 2020 to oversee the process.

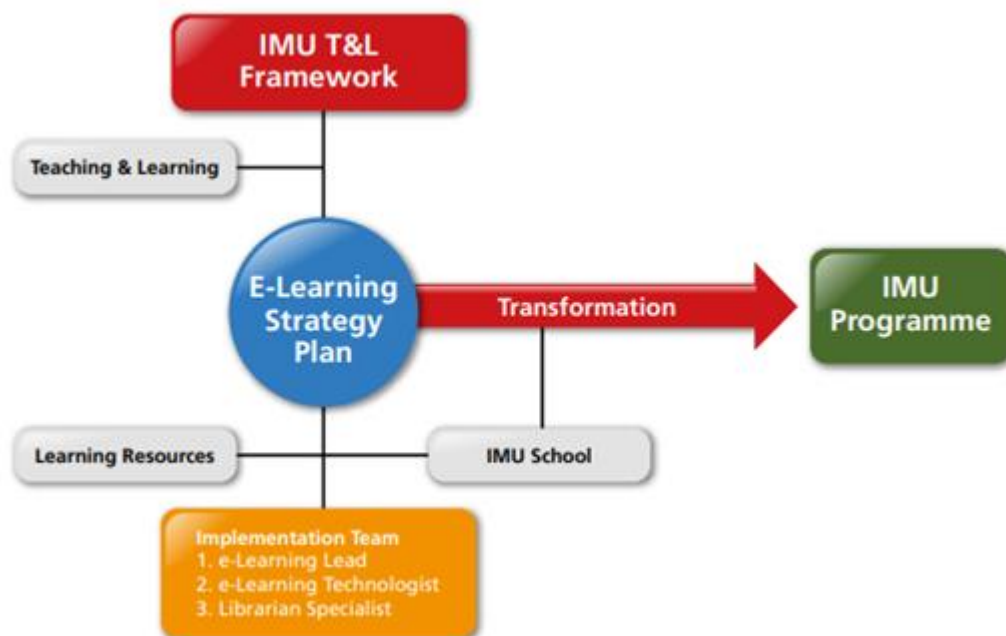


Figure 2

To achieve its objectives, the CeLT adopted a communities of practice (CoP) approach (14). CoPs are defined as 'groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly' (14). CoP subgroups were formed in the areas of medicine, surgery, family medicine, clinical skills and simulation, question-bank, research in educational technology and plenaries for large group learning. Additionally, a newsletter was developed to promote various e-learning activities.

The enhancement process involved the three stages described below.

### Stage 1: Enhancement of the LMS, Lesson Plan Development and Review of Learning Resources

The enhancement of online learning experiences using the MOODLE™ platform was performed by the e-learn unit and faculty. The platform previously comprised only lists of topics and activities (Figure 3) but now incorporates graphics and grids to improve organization and

presentation (Figure 4). This new and improved learning experience supports easier navigation for all stakeholders (Figure 1).

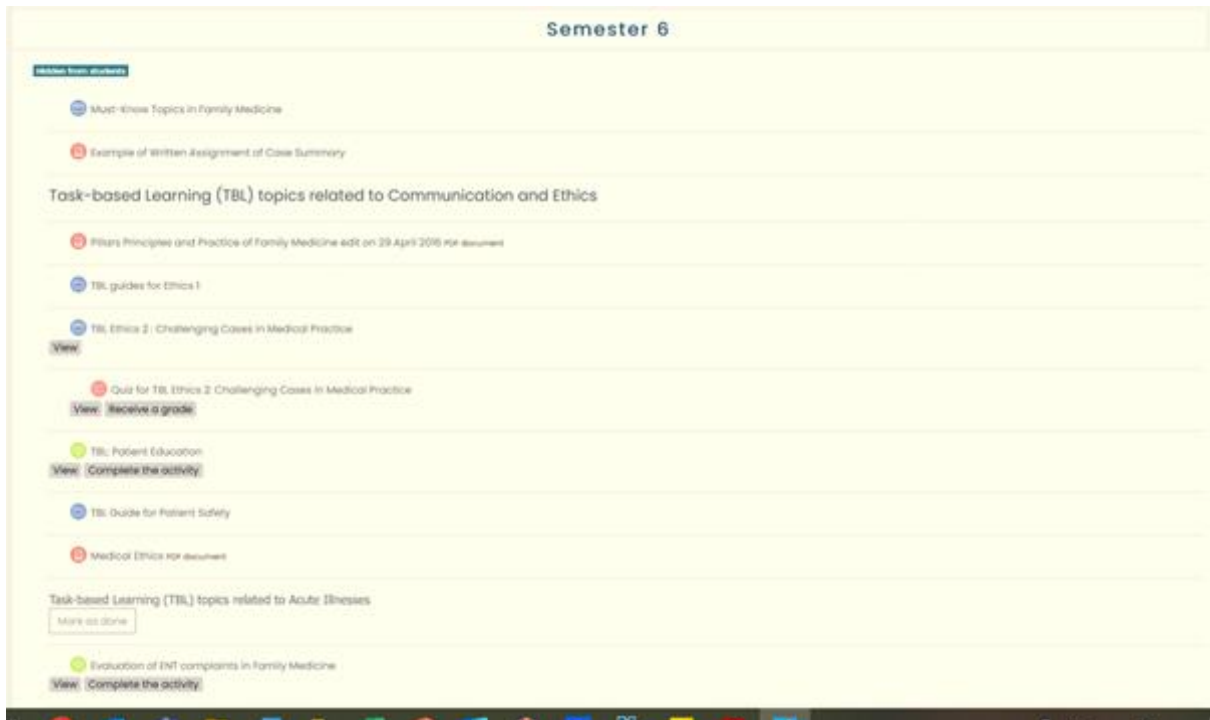


Figure 3



Figure 4

While the Learning Resource Department enhanced the overall appearance and interface of the MOODLE™ learning platform, academic faculty redesigned curriculum content to align with learning outcomes. To guide student T&L, faculty developed effective lesson plans for all subjects across cognitive, psychomotor, and affective domains. All blended learning lesson plans were based on Gagne's 'Nine Events of Instruction' (15), which ensured comprehensive delivery of online learning experiences as in face-to-face T&L. The first component of Gagne's framework, which includes securing students' attention, informing students about learning outcomes and stimulating recall of prior learning, was delivered by means of self-directed learning through the LMS. The second component, which includes presenting the information, providing guidance, reviewing students' performance, and providing feedback, was delivered through face-to-face or online synchronous small group learning. The third and final component, which encompasses performance assessment and enhanced retention and transfer, was again delivered by means of self-directed learning through the LMS and included formative assessment based on one-best-answer questions.

Stage 1 also included a review of all existing learning resources. Additional recommended reading resources were made available as hyperlinks to the IMU digital library, which facilitated easy access to relevant references while excluding unsolicited open-access learning material. Learning resources and hyperlinks that were deemed irrelevant or outdated were updated, removed, or replaced. IMU librarians facilitated access to learning resources and linking of relevant learning resources to lesson plans.

Students were free to access lesson plans, learning objectives, learning resources and formative assessments for each topic.

## **Stage 2: Quality Assessment of Lesson Plans**

In Stage 2, a check-list aided, self or peer-review of the lesson plans available on the departments specific learning platforms on the MOODLE™ was conducted. Lesson plans that failed to meet the relevant requirements were updated (Figure 5). This process provided a degree of uniformity and ensured that lessons plans on the MOODLE™ were acceptable and met the cognitive and functional e-learning standards for blended T&L (16).

Quality of lesson plan	Lesson/topic
	Type of lesson
	Faculty name
Are the learning objectives measurable?	Yes/No
Does all the content support the learning objectives?	Yes/No
Is there any content that could be taken out?	Yes/No
Is there any content missing?	Yes/No
Have all the facts been checked and referenced appropriately? Vancouver/APA style	Yes/No
Does the course follow a logical order?	Yes/No
Do the images accurately represent the course material?	Yes/No
Are the quiz questions clearly stated?	Yes/No
Are all the quiz options believable (even the wrong answers)?	Yes/No
Do you clearly state what learners need to do to pass the course?	Yes/No

Figure 5

### Stage 3: Curation and Creation of Learning Resources

In this final stage, digital learning resources were curated and created by academic faculty before being uploaded to the relevant lessons on the MOODLETM to aid student learning. These resources, which included but were not limited to videos, interactive videos, e-books, digital flash cards and infographics, were intended to complement the self-directed learning areas within each lesson plan

Although distinct, these three stages were operationalized concurrently and synergistically. During the process, it became clear that each stage contributed to and enhanced the other stages. For example, lesson plan development (Stage 1) depended for its completion on the lesson plan review (Stage 2), which might entail further lesson plan development (Stage 1). Similarly, curation and creation of learning resources (Stage 3) was an extension of lesson plan

development (Stage 1), and improvement of the MOODLETM interface (Stage 1) facilitated easier navigation of these learning resources (Stage 3).

To further ensure the success of the enhancement exercise, the CeLT identified two main areas that required faculty support and training to meet the requirements of e-learning: (i) design and development of e-learning objects and (ii) lesson plan development and review.

The relationships among stakeholders and the various activities involved in the process of enhancing the e-Learn platform for a given lesson are summarized in Figure 6.

There is ongoing feedback from stakeholders – especially students – on the e-Learning enhancements described above. Initial feedback from the IMU Student Barometer Survey 2020 returned high scores (84-93%) for satisfaction with online learning and engagement during the Covid-19 pandemic (17).

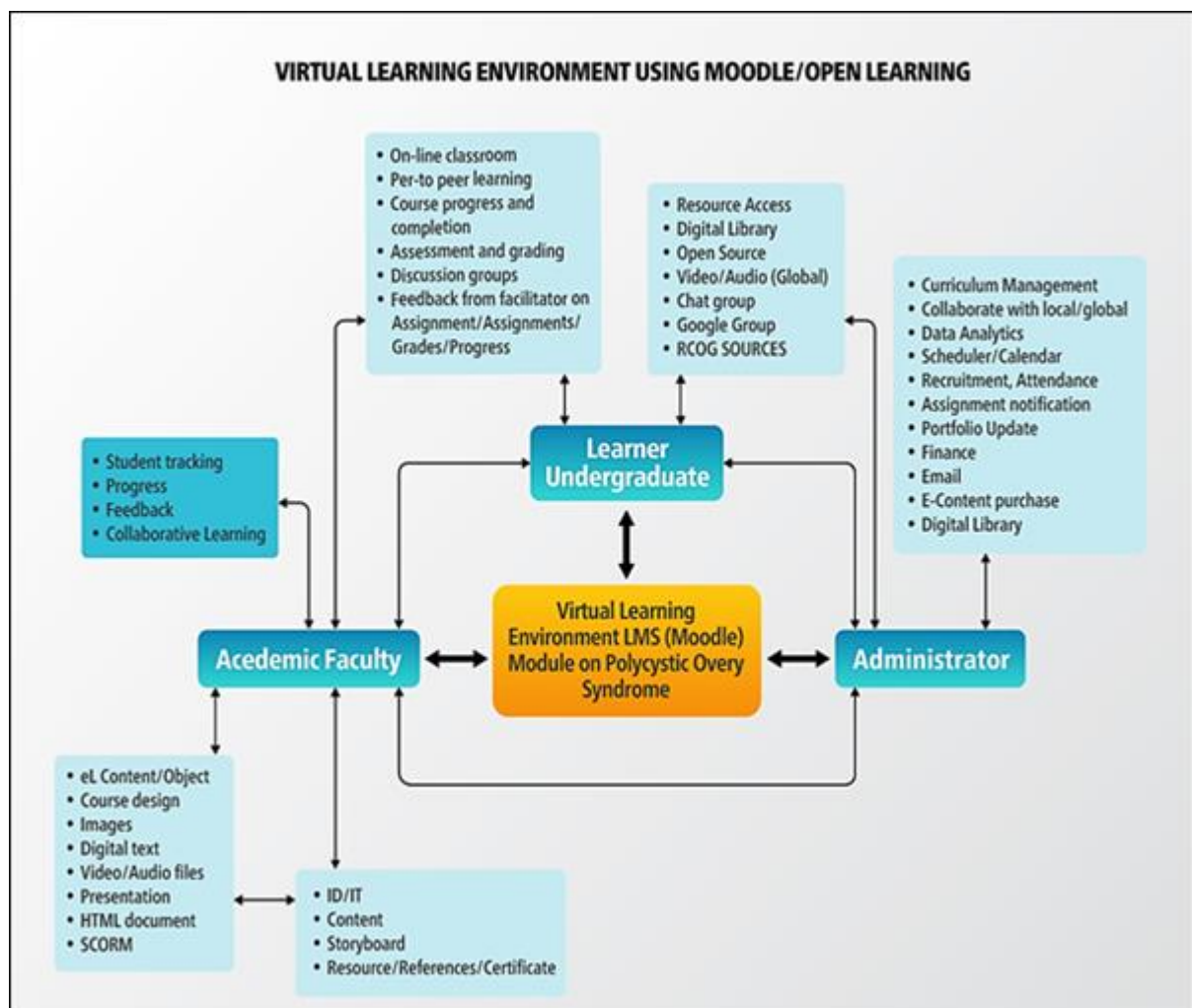


Figure 6



## DISCUSSION

Support from university top management is crucial when developing policies and strategies (18). At IMU, infrastructure and institutional strategies and support have been comprehensively addressed. The IMU e-learning strategy was formalized in 2015 (13) (Figure 2), and the e-learning framework was approved by the IMU Senate in October 2020 to guide 'academic faculty and the E-Learning Unit in the management and implementation of e-learning activities' (2). According to the e-learning framework (Figure 1), stakeholders are responsible for developing and improving the medical programme's virtual learning environment, which includes e-learning materials, synchronous and asynchronous online lectures, online small group learning and online assessments. It is envisioned that data analytics derived from the virtual learning environment will enable comprehensive in-depth learner analysis, informing process improvements and the development of a personalized learning environment that support flexible and individualised study patterns while also promoting student collaboration. This approach should also facilitate monitoring of students' academic progress and allowing timely interventions to bridge any learning gaps among students in difficulty (2,19).

Even before implementation of the IMU e-learning framework, T&L activities at IMU were always supported by an extensive repository of online learning objects. Since its inception, this has evolved over time in form and function to become the IMU e-Learning Platform. Based on MOODLE™. This online learning platform is 'designed to provide educators, administrators and learners with a single robust, secure and integrated system to create personalised learning environments' (20). Having initially served as a mere repository for T&L materials, the MOODLE™ learning platform now offers multiple options for selecting and creating engaging interactive T&L content. The content authoring tools embedded in the platform support the creation of microlearning content, learning activities and assessment tools that incorporate tracking tools for student assessment and rewards, with badges for successful task completion (20).

Headed by an academic with e-learning expertise, the Learning Resources Department supports e-learning across the university and has been instrumental in implementing the goals of e-learning in IMU. Currently The Department's current personnel include instructional designers, learning designers, graphic designers, e-portal administrators, videographers, multimedia designers and information technology specialists. Accordingly, the Department is well placed to provide faculty training and support in e-learning pedagogy and practices, including the development of effective e-learning objects.

To ensure the success of this endeavour, faculty buy-in is crucial. In pursuing this buy-in, the main challenges include faculty's inherent comfort with traditional face-to face teaching coupled with a lack of technical skills and an already busy schedule (12). Additionally, e-learning can be

seen as a threat to faculty expertise and job security (11). In seeking to improve stakeholders' perceptions and attitudes to the implementation and enhancement of e-learning, continuous institutional support is crucial in addressing issues like time constraints and lack of technical expertise. The continuous support provided by the Learning Resources Department and IMU's Centre for Education in terms of ongoing focused upskilling for designing and developing online learning experiences and other specific training needs has helped to increased faculty confidence in e-learning. A wide range of short courses and workshops on navigating and managing MOODLE™ and using various software packages to make e-learning content, videos, interactive lessons, and courses provide relevant and valuable expertise, reducing faculty anxiety and improving productivity.

Adaptation of the CoP approach has successfully promoted faculty buy-in by addressing hesitancy and resistance to change (21). The success of this approach depends on the optimization of all three CoP elements: domain (field of interest), community (faculty) and the practice itself (14). Within each CoP, faculty share a common interest and a commitment to e-learning. Based on frequent interactions in formal and informal information-sharing sessions and collaborations and a willingness to guide and assist, CoP leads become effective role models by adapting to change and demonstrating its value to others. These CoP leads play a vital role in helping teaching novices and digital migrants to achieve targets for lesson plan completion and e-learning object development. By promoting active faculty participation and practice, CoPs train peripheral learners to become competent in e-learning and to view e-learning as a complement to clinical teaching rather than a challenge to their own relevance and expertise.

In conclusion, successful incorporation of e-learning in the clinical sciences depended on all stakeholders' commitment, engagement, and buy-in. The stagewise approach to digital transformation during the Covid-19 pandemic was successful because it aligned with the institution's strategies, which involved a top-down approach to implementing change in practice and a complementary bottom-up CoP approach (18). This synergy facilitated digital learning enhancement and successful implementation of the project. The experience gained from this dynamic adaptation and the regular feedback solicited from programme users will continue to enhance remote T&L practices for effective curriculum delivery.

## RECOMMENDATIONS

Students are among the key stakeholders in this process of e-learning implementation and enhancement, and many studies have explored the student's perspective (12). However, as each institution is different, it is important to document the experiences and perceptions of each university's own students. To improve the quality of e-learning materials and to determine the direction of future enhancements, students must be actively involved in providing feedback.

Another important stakeholder, the academic services department (ASD) must be able to track student attendance and participation in all e-learning activities on the MOODLE™ platform. To that end, a digital logbook that tracks each student's experiential learning and integrates this information in the various e-learning activities would provide a comprehensive overview of that student's activities.

The COVID-19 pandemic may have served as a catalyst for the implementation and enhancement of e-learning in the clinical sciences phase of the medical program. At the same time, it is important to recognize that the fields of technology, education and medicine are evolving rapidly. For that reason, the enhancement of e-learning practices in the medical programme's clinical sciences phase is necessarily a continuous process. Without regular reviews and updates, all such efforts will eventually become obsolete. As such, e-learning in the clinical sciences phase of a medical programme should be a culture practiced by all stakeholders rather than being something to fall back on in times of unprecedented uncertainty.

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