NATIONAL MEDICAL COMMISSION

COMPETENCY BASED UNDERGRADUATE CURRICULUM FOR THE INDIAN MEDICAL GRADUATE

Knows Knows how Shows Shows how Performs

Describe Enumerate Observe Demonstrate Assist

Counsel Prescribe

Analyse Integrate

Guide Communicate

Correlate Interpret

Critique Collaborate

Online learning & Assessment Module 8

Clinician Communicator Team Leader Professional Lifelong Learner

Knowledge | Skills | Attitude | Values | Responsiveness | Communication

Curriculum Implementation Support Program

Module on

Online

Learning and Assessment

2020

National Medical Commission

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Foreword
Online learning and Assessment

The COVID- 19 pandemic in many ways has challenged educators to innovate and ensure that the medical students are able to continue their learning during a situation that has placed an unprecedented strain on the medical education system. Creating a learning experience that allows learners to accomplish the required competency online, many of which are skill and attitude based, is a tough ask. Despite this, many institutions have risen to the challenge and displayed ingenuity in creating a learning environment that fulfils many of the demands of medical education.

Online learning, while not without its drawbacks, has some significant strengths that warrant its continuation in some form beyond these tough times. Flexible learning opportunities, greater learner involvement, impetus to self-directed and collaborative learning are some of the obvious strengths of online learning. Blended learning is going to be the future of medical education.

This module prepared by the Expert Group with inputs from outside experts is a primer of how to improvise at times of necessity and demand. It provides guidance to Curriculum Committee of medical colleges and to the teachers on how to use the online medium to help learners achieve many of the stated competencies including procedural skills and Attitude, Ethics and Communication skills which are traditionally considered not amenable to distance learning. Many of these modalities require very little monetary investment. Wherever possible - low cost alternatives to paid premium platforms - such as open access and free to use resources have been outlined.

Online medical education is nascent - and is fertile with innovations happening in all the medical institutions in the country. I request all the institutions in the country to share their best practices in a spirit of collaboration and ensure that our students get to learn in an environment - real or virtual - that best allows them to fulfil their aspirations. I am grateful to the Expert Group for preparing this learning module on Online learning and assessment which is of current relevance.

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National Medical Commission

Foreword
Online learning and Assessment

The implementation of the new competency based Undergraduate curriculum across medical colleges in India required training of medical college teachers in the various changes built into this outcome-driven new curriculum, year-wise. To achieve this, the Expert Group, advising academic matters, developed a sequential step-wise Curriculum Implementation Support Program (CISP) which included a number of training modalities like Faculty Guides, Learning Resource materials and in-situ training of teaching faculty of colleges through a multi-tier Faculty Development Program. The successful implementation of CISP I in the first year of teaching of the new UG curriculum was a major achievement.

The COVID-19 outbreak in early 2020 posed a major setback to our efforts to train medical college faculty on the changes incorporated in the second year of the new UG curriculum wherein the major challenge of horizontal and vertical integration of curricula were built in,in addition to new teaching learning modalities like Learner-doctor method of clinical training (Clinical Clerkship). This challenge forced the Academic cell and the Expert Group advising the National Medical Commission to explore Online teaching-learning and assessment modalities. This module on Online learning and Assessment is the outcome of these efforts and provides valuable and much needed information to medical college faculty. I hope the information contained herein will be useful to students, teachers and institutions interested in virtual teaching.

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Module on
Online
Learning and Assessment

Glossary

AETCOM: Attitude, Ethics and Communication module introduced into its Faculty Development Program by the Medical Council of India in 2015 for undergraduate medical education.

Asynchronous learning: A learning event in which teachers and students participate at different times. Generally, there is no real-time interaction between the teacher and the students.

Blended learning: Learning which integrates online learning with conventional face-to-face (f2f) teaching. Also called **'hybrid learning'**.

Distance learning: A form of remote teaching-learning method where media replaces word of mouth as the sole means of academic communication. There is often a spatial distance between the teacher and the student.

E-learning: Teaching-learning which is delivered using electronic resources. The teacher and the student may be within the same classroom or at a remote location.

Flipped classroom: An approach where the conventional sequence of teaching-learning activities is reversed. Students read the material at home *before the class* and then use the classroom time to discuss, clarify concepts, create and apply knowledge.

Online Learning: Teaching-learning interactions which take place over the internet. This term is conventionally used for learning that happens across a distance. Learning can happen either partially or purely through the internet.

Pedagogy: Theory and practice of education.

Synchronous learning: A learning event in which teachers and learners engage at the same time. The place may be same or different. It is conventionally used in the context of online learning.

Disclaimer

Mention of/or example of a technology, platform or app for online teaching and assessment is not to be seen as an endorsement of the same.

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Introduction to online learning

The Covid-19 pandemic has dramatically changed the medical education environment and made the shift to online learning inevitable. Close human contact that was the essence of clinical teaching now looks so distant. The current coronavirus pandemic has forced us to explore non-conventional ways of teaching-learning and assessment. Medical schools will now need to be prepared to train the next generation of digital learners using virtual learning environments. This does not mean that traditional classroom teaching will become obsolete, but there is now an opportunity to use both methods efficiently in a hybrid manner, to make the process of learning efficient and effective.[1]

Though online learning has been in vogue for many years now, its application in medical education, especially in India, is rather new. Some teachers have had the experience of online learning – some as facilitators, and others as 'students' – during earlier faculty development interventions[2-3]; but its use for undergraduate education is a relatively new phenomenon.

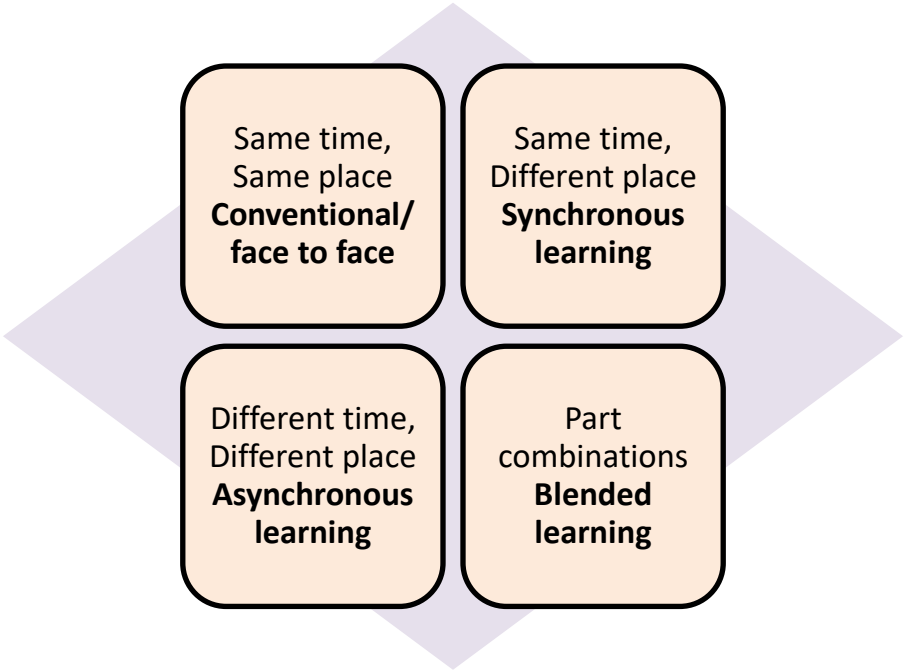
The 'theory' of online learning is more or less the same when compared to face-to-face (f2f) instruction, but there are subtle differences and similarities. The educational cycle, the learning processes, need for interactivity, integration, assessment and feedback are similar in both formats. The use of technology, the spatial distance between the teacher and students, and learner isolation stand out as prominent differences.

Different people have different ideas, interpretations and perspectives about online learning. Depending on the purpose, technology, context and institution, various terms such as e-learning, distance learning, web-based learning, web-facilitated learning, virtual learning, internet learning, distributed learning, computer-based learning, and technology-based learning have been used rather loosely and interchangeably to denote non face-to-face (f2f) learning.[4-7]

Means et al[8] define online learning as "*'learning that occurs entirely (purely online learning) or partially (blended learning) through the internet"* and this is the definition we are going to use in the context of this module.

The most accepted typology of online learning is given in Figure 1.

Fig.1: Typology of online learning (Modified from Coldeway, 1995)[9]



Blended learning is a teaching-learning format where the facilitator effectively integrates the online teaching component with face-to-face sessions. For the purpose of this module, blended learning has been taken as: *"Seamless integration of traditional face to face learning with online activities to enhance the learning experience".*

Online learning: What works, what doesn't

Several factors influence the effectiveness of online learning. These factors include technical skills, academic skills, learner motivation, administrative issues, social interaction, time management, technical problems, cost, and accessibility to the internet.[10] Poor design of courses and inadequate availability of multimedia materials could affect the quality of online training. Online learning has been reported to be as effective as didactic teaching. It can also be instrumental in promoting self-directed learning. Learners can have greater control over their learning as they can go over the content at their own pace. Teachers too can evaluate competencies through online assessments and provide learners feedback for self-improvement.

If faculty in higher education are not adequately trained in educational methods, the problem of ineffective teaching gets exaggerated during online sessions as it has special requirements.[11] Online teaching requires a learner-centered approach, where teachers

need to be competent in using principles of pedagogy, constructive and transformative learning, and assessment and feedback.[12]

Online learning formats

Online learning platforms now offer many opportunities that are being widely used around the world, such as online videos, tutorials, webcasts, video-conferences and virtual simulations. Online teaching-learning can be implemented through **synchronous** or **asynchronous modes**.

The range of available choices for real-time communication extends from online discussion spaces to online chat rooms to online meeting applications. Classroom lectures have now been replaced by live-streamed online lectures, where technology allows recording and online dissemination. Small group discussions and tutorials have been replaced with interactive webinars using online platforms. Almost all these learning resources can also be easily accessed using smartphones.

Information or learning resources can be posted on online platforms, such as websites and blogs. Videos can be shared to demonstrate essential clinical skills, procedural skills or communication skills. Lectures, problem-based learning, simulated lab work, sessions using virtual patients, and discussions can be conducted online, both in synchronous and asynchronous mode. All of these, if used effectively, can build in student engagement and interaction.

Online learning offers flexible learning experiences and allows learners the freedom to experiment with learning at their own pace. It is however not a replacement for f2f teaching.[13] It is initially expensive to set up and requires familiarity with technology.[14]

What the future holds for online learning in India

Although the recent surge in use of online learning has been propelled by the Covid-19 pandemic, it is likely to be adopted as a regular part of teaching and learning in the future as well. Furthermore, newer modes of health care delivery are evolving with rapid advances in information technology. Online learning promises to play a major role in this backdrop.

The recently introduced, competency-based curriculum in India already advocates use of e-learning as a tool for encouraging self-directed learning among students. The CBME document of Medical Council of India (2018)[15] recommends e-learning at the following junctures:

Table 1: Emphasis on online learning in the recently introduced competency-based curriculum

- As a lifelong learner, the Indian Medical Graduate is expected to "*demonstrate ability to search (including through electronic means), and critically evaluate the medical literature and apply the information in the care of the patient*"
- One of the objectives of Foundation Course is to "*to enable the learner to acquire enhanced skills in use of information technology*"
- The new curriculum has reserved time for self-directed learning during every phase of the MBBS course
- The document recommends mandatory provision of skills laboratory in every medical college
- It also recommends mandatory provision of virtual lecture theatres

In addition, medical students also need to develop certain skills, collectively called 21st century skills[16] to fully benefit from online instruction. They need to have digital literacy skills. While students in general are comfortable working with computers and other digital platforms, a deliberate effort must be made to inculcate information technology related literacy, which includes, accessing information, evaluating it critically, and its application to address a given problem. Readers would recall that the Foundation Course introduced from 2019 admissions tried to address many of these issues.

The Pedagogy of Online Learning

Pedagogical approaches which are used for face to face (f2f) teaching might not work if replicated in online settings. It is time to re-conceptualize pedagogical approaches for online teaching.[17]

Table 2: Pedagogical approaches to be used in online learning

1. *Online learning must not be restricted to delivery of information:* Online methods should not merely be used as tools to distribute teachers' notes or PowerPoint slides.

2. *Online tools must be used to innovate and create knowledge*: Online teaching must address higher-order cognitive skills. It must promote creativity, innovation, critical thinking and problem-solving skills in undergraduate medical students.

3. *Online tools must be explored to teach all domains*: Ways and means to teach psychomotor skills, communication skills, ethics, and medical humanities via online mode must be explored.

4. *Online approaches used must encourage participation and collaboration*: Online learning must be conducted through 'involvement' and 'inclusiveness' of the learners. This will also reduce learner isolation.

5. *Feedback, support and mentoring of learners must be carried out:* Learners in online sessions need more interactivity, mentoring, support, feedback and evaluation than the traditional classrooms. Communication between facilitators and learners must be encouraged.

6. *Online teaching must be supplemented by online assessment:* Periodic formative and summative assessment must be built into online courses.

7. *Quality assurance of online teaching and learning must be monitored:* Quality assurance in online teaching must be adopted within the institutional policy document.

Building student engagement online

Here are some tips for building learner engagement in online sessions which work both in synchronous and asynchronous modes:

a. **Allow students to do most of the work**: It is important to give students time to engage and interact with the content. Student should be taught to take up responsibility for their own learning. This must be supplemented by facilitating discussions amongst students, and by giving them collaborative projects.
b. **Interactivity is the heart and soul of effective learning**: Students must be given opportunities to interact with the content, teacher, peers, environment and context; and
c. **Strive for presence**: Teachers should strive to ensure the following three types of presence in their online sessions:

Table 3:

Enhancing effectiveness of online teaching by ensuring cognitive, teaching and social presence

Type of presence	Examples
Cognitive presence (Related to content)	• Select suitable content • Arrange from simple to complex • Introduce content in bite-sized modules • Introducing conceptual and theoretical knowledge into discussions
Teaching presence (Related to instructor)	• Facilitating discussions • Acknowledge and encourage students' contribution • Identify areas of agreement and disagreement • Respond to technical concerns • Set the appropriate climate for learning
Social presence (Related to interaction)	• Allow students to express emotions • Ask for evidence of reading, thinking and understanding others' responses • Build cohesiveness amongst learners by given group work and allowing student-student interactions

(Adapted from Garrison et al[18], and Pelz[19])

Good Online Teaching Practices

The principles for good teaching offline[20-21] and online[1] have been enlisted in literature. These principles reflect the basic premise of alignment between objectives, teaching-learning and assessment methods, need to promote interactivity, use of assessment, feedback, collaborative work, self-directed learning and promotion of higher order thinking skills using online pedagogical approaches.

Table 4: Good Online Teaching Practices

Principle 1: *Teaching-learning methods must match curricular objectives and assessment*
Online pedagogy must be aligned with clear learning objectives, meaningfulness of content covered, the appropriateness of student activities, and the type of assessment.

Principle 2: *Synchronous and asynchronous teacher-student interaction must be encouraged*
Create supportive and non-threatening online environment. Open synchronous and asynchronous communication channels to encourage students to complete their work. This results in higher levels of achievement.

Principle 3: *Promote higher order thinking skills and communication skills*
Online pedagogy should include learning strategies that encourage demonstration of higher order thinking skills and communication skills.

Principle 4: *Teamwork and cooperation among students must be encouraged*
Online pedagogy must encourage collaboration and social interaction among students. This enhances their involvement in learning.

Principle 5: *Encourage active learning*
Teachers must incorporate authentic, problem-solving activities that augment student efforts to actively construct meaningful knowledge through interactivity and application in real-life situations.

Principle 6: *Encourage development of self-directed learning*
Online pedagogy should offer meaningful opportunities to students to bridge the knowledge gap by motivating and instilling responsibility in them. Resultantly, students will embark on significant self-directed learning.

Principle 7: *Opportunities for online summative and formative assessment must be provided*
Online courses should build in valid and reliable assessment periodically. This will provide learners timely feedback and ample opportunities to reflect on their progress.

Principle 8: ***Mechanisms for providing prompt feedback must be built into the course***
Students need appropriate, timely and specific feedback on their performance. Online pedagogy must provide opportunities for students to reflect on what they have learned, what they still need to know, and how to assess themselves.

Principle 9: ***Effective time management and timely task completion must be emphasized***
Learning to use one's time well is critical for students, more so in an online environment as there is no substitute for time on task. Due emphasis should be given to defining time expectations for students in order to establish the basis for high performance.

Principle 10: ***All stakeholders must communicate high expectations from students***
In an online setting, it is pertinent to set clear expectations for quality student performance. Clear and high expectations provide students with precise guidelines about the type and quality of work essential for proficient and timely assignment completion.

Principle 11: ***Respect diverse talents and ways of learning***
Students have a wide variety of learning styles and needs. Online pedagogy should carefully consider prior knowledge, cognitive processing, personality styles, beliefs about learning, and demographics.

Principle 12: ***There must be a robust mechanism for monitoring development and mentoring***
Online pedagogy must support continuous monitoring and mentoring so as to facilitate achievement of intended outcomes of online learning.

(Modified from Saiyad et al[1] with permission)

Teacher roles, competencies and skills required for online teaching

Good online teaching practices will also require faculty to develop competencies in three major areas: technology, subject expertise, and pedagogy. Technical support to develop and manage online teaching modules, time, and support to online teaching are other minor issues.

Table 5 below lists some of the expectations from teachers by students when going through online courses:

Table 5: Students' expectations during online courses

- Easy to follow course design and navigation
- Clear directions for activities and assessments
- Reasonably quick grading and feedback
- Regular communication from the instructors

Based on these needs, teachers need to perform the following roles and develop the required competencies to be effective at online teaching (Table 6):

Table 6: Teacher roles and competencies needed for online teaching

A: Roles:

- instructional designer
- content facilitator
- technologist
- process facilitator
- advisor or counselor
- assessor
- manager or administrator
- researcher

Goodyear et al[22]

B: Competencies

To perform the above roles, the following **competencies** will be required:

- Knowledge of the online process
- Technical skills
- Online communication skills
- Content expertise, and
- Personal attributes: inherent motivation, integrity, visible, responsive and approachable, organized, analytical, respectful, active, flexible, open, honest, compassionate and supportive, and ability to lead by example.

(*Salmon*[23]; *Keengwe et al*[24]).

Skills needed for online teaching

The teaching skills required in the context of online teaching include[25]:

a. ***Communication skills:*** The need for clear and concise instruction is important for online teaching. Teachers who are adept at face to face teaching may need to augment their communication skills to be good online teachers.
b. ***Technological skills:*** Skills specific to the medium and content being taught, general computer literacy to be able to use word processors, spread sheets and presentations are pre-requisites for online teaching. For using simulations, additional skills may be required.
c. ***Pedagogical skills*****:** Online is only a medium for academic exchange - it requires a full complement of teaching skills, including generating learning objectives, matching content and mode to objectives, promoting interactivity, assessment and feedback, classroom management, and mentoring. A particular mention must be made of the skills of the teacher to engage the students who are physically separated from the teacher as well from peers and to encourage them to apply what they are being taught.
d. ***Design skills*****:** These include understanding and applying instructional design principles using learning materials in different formats. Teachers need to use student feedback to make changes in the format as well as ensure quality of learning.
e. ***Managerial skills*****:** Managing the classroom is as important in online teaching as it is in f2f situation. Ability to manage time, demonstrating leadership, managerial and mentoring skills, handling assignments and record keeping and following institutional, legal, ethical and professional requirements are some examples of these skills.[13]

Technology for online teaching

There have been rapid advances in technology used to deliver educational content, and now even social media platforms have started exploring educational needs. Moore's law,[26] which is often extrapolated to state that technology advances which almost doubles every eighteen months, suggests that training people in use of one technology will have limited effect. Further, with advances in technology, teaching methods are also expected to evolve (Table 7).

Table 7: Types of technology available in online courses

- **Websites and blogs** – access to stored information and repositories; electronic versions of scientific papers
- **Multimedia technology** – appropriate combination of video / still images and sound
- **Asynchronous modes** – like threaded discussions, assignments
- **Interactive resources** – providing real time interaction between teachers and students

Compatibility, accessibility, ease of use, user-friendly, opportunities for feedback are some of the criteria directing the choice and adoption of online platforms. While selecting a technological resource, the following points become important:

- Technology needs to be chosen depending on user needs, and not simply because it exists. Technology needs to be aligned to the learning objective.
- Technology has to be user-friendly to all stakeholders. This includes elements such as easy installation of software on computers, requirement of basic programming skills etc.
- Technology needs to be accessible and amenable to use in a variety of platforms, such as desktop computers, laptops, tablets and even smart phones.
- Technology needs to be compatible with the level of learners in terms of language and ease of learning to make it effective.
- Consideration of costs always determine feasibility of use of technology.

It is often useful to use a mix of appropriate technological resources which are available. This enables one to cater to online learners with a diverse variety of learning styles. This in turn helps students achieve desired learning outcomes.[27]

Pre-requisites to begin online teaching

To initiate online teaching, preparations will be required at all levels of stakeholders (teacher, learner, institution etc.). An important point is to ensure that all students have equal access to technology. So availability of enough computers and access to a high-speed internet connection on campus for all faculty and learners is an essential investment. The checklist to identify the pre-requisites in terms of infrastructure and support system that is required is given below (Table 8):

Table 8: Checklist to identify pre-requisites for initiating online teaching

1. Besides generalized IT support, does the institution have a separate cell to provide technical support to online learning activities?
2. Has a Committee been formed to coordinate and monitor online teaching in the institute?
3. What learning management system and software packages has the institute installed?
4. Is high speed internet freely available on campus?
5. Do all faculty and learners have access to laptops and/or smart phones?
6. Do all faculty and learners have individual and unique log-in IDs and passwords to access the learning management system?

(Modified from Brenton[28])

7

A Coordination Committee formed for each phase of MBBS teaching and headed by the MEU will be useful to monitor the quality of online teaching. Further, it may be useful to decide the workload and number of online sessions given to students each week, at the inter-departmental level. It is important not to subject them to cognitive overload as the attention span of students in online sessions can be pretty short.

Tools for online teaching

- **Online collaboration tools**: These enable the teacher and learner to upload and access lessons and assignments online. Texts, documents, images and videos can be shared, viewed and also edited in real time. Tools included in Google Apps and Google Classroom are a wonderful medium to brainstorm and simultaneously document the work of both the instructor and learner. Other tools available for online learning are Google Meet, Zoom, Cisco Webex, Free conference call, Microsoft teams, Go to meeting etc.

- **Presentation software:** Widely used tools such as Microsoft PowerPoint and Google Slides are an excellent means to augment lecture content by embedding high resolution images, diagrams, animation, audio and video files.
- **Course management platforms:** This is also known as Learning Management Systems (LMS). These platforms allow stakeholders to organize all resources needed for a class in terms of the syllabus, document sharing, audio and video files, assignment announcement and submission, discussion boards, online quizzes, grading tools, etc. Canvas is one such example. Some of the widely known online learning management tools are Swayam, Moodle, Google Classroom, Coursera, Clinical Key, Udemy, Teachable among many others.
- **Audience response systems:** These are easy and quick ways to connect with learners and gauge their learning in order to adjust the pace of teaching to learner requirement. This was usually done through clickers in a traditional classroom. A more popular option now is with use of software and applications which enable one to embed interactive polls between presentations, and gather responses through smart phones, which can be displayed in real-time to learners.
- **Lecture-capture tools:** Instructors are able to record their lectures on their local devices without additional requirements and upload them for learners. Such tools are useful for their ability to provide the learner with opportunities to review the content at their own time, pace and frequency. Studies have shown that such tools only augment the teaching-learning process rather than diminish student attendance.

Best practices in selecting appropriate technology

Radical changes in application of technology are already reshaping all areas of teaching and learning.[29]. Traditional forms are being challenged and massive online open courses (MOOCs) are paving their way in. Nevertheless, a visible disconnect exists between technologies, research, design and practice.[30]

Quite often, you will find instructors using fancy technology simply because it exists. There might be no need to use complex technology where a simple discussion or a simple reading might suffice. Technology is generally effective when the application directly supports the objectives and the purpose of the curriculum. Multimedia which simulates real-life situations will always be preferred, and it is best if they are tailored to the local context.

Here is a list of do’s and don’ts that can help one use technology in an optimal manner (Table 9):

Table 9: Some do's and don'ts when using technology in online teaching	
Do's	**Don'ts**
Choose and integrate appropriate technology that supports overall educational goals and curricular objectives.	Avoid using technology for the sake of using it, if it doesn't support the lesson plan. It is a costly mistake which must be avoided.
Train and encourage teachers to make judicious use of technology in their classrooms.	The role of technology should be to empower teachers and learners rather than to replace them.
Technology should be adjustable in terms of students' skills and abilities, provide feedback on progress, and give them enough opportunities to collaborate in the teaching-learning process.	Instructors should not be over-dependent on technology. No technology is foolproof, and technology depends on multiple external factors.
Ensure that teachers and learners are actively involved with a range of relevant and practical engagement techniques. Such strategies should become standard practice.	Mere use of technology doesn't necessarily guarantee engagement. Student engagement strategies will need to be built in while designing a lesson plan.
An optimal level of fidelity (realism) is preferred when using simulations. The degree to which technology simulates the intended task or environment must preferably match with the learner's expertise and the educational objectives of the module.	Every technology requires a minimum level of infrastructure, in terms of hardware and software tools or internet accessibility. Students with limited access to these technologies must also be considered during planning. Fair and equal access to all students is a pre-requisite for use of technology.

Implementing Online Teaching

Once the basic infrastructural requirements are in place, online learning can be implemented at institutions for individual batches. Preparation for online teaching at the level of the individual class can be divided into the following phases:

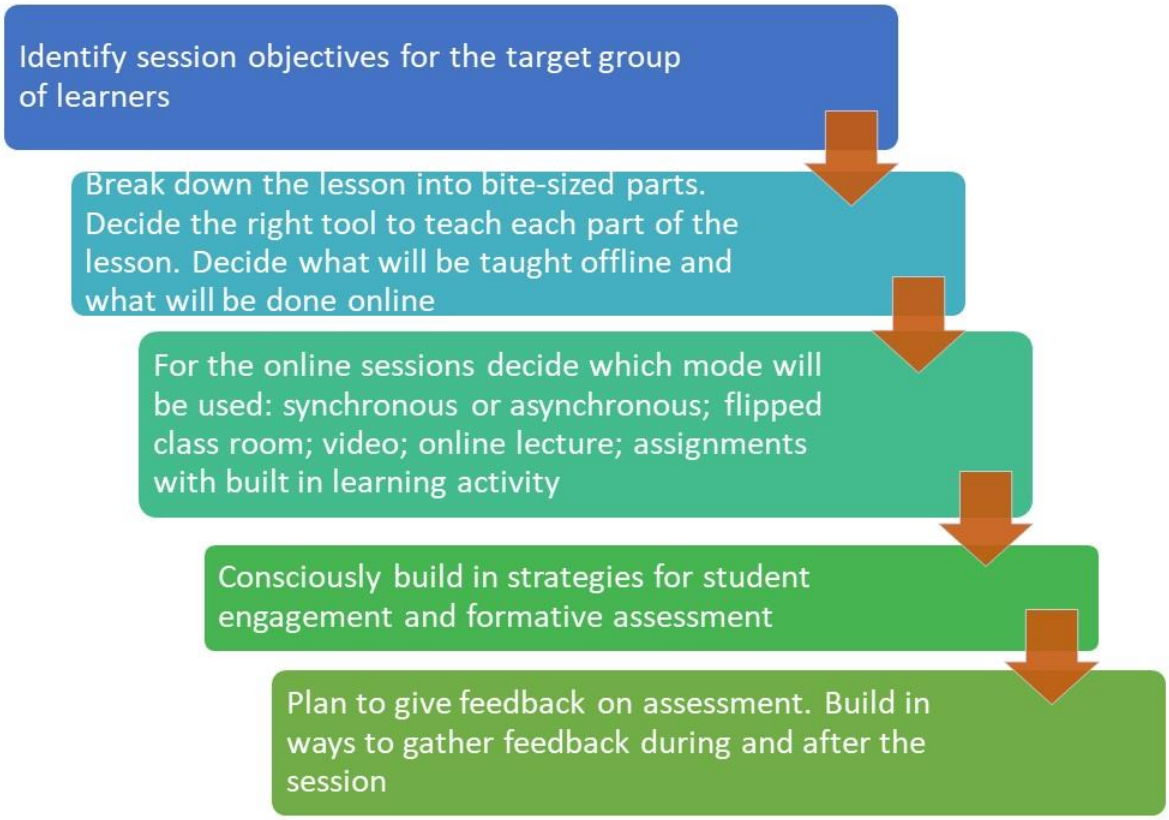
(a) Lesson planning
(b) Conducting online sessions
- Keeping students engaged
- Facilitating online discussions
- Managing Online classroom

(c) Post-session assessment and evaluation

A. LESSON PLANNING FOR ONLINE TEACHING

A well-designed lesson plan is key to the conduct of an effective online teaching session. Similar to any other teaching plan, if one identifies and aligns the 'golden triangle' of learning objectives, teaching-learning methods and assessment, the subsequent conduct of online teaching session will be a smooth affair. The following flow chart (Fig. 2) will help in preparing a lesson plan before actual conduct of online teaching session.

Fig. 2: Lesson planning for online teaching session



It is important to break the lesson into small bite-sized parts. It is important to be prepared with Plan B in case of technology glitches. Never feel embarrassed to accept the failure of technology system and be ready to plan the session on another day or with some other mode. Not everything needs to be delivered in the synchronous online mode. It is important to explore ways other than online lectures. It is best to use a mix of suitable methods to deliver content and make the content more relevant and interesting.

Table 10 lists some of the asynchronous methods to teach students online.

Table 10: Examples of asynchronous online teaching methods
• Send reading material and ask them to take a self-assessment • Assign video to watch and ask to submit related assessment • Ask learners to teach the class or conduct quiz • Share resources and ask learners to submit a project • Send learners on an online scavenger hunt: Ask them to search for credible literature on a specific topic • Give paper case and have a discussion online • Have a debate • Start a wiki • Give an experiential activity and ask learners to write reflections

The **flipped classroom** concept uses valuable synchronous time to clarify concepts, clear doubts and discuss the more in-depth issues of the topic, after the learners have learnt the basics on their own.

CONDUCTING ONLINE SESSIONS

Keeping students engaged

Keeping learners engaged is the most challenging part of online teaching as there is no face to face contact.

Table 11 lists some of the tips and strategies to keep learners engaged during the actual session.

Table 11: Tips and strategies to keep learners engaged
• Try and learn learners' names and use them • Build a rapport with learners: use formal and informal ways of interaction, model disclosure • Create the right environment for the class; build trust • Be available to answer questions and solve doubts • Introduce interactivity through online tools which enable conduct of polls, and gather real-time response • Embed multiple choice questions or quizzes between the session to gauge learning understanding • Ask how and why questions to challenge learners like you would be in a traditional classroom • Give opportunities for learners to ask questions and clarify their doubts • Check if the pace of the lesson is fine with the class • Use break-out rooms and give group work • Encourage discussions online

Questioning is one of the simplest ways of engaging with students. The art of questioning has to be learnt for use both in online and offline modes. Broadly, these questions are not meant to be graded, but used only as a tool to generate attention, promote thinking, link knowledge and promote application. Some of the types of questions used for this purpose (Table 12) are as follows:[31]

Table 12: Type of questions that can be used for student engagement	
Format of question	**Example**
Rhetorical question	Have you seen blood pressure being recorded? Let me show you.
Questions which generate interest	What would happen if you don't eat carbohydrates for 3 days?
Questions to ascertain baseline knowledge	Can someone tell the route of administration of BCG vaccine?
Questions to help the class recall already learnt facts	What is the daily protein requirement for a normal adult male?
Redirecting questions	We learnt of some drugs which can decrease blood sugar level. Can you tell me some drugs which will increase blood sugar?
Bridge questions' (i.e. questions which bridge the gap between knowledge and its application)	How can the clinical differences in diarrhea originating from small intestine and large intestine help you to decide on the need for antibiotics in a child with diarrhea?

Facilitating good online discussions

Online discussions have high pedagogical value as they promote interactivity, engage students and build in social presence. Gao et al[32] have suggested that online discussions should aim at promoting higher order thinking. This can be done by questioning, elaborating, interpreting and relating information to prior knowledge. Discussions should help students to construct their own knowledge. Presenting and discussing conflicting perspectives (e.g. role of statins in cutting down risk of myocardial infarction, differing views on ethics) helps in generation of knowledge which is long lasting.

At first, it may appear difficult but most of the nuances of good face-to-face discussions can be applied online as well. Some of the techniques of good facilitation are as follows:[33]

a. Involving all students in discussions is important. If the groups are very large, it makes sense to divide them into manageable sub-groups with facilitators in each group. In case enough faculty are not available, residents can be trained in facilitation skills.
b. Teachers should make an effort to identify non-responders and encourage them to contribute. Similarly, one should not allow a few students to dominate the discussion.
c. All contributions must be acknowledged. This opportunity should be utilized to provide feedback to students.
d. A good facilitator knows when to speak and when to go silent. While the facilitator may have to take the lead in the beginning, a good discussion means that students interact with each other with the facilitator taking a back seat.
e. Students tend to be callous and abrasive with each other in online settings. This might lead to friction and others might not participate enthusiastically. Therefore, it is important to set ground rules in the beginning and intervene when any untoward incident occurs
f. Allow students to lead the discussion after they get used to the format. This helps them to develop ownership of the process and brings out new ideas, new way of looking at existing situations, and a much-needed change from monotony.

Online classroom management

One of the key differences between conventional and online classes is classroom management. In a conventional classroom, the teacher can ‘see’ all students, notice their body language, ask/answer questions from specific students and move around in the class. In online classes, however, this functionality is limited. Several software packages allow conversion of a large class into smaller groups (breakaway groups). But the best

method is to manage the group as a whole. Just like conventional classes, it may be good idea to keep the class size small. Students generally remain ‘anonymous’, especially when the online class size is large. This usually helps otherwise shy students to ask doubts using the chat box function.

Another important difference lies in the learning environment. While mobile devices are generally discouraged in conventional classes, they play an important role in online classes. As both teachers and students are getting used to the new behavioural norms, it may take some time to adjust when f2f classes start again.

A concern voiced by many teachers is the ‘disappearance’ of students after logging in. While asking all students to keep “*camera on-mike muted*” might be one option, online assessment provides an important tool to ensure presence. The online teacher lacks the opportunity to see the expressions of her students to gauge their understanding. This is where role of ongoing assessment comes in. This will be discussed more under the assessment section.

Table 13 lists some online classroom management techniques:

Table 13: Online classroom management techniques

1. Lay down ground rules for the classroom
2. Encourage students to develop their own ground rules
3. Emphasize interaction. Try to identify non-responders
4. Use breakaway groups to encourage interaction
5. Be a roving facilitator when using breakaway groups
6. Avoid information overload
7. Pose probing and application-oriented questions
8. Provide immediate feedback
9. Use techniques like flipped classroom to promote active learning
10. Don’t read from your slides
11. Link attendance to participation in class
12. Use more than one technology to promote interaction.

B. POST-SESSION ASSESSMENT AND EVALUATION

Wherever possible, plan to conduct online summative assessment after an online teaching session. It does not stand to reason that the learners trained through one type of learning environment are assessed through a different one. Where online assessment is not possible, traditional methods of assessment can be used.

Some simple informal classroom assessment techniques such as polls, muddiest point or one-minute paper can help in knowing whether the concepts just taught have been understood by students or not. For formal assessment, MCQ tests can be carried out using Google Forms or other interactive tools.

Evaluation must be carried out as part of quality assurance practices. Evaluation of both the learning process and outcomes must form a part of any online teaching program. Student feedback can help in improving the manner of delivery of this content. More on this topic can be read in the section on Quality Assurance of online learning.

Teaching Procedural Skills Online

Teaching procedural skills online is a formidable challenge to medical educators. E-learning has been shown to be effective in supporting skills teaching. Fitts and Posner's[34] three-stage theory of motor skill acquisition is a popular method used in teaching surgical and motor skills. These three stages of acquisition of a skill are:

(a) **Cognition** or understanding the task: This needs explanations about the activity.

(b) **Integration** or comprehension and performing the mechanics of the task: This needs provision of feedback and deliberate practice.

(c) **Automation** or ability to perform a task with efficiency, speed and precision: This needs little cognitive input but automated performance. The focus is on refining performance.[35]

While the stage of cognition can be fostered by online interactive sessions, the stages of integration and automation require specific planning. Complex procedural skills can be taught by breaking them down into small steps. Peyton[36] suggested a four-step approach to introduce skills to new trainees as follows:

Step 1: Demonstrate: The instructor shows the skill at a normal pace. No additional comments are offered at this step.

Step 2: Talk the trainee through: The instructor describes each sub-step of the procedure while showing the skill again to the students.

Step 3: Trainee talks trainer through: Here the trainee describes the steps while the instructor performs the skill for the third time, based on the trainee's description.

Step 4: Trainee does: The trainee performs the skill on his or her own.

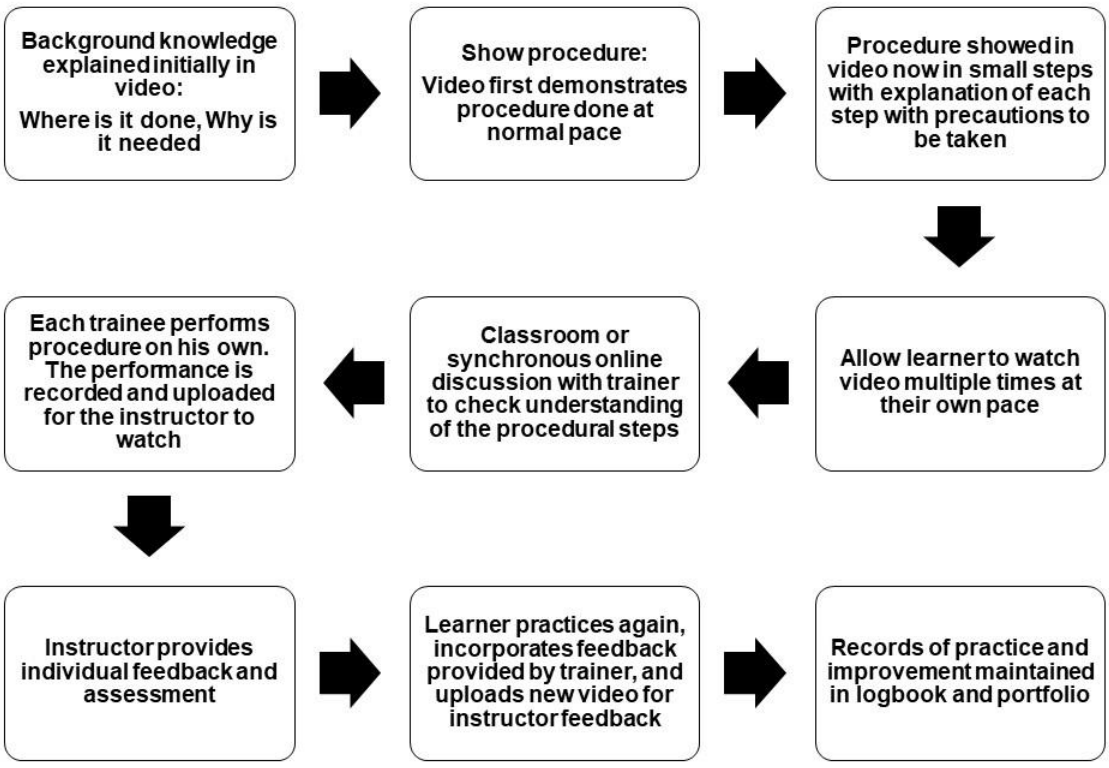
These steps break the task into four components: demonstration, deconstruction, formulation and performance.

Online instructional videos provide learners an opportunity to watch the demonstration and to deconstruct different steps of the skill at the trainee's pace. These videos have the flexibility of being paused and being watched repeatedly at multiple occasions. This is said to help learners understand complex procedures better. This process helps in acquisition and retention of the procedural knowledge.[37] Further, if used in a blended manner, this can be combined with actual performance. The performance phase can be recorded and can be used to provide formative feedback. These videos can be used for

supervision, post-procedure debriefing, providing feedback, assessment and promoting reflection.[37]

Alternatively, these videos can be watched in small groups / online break rooms with discussion.

Fig.3: Suggested training model of how online videos can be used to teach skills



For example, a simple procedural skill such as tying a knot, or suturing needs task-training models. An instructional video can take the trainee through the steps of demonstration and deconstruction. The comprehension step (“trainee talks the trainer through”) can be done by using synchronous interactive online sessions with the trainer. The next step of performance (“trainee does”) can be recorded. Simple recording devices such as a laptop, smart phone or headgear camera can be used for supervision and recording. The recorded video can be uploaded to obtain feedback and for assessment. The learner can repeat the performance based on the received feedback, and again upload a new video

until he attains the pre-defined level of competence. Feedback provided on these videos have been shown to improve simulation scores, technical skills and even patient safety.[38]

Availability of task training models or kits for all the procedural skills could be a challenge. The learning resource material needs to be developed or acquired depending on the availability, resources and requirements. If common training kits can be made available for all the learners by the institution, it ensures uniformity. For more complex procedural skills, availability of mannequins and online screen-based virtual-reality simulators will be valuable for training, feedback and assessment.

It is possible to prepare peer-reviewed educational videos to teach skills and procedures.[39] People learn effectively from multimedia.[40] Learners have been found to use online videos prepared for conducting OSCEs for self-study of clinical skills.[41]

Teaching health humanities online

Competencies that focus on imbibing appropriate values, ethical conduct, professionalism, interpersonal and communication skills are an important component of the MBBS program. These skills were previously deemed to be obtained passively by observing and associating with senior colleagues in the profession. However now, with the introduction of modules like AETCOM[42], the acquisition of these competencies has been mainstreamed. Many of these outcomes lend themselves to online acquisition with correct lesson planning and appropriate use of technology.

It must be remembered that learning needs should drive the use of any technology and not vice versa. Many of the learning outcomes can be attained by fairly low investment in technology and use of free and open-access resources. We have chosen examples from the AETCOM module[42] to demonstrate how the online learning environment may be used and adapted to help learners acquire requisite competencies.

Example 1. This example uses a first-year communication module that encompasses large group and small group learning, observation skills, collaborative and self-directed learning and formative assessment. This example uses Module 1.4 of the AETCOM booklet[42].

S. No.	Component	Online adaptation	Resources
1.1	Introductory session	Online lecture to large group OR Uploaded recorded lecture with online discussion (flipped classroom format)	Online video platform (subscription or open source) Above + Online repository such as YouTube
1.2	Self-directed learning	Provide assignments that require students to: - research and compile information individually and in groups - prepare and upload reports These reports are then reviewed by faculty and shared with students	Group email OR Online word processing platforms that allow documents to be shared or edited together ± Online video platform that allows group calls
1.3	Small group sessions on improving communication skills	A communication video with common mistakes in communication is prepared with standardized patients This is viewed together by learners A discussion (live or chat box), that elicits student observations of these mistakes and how to correct them, follows	Online video platform (subscription or open source)
1.4	Closure session	A discussion in small groups that summarizes learning and future learning to be done	Online video platform
1.5	Assessment	Students are graded for - Participation in activity and - assessment of self-directed learning	Spreadsheet or an electronic form with components

Example 2. The second example adds the complexity of a skill session. This example uses Module 3.1 of the AETCOM booklet[42].

S.No.	Component	Online adaptation	Resources
2.1	Introductory session	Same as in example 1.1	Same as in example 1
2.2	Small group sessions	Same as in example 1.3	
2.3	Skills lab sessions	A standardized patient is available online for real-time communication. A communication task is provided to the student which is done online. (Ideally the session is recorded and uploaded to the server for retrieval by the student designated peer and preceptor) The standardized patient assesses learners using a check list and comment form and submits it online. He can also be available for the debrief. After the task is completed, the student retrieves the recording of the encounter and records observation, comments and points for improvement The preceptor can view the interaction live OR can retrieve the recorded encounter and review. A debrief opportunity is created between the student and the preceptor where the performance is reviewed and a plan for improvement is made through guided reflection.	Online video platform (subscription or open source) with recording facility (ideal) and ability to retrieve and view (ideal) Online form to collect patient-preceptor and learner impressions of encounter

Example 3: This example describes a way to emulate a team tag-along session. This example uses Module 2.4 of the AETCOM booklet[42].

S.No.	Component	Online adaptation	Resources
3.1	Tag-along session	An identified member of the health care team joins on a video call with the group of students and facilitator. After an initial goal-setting discussion, the member of the health care team does a walkthrough of his or her area talking and taking questions from the students. A front facing camera fixed to the upper garment and earphones are simple and cost-effective workarounds (as opposed to having another person accompanying the team member with a camera). It is important to brief patients and colleagues involved in this session and get necessary permissions for use of videos and images.	Online video platform (subscription or open source) Smart phone to transmit the walk - through to the online platform
3.2	Small group discussion	Can be done immediately following the walk through or later to elicit observations, reflections, summaries and learning	Online video platform (subscription or open source)

Example 4: This example provides a way to emulate a session on empathy. This example uses Module 2.8 of the AETCOM booklet[42].

S.No.	Component	Online Adaptation	Resources
4.1	Patient interviews	With suitable and appropriate permissions students may be allowed to interview family members of patients through an online platform. (If needed, faculty observer can be present to ensure comfort and safety). Logins from different locations of family members allows exploration of feelings of relatives - not proximate to the patient.	Online video platform (subscription or open source)
4.2	Large group discussion	After suitable permissions have been taken, family members are asked to join, speak and answer questions from participants in a large group discussion on a moderated online platform.	Online video platform (subscription or open source)
4.3	Self-directed learning	Lists of online resources such as videos or movies are provided. Students can view them offline - write a report and submit them.	Ability to submit through email or an online submission process
4.4	Closure	Same as in 1.4	
4.5	Formative assessment	Submission of items in 4.3	

Example 5: This example provides an example for emulating an online-case based discussion on medical ethics. This example uses Module 3.2 of the AETCOM booklet[42].

S.No.	Component	Online Adaptation	Resources
5.1	Introduction of the case	A paper case may be posted ahead of time and introduced through a small group online session. Innovation could include a video recording of a patient interview followed by discussion.	Online video platform (subscription or open source)
5.2	Self-directed learning	Same as in 1.2 based on the case provided	
5.3	Anchoring lecture	Same as in 1.1	
5.4	Discussion and closure of case	Same as in 1.4 Additionally, an online role play can be done with two students. Remaining students can identify issues and critique them.	Online video platform (subscription or open source)

From these examples, it may be evident that a good approximation of learning which occurs in a physical environment, can be emulated in an online environment. This requires adequate planning and use of resources even if limited creatively. It must be emphasized that, remote learning is not a substitute to proximal guided learning that a master teacher provides. The use of webcams and phone cams reduce the amount of detail that can be captured in an online system and do not completely replace the aesthetics and immersive experience of a skills lab or patient care setting. However, planning, practice and wise use of technology allows skill acquisition to proceed in an uninterrupted fashion.

Online assessment

Online assessment involves the use of electronic or digital devices to construct or deliver assessment tasks. This may also be used to monitor progress of learners, to mark or grade assessments, and for record keeping of these data. The digital devices can range from simple devices such as smart phones or tablets, to laptops and desktop computers, and can go up to complex simulators and gaming devices.

Role of assessment in online teaching

Assessment can be used in different ways in online teaching. Some of them are as follows:

1. ***Assessment before teaching***: Using short quizzes or tests before starting a topic can be useful for teachers to gauge the baseline knowledge and skills of the students. This can be used to subsequently tailor the teaching according to the level of the learners. This can even be done informally by asking questions before the session starts using the poll option or chat box. Teachers need to know the level of the group as a whole and not individual performance in this situation.

2. ***Assessment during teaching***: This can be done at the level of a course or at the level of a teaching session.

    a. Tests conducted midway between a course help students to self-assess their learning and keep up with the deadlines. They help teachers to make mid-course corrections and give feedback to learners.

    b. It is always a good idea to break up long teaching sessions into smaller sections. This helps students to concentrate. Several simple classroom assessment techniques[42] exist and these are useful as these are quick, anonymous, and non-graded. Techniques such as polls, muddiest point or one-minute paper can help in assessing knowledge, recall, and understanding. Several of these techniques can be adapted to online settings with use of interactive applications. Here key messages from the topic just taught can be asked in an applied form. This helps teachers in knowing whether the concepts just taught have been assimilated by students or not. Again, here group performance will be important rather than individual performance. If most of the students have got the answers wrong, the concept will have to be revisited and explained. Concept maps and one sentence papers can be used to test ability to synthesize knowledge.

Breaks such as these, also give students a chance to ask for clarifications, which they otherwise hesitate to ask.

3. ***Assessment after teaching***: This can be done at the level of a unit or at the level of a course:

    a. After completion of a unit (or some units), formative assessment can be done. Here the purpose will be to assess the performance of the learners, as well as to give feedback about what they have done well and what can be improved.
    b. After the completion of a course, summative assessment is performed to make pass/fail decisions for certification.

4. ***Assessment as learning***: It is customary to classify assessment as formative (assessment *for* learning) and summative (assessment *of* learning). The contemporary trend is to use assessment to facilitate learning. This involves giving students an assessment task which will require them to go through an authentic experience or perform an activity, and thereafter submit a report. For example, students could be asked to go into the community or a hospital ward, interact with certain subjects, read about the topic, and compile their findings and submit their learning in the form of a report. This kind of assessment erases the artificial divide between learning and assessment. This also promotes self-directed learning.

Formats for e-assessment

When online assessments first started, they merely involved transfer of paper-based questions to an online format. However, much of that has now changed. With e-assessment, a whole range of different question formats are possible.

These include multiple choice questions and their variations such as extended matching or assertion-reason type questions. But besides these, there is the possibility of using audiovisual triggers such as clinical photographs, X-rays, gross or microscopic images, graphs, or auscultation sounds. Simulations can be used to develop electronic patient management problems and virtual patient scenarios.

Live interactivity is possible in online assessment which makes it possible to perform virtual OSCE, where students can be assessed using standardized patients or videos. This is useful for assessment of communication skills and history taking skills.

Electronic portfolios can be used to gather evidence of learning. Activity based assessment such as project-based assessment or reflective writing are useful methods

which can assess behavioural competencies which are usually considered ‘immeasurable’.

The different question formats that can be used in online assessment are summarized in Table 14.[44-45]

Table 14: Different question formats that can be used in online assessment

- Multiple choice questions and its variants
- Short answer questions
- Online polls
- Picture based questions based on audiovisual clues
- Electronic Patient Management Problems
- Objective structured video examination (OSVE)
- Projects
- Reflections
- Portfolios

Advantages of automation

Use of well-designed online assessment formats brings in efficiency and ease in marking assignments. Several assessment formats can be automated during their construction phase, reducing subsequent faculty workload. Use of well-constructed rubrics and standard marking formats can make most assessment formats more reliable and fair to learners, by reducing inter-rater variability. It is possible to verify whether students are adhering to deadlines and submitting assessments on time. Monitoring learner progress is simplified as record keeping is much more meticulous and at one’s fingertips.

Rethinking the concept of what to ask

Since online assessment first began by replicating paper-based assessment to computer-based settings, most people presume that it can be used only to test objective assessment questions. However, this is not true. The way students learn, depends heavily on what kind of mental processes are activated by the questions asked during assessment. If questions merely test rote learning, students will veer towards surface learning. When questions asked are more complex, students will start learning deeply and try to connect the dots between different mechanisms. The kind of trigger that we use to ask questions influences the learner’s way of studying differently. This can be done by the following ways (Table 15):

Table 15: How to ask questions differently

What to ask	How to do this and what this does	Example
Ask higher order questions	Rather than asking questions from the lower levels of Bloom's Taxonomy which encourage rote learning, ask questions from the higher levels such as comprehension, application, analysis, synthesis and evaluation. These could be in the form of problem-solving exercises, projects, surveys, or case studies.	Instead of asking: *Enumerate the morphological changes seen in the heart in rheumatic heart disease.* convert it into a higher-order question by simply using a clinical scenario. *If a child with rheumatic fever is not treated, what are the changes that can be expected to be seen in the heart 15 years later?*
Ask integrated questions	Ask questions based on pathophysiology and mechanisms in clinical subjects. Similarly, when teaching basic subjects, the applied relevance must be emphasized. This will help students to form neural connections in their mind and study a subject deeply by understanding the basics rather than merely memorizing it by rote.	Instead of asking: *'What is the action of cyclooxygenase on inflammation?'* the student can be given a scenario like, '*After watching too many webinars, a student has a headache and takes an aspirin to relieve the pain. Which steps of inflammation will be affected by the medication*?'

Build authenticity into questions	When students will finally encounter patients, they are likely to face complex situations. So instead of restricting questions to one chapter or topic, it may be useful to expose them to scenarios where they need to explore their learning beyond unit-wise or department-wise boundaries. Authentic scenarios will help in preparing students for real life patients.	If a question about a treatment of a condition is asked, it may be possible to include details about a co-morbid condition, which could lead to side effects or contradiction to use of a routine drug. If a patient is poor, and a drug cannot be afforded, then that kind of situation can be built into the question. If a patient might not be expected to comply with a regimen, then what choices would a physician have to alter his management?

Assessment in clinical settings

When it comes to assessing clinical competencies, cognitive parts of competencies such as clinical reasoning and communication skills can be assessed online. It is also possible to test heart sounds or visual signs through online platforms. Simple electronic patient management problems or complex AI technology-based virtual patients (computer-based simulations) can be used to test clinical reasoning skills.[46-48]

There have been reports where Objective Structured Video Examinations (OSVE) have been used with some evidence of being valid.[49] In an OSVE, different clinical scenarios were chosen depending upon the clinical and communication skill competencies to be tested. Short patient-clinician interactions, less than 10 minutes long, were scripted and filmed. Each scenario included some deliberate communication skills elements such as greeting the patient, checking for the identity, use of open and closed questions, eye contact, displaying empathy, clearing doubts, summarizing and closing. Some obvious errors in communication were included in the script. Students were expected to watch the video. Thereafter, they were given answer sheets where they had to identify what was done right and what was done badly in the patient-doctor interaction.

However, Holmboe[50] stated that “although simulated patients and other simulation technologies were important and reliable tools for teaching clinical skills and evaluating competence, they cannot substitute direct observation of students’ clinical skills on real patients by the faculty”.

Now, with the availability of software which permits real time interactivity such as Google Meet, Zoom or Skype, students can be observed and assessed on history taking or communication skills using real or standardized patients. These sessions can be recorded easily and assessed. Assessment of communication skills, professionalism and attitudes can be done through use of simulations, standardized patients and online *viva*. This has been discussed earlier. Use of hypothetical scenarios can help in assessing a student's competence in managing complex clinical situations.

With the availability of break-out rooms, several institutes are experimenting with conduct of online or electronic OSCEs. This, however, requires a great deal of coordination and planning so that students move in and out of online OSCE sessions seamlessly. Each room needs presence of cameras and recording equipment. Faculty and standardized patients are needed depending on the stations. Proctoring devices and encryption of data may be essential. This is an expensive affair, and needs involvement of a whole team of faculty, assistants and IT specialists to run smoothly.

Choosing the right assessment tools

The assessment clock model[51] provides educators practical guidance about how to determine the key characteristics of assessment and decide the most suitable assessment tool in a normal or crisis situation. This model is based on van der Vleuten's[52] empirical formula:

> *Utility of assessment = Validity x Reliability x Cost-effectiveness x Acceptability x Educational Impact*

The model can be interpreted to suggest that in normal circumstances, when one is developing a low-stakes examination, more weightage should be given to features like the cost, acceptability and educational impact. For high stakes examinations, validity and reliability are more important characteristics. However, in crisis situations like the Covid-19 pandemic, weightage would be on acceptability and cost issues, especially as we are transitioning to a new method of assessment, and there are issues of fairness and security.[53] Validity and reliability will remain the most important issues for high-stakes examinations like selection examinations and high-quality items must be chosen carefully for inclusion into question banks.

Feedback in online settings

Feedback is a two-way process. Students need to get feedback on how they are performing, while teachers need feedback from students on how their teaching is being received.

When learners are provided with formative feedback, assessment becomes a learning opportunity. Online assessment enables provision of individualized feedback which plays a very important role in enhancing student learning. This can be done using several formats. In case of assessment-related feedback, examples and model answers provide excellent opportunity for the student to compare his performance. This can help one to reflect on the assessment process also.[54] Feedback can be built into assessment, using automation in certain cases. For example, in case of self-assessment modules to be administered at the end of every unit, specific feedback can be built into each option chosen by the learner. Automation easily enables this to be shown to the learner as soon as they have submitted their responses. Another way of providing feedback is to design automated feedback statements based on scores obtained by the learner. This might not be very specific but can provide some guidance to the learner. For faculty, common feedback responses can be designed in the form of macros which need to be inserted by ticking a box, enabling faster marking and provision of specific individualized feedback.

Feedback related to psychomotor skills can be given after viewing recorded videos as explained earlier. The logbook can also be maintained electronically with options for locking after each loop. This can also serve as a permanent record of the progress made by the learner.

If time permits some personal time devoted to each student can be very productive. However, personalized feedback requires lot of time and effort from teachers. To be available to students for voice interactions outside the scheduled sessions can be very helpful, but taxing for the teachers. It may be a good idea to provide fixed time slots for personalized interactions through virtual or telephonic modes.

Group feedback is another technique, where all assignments and feedback are available for all members to view and correct themselves. This also makes the whole process transparent.

One advantage of using online tools is that feedback can be given in the form of small doses which are spaced out throughout the course. Small doses of frequent formative feedback will be more easily accepted and assimilated by learners. Faculty will need to be trained in providing constructive feedback. Use of rubrics and macros can enable specific feedback to be delivered efficiently and at fixed periods, depending on the pace at which learners are progressing.

The issue of plagiarism

A common complaint among teachers is that students tend to copy and paste from online sources. Plagiarism is a universal phenomenon among learners. It will be important to spread awareness about what constitutes plagiarism and why it should not be practiced

among both students and faculty. Use of anti-plagiarism software should become a routine practice. A strict non-tolerance policy against plagiarism needs to be enforced and a culture of academic integrity needs to be slowly encouraged on all campuses.

The cost of online assessment

While there are several free or low-cost software and applications which permit one to conduct low-stakes examinations and classroom assessment easily, using online tools for high-stakes examinations comes at a high cost. However, as the number of users increase, the cost of these software applications is likely to come down.

Proctoring devices are required to eliminate the possibility of student cheating and manipulation. These need to be installed at the level of the Universities and institutions, to prevent copying. Electronic software is available which block the use of other screens when the examination is on. There are ways to monitor eye movement and time away from the camera. These tools can enable examinations to be carried out under surveillance of web cameras. This will incur massive costs and will require storage of huge amounts of electronic data.

It must be remembered that online assessment is not the ultimate solution to all our woes. It must be used in conjunction with face-to-face assessment. However, it does help in reducing faculty workload through automation. To be fully acceptable, we will have to seek tools which make assessment valid, reliable, cost-effective and acceptable.[55] Overall, one cannot ignore the educational impact of using assessment on student learning. Online assessment is now an integral part of the assessment toolbox. It is not a substitute, but a complement to regular face to face assessment.

Quality assurance in online learning

As the use on online modes of teaching and learning increases, it becomes important to monitor the quality of educational processes and determine if the intended educational outcomes have been attained.

Several processes need to be evaluated for quality assurance in online learning.[56-57] These are listed below:

(a) Leadership and management: Policy, vision, mission, goals, planning
(b) Faculty profile and faculty development
(c) Availability of technology, infrastructure and learning resources
(d) Curriculum design
    i. Competencies, learning outcomes and learning objectives
    ii. Instructional methods
    iii. Course activities and learner engagement
    iv. Assessment
    v. Continuous quality improvement and evaluation
(e) Learner support and feedback: learner profile
(f) Learner accessibility and experience

Just as in the traditional classroom, some **benchmarks** are essential to the conduct of online teaching. These include[58]:

- clear planning,
- good infrastructure,
- faculty support to conduct online learning,
- clear standards for good course design,
- clear instructions for students,
- open communication channels between faculty and students,
- regular feedback to students on their progress,
- regular feedback from students on their experience, and
- continuous monitoring and evaluation.

How to conduct blended learning sessions

It is predicted that online learning will continue to be a part of our regular teaching armamentarium even when the pandemic ends, albeit in a blended learning format. **Blended learning is the "thoughtful integration of classroom face-to-face learning experiences with online learning experiences**".[59] Given the experience of online learning that has been gained during the pandemic, it may be useful to continue using it in the post-pandemic phase, in a blended learning format, subject to further deliberations and consensus.

Blending the advantages of face-to-face interactions with online sessions enhances the learning process. Blended learning can:[60]

- Expand the opportunities available for learning,
- Provide information and resources for learners,
- Streamline course management activities,
- Facilitate student engagement through interactivity and group work.

Hallmarks of blended learning:

There are four hallmarks of blended learning (Fig.4). These are:

1. **Seamless integration of online and face-to-face session:**
   The facilitator integrates the face-to-face session with online activities by summarizing the online activity and linking it with the face-to-face session.

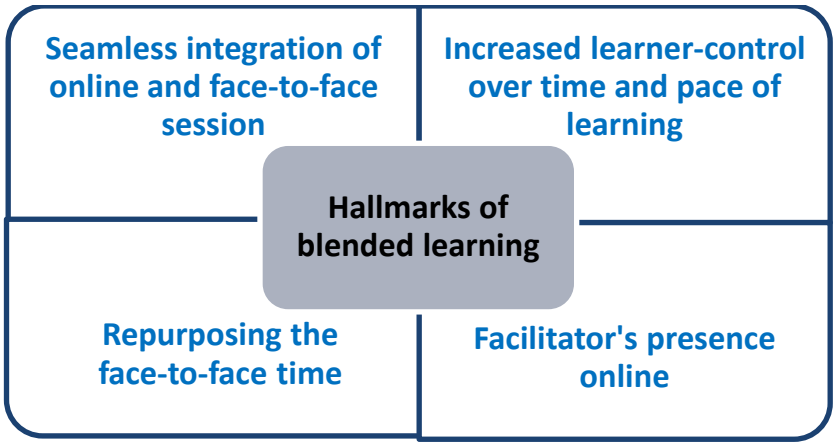
2. **Increased learner control over time and pace of learning:**
   Learners should be able to access the online contents at the time and place of their convenience. There should be flexibility in learning.

3. **Online presence of facilitators:**
   Facilitators should be visible through the online activities. This is possible by providing timely feedback and participation in discussions.

4. **Repurposing the face-to-face time:**
   Traditional class time is replaced with time taken by students to carry out their online learning activities. It is ideal to use the face-to-face learning time to impart higher-order learning and skills, while using the online sessions to recall or deliver basic knowledge and carry out collaborative activities. Blended learning provides

possibilities to repurpose the contact time to facilitate deeper thinking and in-depth learning.

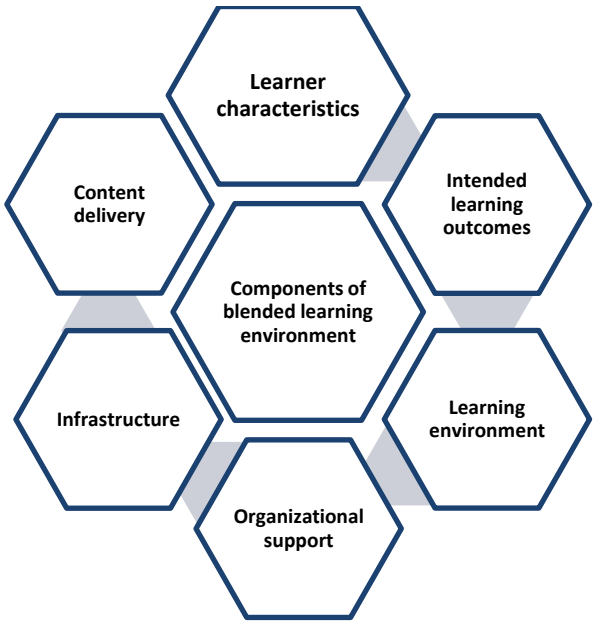
Fig. 4: Hallmarks of blended learning



Components of blended learning

Fig. 5 shows the main components which make up the blended learning environment.

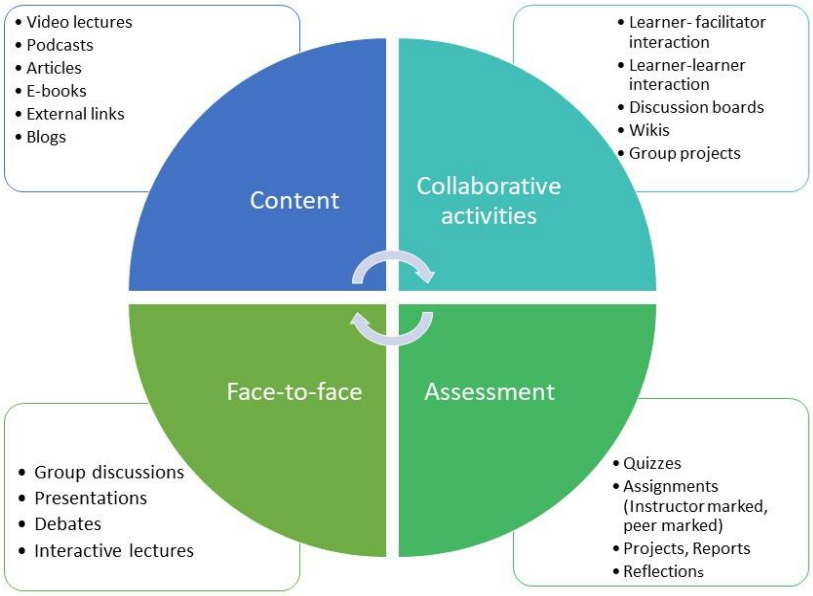
Fig. 5: Main components of the blended learning environment



Designing a blended learning session

The process of blended learning goes through the following steps in a cyclical manner: planning, designing, implementing, reviewing and improving. Fig. 6 shows some of the activities that can be incorporated into blended learning sessions:

Fig. 6: Examples of activities which can be included in blended learning



Questions to be asked while designing online activities

1. How will the learning activity support the intended learning outcomes?
2. What will motivate the learners to engage in online activities?
3. How can the facilitator motivate the learners and encourage to support one another in online learning?
4. Can a learner's activities and tasks be incorporated into continuous assessment, so that the learning activities can conform to the principles of student-centred learning?

EXAMPLE

Here is an example of a blended learning module for undergraduate students of final MBBS (Part II):

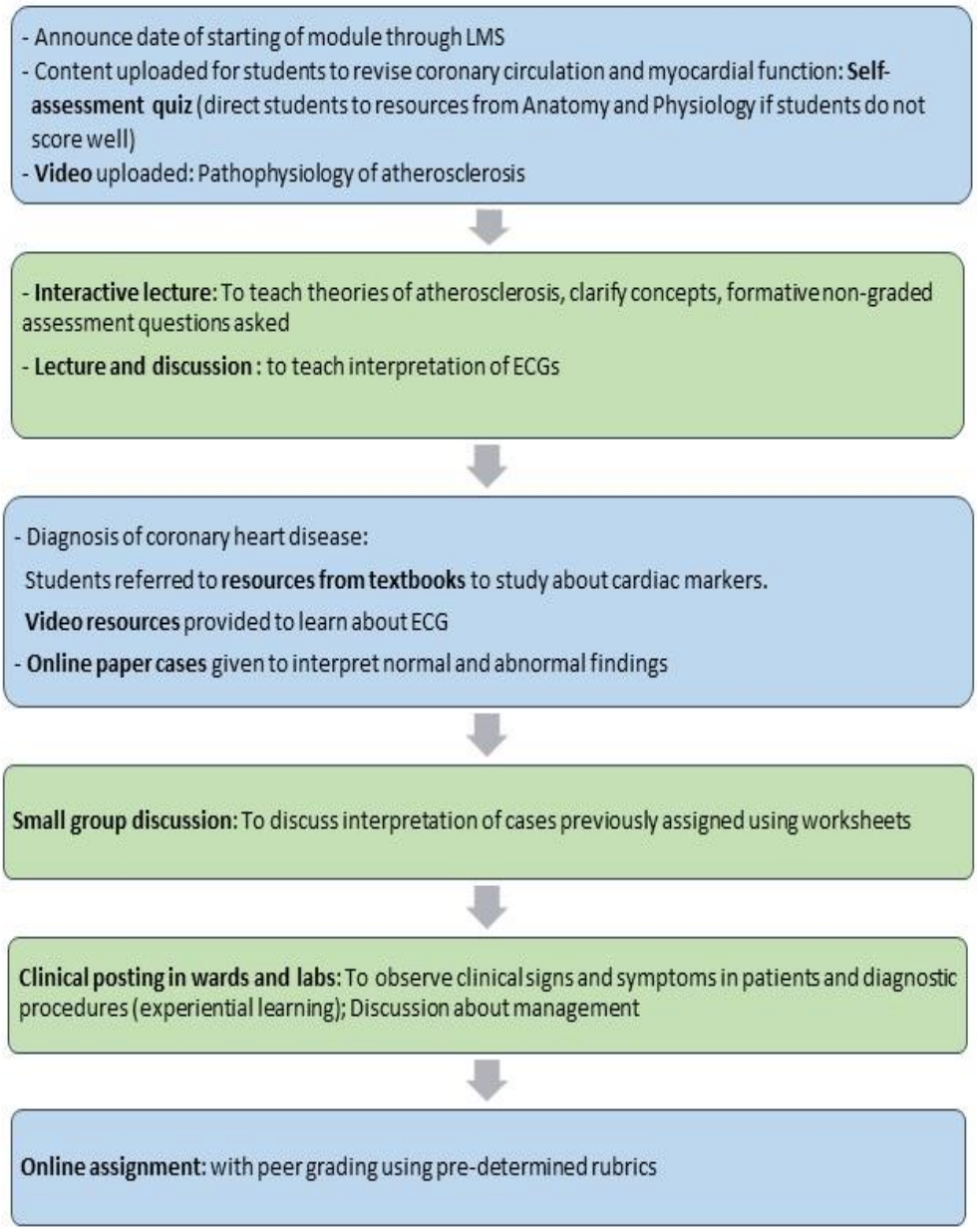
BLENDED LEARNING MODULE ON CORONARY ARTERY DISEASE

Learning objectives:
On the completion of this module, the learner should be able to:

- Describe the etiopathogenesis of coronary artery disease
- Choose the correct approach to diagnose coronary artery disease
- Apply the right medical and surgical approaches to manage a case of coronary artery disease

Fig. 6: Online and face-to-face components of a blended learning module on coronary artery disease

- Face-to-face - Online component



Advantages of Blended Learning

1. Improved content access to the learners,
2. Learner-centered teaching,
3. Improves communication, creativity, collaboration and critical thinking among learners,
4. Inculcate life-long learning skills,
5. Provides greater flexibility to the learners.

Challenges:

1. Creating infrastructure to deliver online contents,
2. Training faculty members in the process,
3. Providing accessibility to the learners,
4. Organizational culture and support.

Blended learning is an effective method which is student centric and provides flexibility to learners. It must be adapted to meet the needs of the new digitally savvy learners.

EPILOGUE

The concept of triage

During the Covid- 19 pandemic, most faculty have been involved in clinical care, and learners had to be off campus due to safety concerns. Medical education had to take a back seat. Clinical teaching, specially, has been disrupted in these unprecedented circumstances. At a time like this, we will have to take some difficult decisions to cater to our immediate needs and mitigate the long-term negative consequences. We will have to evaluate the feasibility of what can be done and triage our resources. At all levels, we will have to determine: (a) what activities can be continued, (b) what activities should be postponed, (c) what activities can be adapted to another format and what remedial action/s need to be taken, (d) what activities should be dropped, and (e) what new activities need to be added.[61] For example, if clinical teaching cannot be conducted during the pandemic, one has to assess which parts can be converted into video or online teaching, and what needs to be postponed for later. Batches of students who have missed certain competencies must be taught and assessed on those competencies, once the campus is safe for on-site classes. If Covid- 19 related competencies were not being taught earlier, they have to be added to the curriculum. This kind of mapping of competencies where sacrifices and difficult choices to be made are charted out, is useful in a crisis. These kinds of negotiations must be made reflecting on the ultimate impact on medical education in the future.

Sharing resources

Since most institutes face a resource crunch, it is advisable to share resources such as instructional videos and skills laboratories between institutes. Preparing instructional videos is time consuming and needs trained resource faculty. Once these instructional videos are prepared, they can be reused, and a library of such videos can be developed as collaborative project between the institutions or Universities for common use. Colleges of one region can collaborate and create electronic question banks using the concept of consortia. All participating institutes will need to contribute good quality questions which are validated to the question bank. Administrative costs of maintaining the question bank can be shared between all participating institutes.

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