The Medical Educator's Playbook on:

How to use Digital Resources to implement new MBBS curriculum and teaching methodologies?

With illustrated digital teaching–learning modules and sample lectures on key topics and pedagogies

Designed from a series of hands-on workshops conducted by
Elsevier India & Christian Medical College | Ludhiana 2022-2024

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Foreword from the Managing Director's Desk, Elsevier India

As India's undergraduate medical education embarks on a transformative journey under the new competency-based MBBS curriculum, we acknowledge both the profound opportunities and the significant challenges that lie ahead. The Government's unwavering commitment to cultivating practice-ready, compassionate doctors for Primary Health Centres is a crucial pillar in achieving Universal Health Coverage and meeting WHO's established doctor-to-population ratios.

To realize this ambitious vision, our educators must be equipped with robust, digitally enabled systems that simplify curriculum delivery and assessment, while simultaneously inspiring active, student-centred learning among the next generation of healthcare professionals.

In this context, our initiative—**Faculty Development Workshops**: "*Harnessing Digital Resources to Implement New Competency-Based Curriculum Teaching Methodologies*"—is a pioneering industry-academia collaboration initiative to support India's undergraduate medical educators. Through these workshops, Elsevier stands beside our educators, empowering them to leverage world-class, locally relevant digital resources aligned with over 2,900 MBBS competencies.

Since 2022, our collaboration with Christian Medical College (CMC) Ludhiana, a recognized National Faculty Development Centre, along with Medical Education Thought Leaders such as Dr. Dinesh Badyal, has facilitated six national workshops engaging over 200 faculty members from 57 medical colleges across 10 states. Building on this momentum, our Regional Faculty Development Programs in the North-East and other states continue to foster a new generation of faculty champions who are leading digital adoption at the grassroots level.

Our purpose is clear: to nurture a vibrant community of faculty innovators who are driving digital transformation in undergraduate medical education—shaping a future where India's medical learning systems are world-class, accessible, and aligned with national health priorities.

Together, we are committed to this shared vision—partnering hand in hand—to shape the future of medical education in India.

Vidur Renjen

Managing Director
Elsevier India

Foreword from the Director's Desk, CMCL

The field of medical education in India stands at a transformative crossroads. As technology becomes an increasingly indispensable part of our lives, its integration into medical teaching and learning is no longer a luxury but a necessity. In this era of rapid advancements and global interconnectedness, preparing the next generation of doctors demands innovative approaches that extend beyond the traditional classroom.

The Medical Educator's Playbook on "How to use Digital Resources to implement new MBBS curriculum and teaching methodologies?" is a timely and invaluable resource for medical educators navigating this evolving landscape. This is not just a manual but a vision—a roadmap to empower educators in implementing the new MBBS curriculum by delivering content and resources that are engaging, accessible, and impactful. It underscores the importance of blending the rich tradition of Indian medical education with cutting-edge digital resources to create a robust, learner-centred experience.

At our institute, we have conducted faculty development workshops for our own faculty as well as for educators from multiple states and colleges across North and East India. Through these sessions, we witnessed firsthand how digital modules can transform teaching, learning, and assessment processes. They enable students to grasp complex concepts, connect theoretical knowledge to clinical practice, and prepare for real-world challenges. This captures these possibilities and offers practical, actionable strategies for educators at all levels.

As you explore its pages, you will find not only technical insights but also a call to action—a call to embrace the future of medical education with creativity, adaptability, and a steadfast commitment to excellence. I am confident that this will serve as an indispensable guide for educators across India, fostering innovation and collaboration in the pursuit of shaping competent, compassionate, and globally competitive medical professionals.

Let us, as educators, be the catalysts for this transformation. Together, we can ensure that the doctors of tomorrow are equipped to lead with knowledge, skill, and purpose.

Dr. William Bhatti

Director at Christian Medical College & Hospital (CMC) Ludhiana, India

Foreword from the Principal's Desk, CMCL

Medical education is the cornerstone of our nation's healthcare system, and as educators, we bear the responsibility of preparing future doctors for the challenges of an ever-evolving world. In this digital age, traditional methods of teaching alone are no longer sufficient. We must embrace technology to create dynamic, engaging, and effective learning environments.

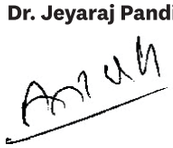
***The Medical Educator's* playbook** is a testament to the power of innovation in education. It provides practical strategies and creative approaches for integrating digital resources into the MBBS curriculum, helping educators not only adapt to change but also lead it.

At our institute, we believe that industry-academia collaboration is key to driving meaningful change in medical education. Such partnerships bring real-world relevance, advanced technological tools, and valuable industry insights into the academic sphere, ensuring that our students are not only well-prepared in theory but also equipped with the practical skills needed in their careers. A prime example of this is our collaboration with Elsevier, a globally recognised publisher and information analytics company. Through this collaboration we have co-created a series of non-commercial academic workshops for undergraduate medical faculty aimed at improving undergraduate medical education accessibility and quality across India.

This captures the essence of such transformative efforts, offering actionable insights that every educator can apply to improve their teaching and their undergraduate medical students' learning experiences.

I encourage you to explore this resource with an open mind and a commitment to enhancing the learning journey of your students. Together, let us redefine medical education and ensure our graduates are equipped to serve with competence, compassion, and confidence.

Dr. Jeyaraj Pandian



Principal at Christian Medical College & Hospital (CMC) Ludhiana, India

Preface

In the dynamic landscape of medical education, the recalibration of the MBBS curriculum in India marks a pivotal moment, necessitating a profound reimagining of teaching methodologies. The integration of digital resources has emerged as the linchpin for navigating this transformative journey. This preface delves into the conceptualization and essence of faculty development workshops focused on "HARNESSING DIGITAL RESOURCES TO IMPLEMENT NEW MBBS CURRICULUM IN INDIA," with a specific emphasis on non-didactic teaching methodologies those are integral to the evolution of medical pedagogy.

The workshops outlined in this compendium are more than mere technical training sessions. They serve as incubators for fostering a pedagogical shift towards learner-centric approaches, aligning with the broader vision of the restructured curriculum. At the heart of this transformation lie non-didactic teaching methodologies, each a catalyst for cultivating critical thinking and holistic understanding among medical teachers. Small Group Teaching (SGT) now takes up two third of the time allocated for each subject and in each SGT there's a scope to use digital resources. SGTs are being used in Self Directed Learning (SDL), Integrated Learning (IL), Case Based Learning (CBL), Early Clinical Exposure (ECE) and many more teaching learning and assessment methodologies.

Self-directed learning takes centre stage in these workshops, encouraging faculty members to empower students to take charge of their educational journey. Digital resources become not just tools for content delivery but enablers of independent exploration and inquiry, fostering a culture of continuous learning beyond the confines of traditional classrooms.

Integrated learning, another cornerstone, envisions a curriculum that seamlessly weaves together various disciplines. The workshops delve into strategies for utilizing digital resources to break down silos, presenting a unified and interconnected approach to medical education. By leveraging technology, educators can create interdisciplinary modules that mirror the complexity of real-world medical scenarios.

Case-based learning, an exemplar of applied knowledge, is spotlighted as a transformative teaching methodology. The workshops guide educators on employing digital resources to curate compelling case studies that stimulate problem-solving skills, clinical reasoning, and a deep understanding of the contextual relevance of medical knowledge.

Early clinical exposure, a paradigm shift from conventional methods, is explored as an avenue to bring clinical exposure from the first day of medical college training thus bridging theory and practice. Digital platforms enable virtual clinical simulations, augmenting early exposure and allowing students to navigate lifelike medical scenarios before entering the clinical environment. The workshops delve into the practicalities of implementing such experiences effectively.

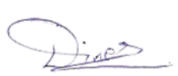
Formative assessments, integral to gauging student progress, are reimagined through digital tools. The workshops equip faculty members with strategies for incorporating real-time feedback, identifying quick and slow learners, interactive quizzes, and multimedia assessments, transforming assessments from summative evaluations to continuous, informative processes that drive learning.

Looking at how digital resources are pivotal to make implementing the curriculum components easier. In a notable example of industry-academia collaboration, CMCL partnered with Elsevier to deliver a series of faculty development workshops under the theme *"Harnessing Digital Resources to Implement New MBBS Curriculum Teaching Methodologies."* These workshops were conducted both at CMCL and at other centers, including Gauhati Medical College and Hospital (GMCH), encompassing participation from over 200 faculty, 57 medical schools, 10 states across North and North-East India. Recognizing the need for a structured dissemination of the outcomes, we decided to compile this compendium. It is designed to provide a feasible, adaptable model that faculty and departments can tailor to meet their specific curricular and institutional requirements.

As faculty members embark on the journey of implementing new MBBS curriculum, these workshops serve as compasses guiding them through the uncharted territories of educational innovation. By harnessing digital resources and embracing non-didactic teaching methodologies, educators can collectively propel the MBBS curriculum into a realm where the acquisition of medical knowledge is not just a passive act but an engaging, participatory experience. This preface extends an invitation to undergraduate medical educators to embrace this evolution, to explore the untapped potential of digital resources to make their lives easier, and to pioneer a new era in medical education in India.

Best Wishes,

Dr Dinesh Badyal



HOD Pharmacology and Vice Principal Medical Education, CMCL, Director CMCL - FAIMER

About Elsevier

Elsevier, part of the RELX Group (formerly known as Reed Elsevier), is a world-leading provider of information analytics solutions. **Elsevier is renowned for its scientific, technical, and medical content that helps advance research, healthcare, and education for the betterment of society.** To improve the delivery of healthcare and healthcare education, we combine content, technology and expertise in analytics to empower physicians, faculty, students, other healthcare professionals as well as patients to make better decisions thus leading to improved teaching and learning outcomes, improved patient outcomes and more cost-effective healthcare. Elsevier serves more than 30 million scientists, students, and health and information professionals around the world.

Our proud tradition extends over 145 years of expertise in academic & scientific publishing, present in 24 countries, has 83 million unique authors, 20,000 editors, 72,000 Editorial board members and 83,000 reviewers, and account for over 25% of the world's clinical content. Our content and solutions are used by over 25,520 Academic and Govt institutes globally, and these numbers continue to grow. Our solutions encompasses renowned imprints such as Saunders, Churchill Livingstone, Mosby, and Butterworth-Heinemann. Elsevier publishes many leading academic journals, including The Lancet and Cell, many leading textbooks such as Nelsons Essentials of Pediatrics, Gray's Anatomy, Williams Textbook of Endocrinology, and other leading reference products such as Science Direct, Scopus, the world's largest abstract and citation database. We recognize our profound responsibility to contribute to, and serve, our scientific and professional communities. We actively lead and participate in several initiatives which ensure that we adhere to international standards and codes of practice and assist those in developing countries in accessing our content. Elsevier supports research capacity building in developing countries as part of our commitment to universal access. Research4Life is a cornerstone of our corporate responsibility program and a keyway of achieving this. As a partnership of United Nations agencies, leading universities and publishers of four programs – HINARI, AGORA, OARE and ARDI – Research4Life makes 35,000 peer reviewed resources (journals, books and databases) available for free or at low cost to more than 6,000 institutions in 116 developing countries. Elsevier is a founding partner and a leading contributor of content with over 2,000 journals, 7,000 books and Scopus. At Elsevier, we recognize the potential for scientists and clinicians to find new answers, reshape human knowledge and tackle the most urgent global crises.

Elsevier has been operating in India for over two decades and has been promoting e-learning/ use of digital resources for MBBS teaching-learning for several years. Elsevier in India has been working with global and national thought leaders, and premier medical schools across the country to promote digitization in medical education in India. Our flagship e-solutions and products, available in India, include The Lancet, Cell, Scopus, Science Direct, Clinical Key Physician, ClinicalKey Student, Complete Anatomy, Osmosis and legacy textbooks such as Gray's Anatomy, Guyton's Physiology, Davidson's Medicine, Robbin's Pathology, and Nelson's Paediatrics, Vishram Singh's Anatomy, Dhingra's ENT have helped and are helping shape the country's medical education landscape. Many of these next generation undergraduate medical education e-solutions and products are now used at leading Indian Medical Schools like CMC Ludhiana, AIIMS Rishikesh, AIIMS Patna, KMC Manipal, KMC Mangalore, DY Patil Pune and KGMU Lucknow.

In past, Elsevier along with the Madhya Pradesh Government has launched Hindi books for the first year MBBS courses as part of a project to impart medical education in the Hindi language, which also aligns with National Medical Commission NMC's recent CBME guidelines released in 2024

From 2022 to 2024, Elsevier in a non-commercial partnership with CMCL has conducted four faculty development workshops for colleges across North India and one regional workshop for colleges in Northeast India thus covering . These workshops saw participation from 175 faculty, 65+ medical schools ,12 states across North and North-East India. The theme of these workshops was HARNESSING DIGITAL RESOURCES TO IMPLEMENT NEW MBBS CURRICULUM IN INDIA. Three similar workshops were also conducted for faculty in King George Medical University, Lucknow and Seth GS Medical College, Mumbai.

About The Christian Medical College & Hospital, Ludhiana (CMCL)

The Christian Medical College & Hospital, Ludhiana is an educational and research institution of an all-India character established with a mission focussed to provide excellent comprehensive training to graduate and postgraduate students for advancement of medical knowledge and research to make a significant contribution to the health standards of all communities of our nation, urban and rural and to reach primarily the unreached communities of India or elsewhere as needed

This national institute of eminence with exemplary medical education faculty, also hosts National Medical Commission Nodal Centre, CMCL-FAIMER Regional Institute, and one of the India centres of AMEE the International Association for Health Professions Education.

The Christian Medical College is situated in a large campus not far from Ludhiana Railway Station, on both sides of the Brown Road. The Campus has residential quarters for the staff, hostels for medical, nursing and paramedical students, both men and women. The College maintains 775 Hospital beds. Our national medical and para-medical teaching staff and other staff come from nearly every state in India. The Government of India and Punjab have continued their interest and support in the work and the development of the college and its hospital.

The Christian Medical College is recognized by the Medical Council of India. Since July 1999 the College is affiliated with Baba Farid University of Health Sciences, Faridkot, Punjab. Ludhiana, one of the old-established cities of Punjab, with a population that has increased during recent years to around 20,00,000 lies 300 km north-west of Delhi and less than 150 km from the border with Pakistan. It is situated on the Grand Trunk Road running from the border through to Delhi, and is an important railway junction. Today it is one of the fastest-growing small and medium industrial centers in India.

For more details, please visit https://www.cmcludhiana.in/

Digital Resources from Elsevier

ClinicalKey Student

A multimedia rich education platform packed with curated content resources - books, videos, cases, formative assessments & summaries). Easily searchable to enhance learning with effective integrated teaching, testing and study tools. Also, coming up interactive virtual cases that reflect authentic patient scenarios to assess and develop undergraduate students' clinical reasoning acumen in a risk-free environment.

India Skills Video

Now available along with ClinicalKey Student and developed in India, this platform hosts highly informative and engaging 150+ hours of 400+ audio visual modules (hands-on and procedural) on practical & clinical skills for undergraduates.

ClinicalKey Student

Osmosis

A medical learning platform that uses proven learning sciences to reinforce content, making learning more effective and efficient through byte-sized conceptual videos on 1,800+ highyield topics, plus linked assessments.

Osmosis

Complete Anatomy

The world's most advanced and representative 3D anatomy platform with ground-breaking technology, models and content. A learning environment with unique collaboration and teaching tools designed for blended learning to take anatomy beyond the dissection lab.

Complete Anatomy

Approach behind conducting these Faculty development workshops

Why?

The introduction of the CBME (Competency-Based Medical Education) curriculum for MBBS in India in 2019 brought several opportunities for Small Group Teaching (SGT). Coincidentally, the COVID-19 pandemic emerged the same year. This led many medical faculty to adopt online and digital resources for teaching, learning, and assessments.

Now, as students returned to physical classrooms and clinics, the exposure to online and digital resources during the pandemic has significantly raised awareness about their availability and utility. This has created a pressing need to train faculty in the effective use of digital resources for teaching, learning, and assessments.

What?

To address this need, it is essential to identify relevant digital resources aligned with the new MBBS curriculum and to develop a structured approach for their implementation.

In our series of workshops, faculty were introduced to a variety of digital resources, including both open-access and subscription-based tools and asked to create digital Teaching Learning Modules using existing resources

How?

The sessions began with an introduction to these resources, followed by hands-on practice in selecting and using them within various components of the curriculum. For example, faculty explored their application in Self-Directed Learning (SDL), Integrated Teaching, Early Clinical Exposure (ECE), Case-Based Learning (CBL), and Formative Assessment (FA).

Participants were then guided to design Teaching-Learning-Assessment (TLA) modules using representative digital resources. The methodology included large-group presentations and small-group hands-on sessions. Small groups developed modules using pre-designed collections on various common disease conditions and topics outlined in the new curriculum. These modules were presented to larger groups and expert panellists for feedback, idea exchange, and further refinement.

Why now?

While traditional Teaching-Learning Methods (TLMs) and similar formats are already in use in India, why is there a need for digital resources? Today's learners already use digital tools in their daily lives. Incorporating these resources into their education aligns with technological advancements and helps prepare them for the future.

Introduction
Overview of digital resources.

Hands-on Practice
Selecting and using resources within curriculum components:

- Self-Directed Learning (SDL)
- Integrated Teaching
- Early Clinical Exposure (ECE)
- Case-Based Learning (CBL)
- Formative Assessment (FA)

Design TLA Modules
Guidance on creating Teaching-Learning-Assessment (TLA) modules.

Small-Group Sessions
Develop modules using pre-designed collections:

- Common disease conditions
- Curriculum topics

Presentations
Small groups present modules to:

- Larger groups
- Expert panellists

Feedback & Refinement
Exchange ideas, receive feedback, and refine modules.

In digital formats, students can revisit standardized, authentic learning resources multiple times at their convenience (anytime, anywhere, 24/7). These resources are easy to access, engaging, and especially suitable for the current generation of students, who often have limited attention spans.

The modules developed using digital resources encourage the standardized delivery of the new curriculum, foster parity in teaching-learning activities, and bring together innovations and best practices from across geographies.

Understanding the teaching methodologies

Theory of Integrated Learning

INTEGRATED LEARNING AND ALIGNMENT TEACHING METHOD

Integration in the new CBME (Competency-Based Medical Education) curriculum for MBBS in India refers to purposeful merging of medical disciplines to provide students with a holistic understanding. This approach goes beyond traditional silos, emphasizing a comprehensive and interconnected learning experience aligned with competency-based models. It often involves a patient case with a given disease condition integrating basic sciences, paraclinical sciences and clinical skills to diagnose and manage real-world medical conditions, thus preparing the IMG (Indian Medical Graduate) to be "practice ready."

Types of Integration

Horizontal Integration and Alignment: Merges content across disciplines in the same phase of MBBS. Example. Rather than isolating anatomy, physiology, and biochemistry, in first phase MBBS curriculum, a horizontally integrated approach teaches about the anatomy of thyroid gland, physiology of thyroid hormone, and related biochemistry.

Alignment involves delivering subject material related to a specific organ system or disease condition during the same phase in MBBS and within a specific timeframe. This ensures educational components harmonize with desired competencies, guiding teaching, content, and assessments toward the skills necessary for effective medical practice.

Example. The MBBS course calendar is organised in a way that teaches about the anatomy of thyroid gland, physiology of thyroid hormone, and related biochemistry (interpretation of thyroid test) simultaneously.

Vertical Integration: Blends knowledge and skills across phases of MBBS. Example. Early years cover basic thyroid sciences in Anatomy, physiology, biochemistry, pharmacology), progressing to skills and clinical aspects (like Goitre in Medicine, Thyroidectomy in Surgery, Iodization Program in Community Medicine) in next phases, ensuring a smooth transition from foundational knowledge to clinical application. The suggested methods are sharing, nesting and co-relation.

Challenges in MBBS Teaching-Learning in India

In the landscape of MBBS undergraduate medical education in India, several challenges hinder effective holistic teaching and learning. These challenges include the vast curriculum delivered through diverse teachers, methods, different learning styles and paces among students, difficulty in understanding subject relevance and unable to link to real-world application, developing skills to generate practice-ready Indian Medical Graduate (IMG), limited faculty faculty time, and the advent of digital resources

Meeting these challenges through Alignment and Integration:

Enhanced Learning Outcomes: Integration fosters interconnected understanding, promoting deeper learning. Alignment ensures learning objectives contribute directly to competency development, enhancing knowledge relevance and applicability for "practice-ready" graduates.

Real-world Application: Integration mirrors real-world medical scenarios, preparing students for multifaceted challenges. Alignment with competencies mirrors requirements in clinical settings, bridging the gap between theory and practice for students to be "practice-ready."

Holistic Skill Development: Integration combines theoretical knowledge and practical application for a broad skill set. Alignment systematically builds competencies required for comprehensive medical practice by the IMG

Efficient Use of Resources: Integration optimizes resources and effective utilization of teaching time by breaking down subject-specific barriers. Alignment directs resources toward achieving specific competencies, avoiding redundancy

Adaptability to Healthcare Needs: Integration prepares students for dynamic healthcare by offering a versatile skill set. Alignment with competencies ensures education remains current and responsive to healthcare demands.

Patient-Centred Care: Integration and alignment contribute to professionals delivering patient-centred care. Patient outcomes improve when healthcare professionals possess an integrated and aligned skill sets.

Use of Digital Resources and Current Technologies in Alignment and Integration:

High quality peer-reviewed digital resources could be mixed-matched and used to develop digital teaching learning assessment modules integrating content/ resources from different disciplines for a comprehensive understanding of a given integrated topic. Furthermore, virtual patient cases requiring integration of knowledge from various disciplines, clinical cases, videos, virtual clinical scenarios/ simulations can also be aligned with desired competencies. Collaborative Online e-solutions/ platforms may also be used to foster interdisciplinary collaboration amongst various subjects. The question banks and digital assessment tools can be employed for continuous formative assessments to evaluate integration and application of knowledge - ensuring alignment with competency-based objectives.

Conclusion: In conclusion, aligning and integrating various subject disciplines in the CBME curriculum for MBBS in India is crucial for comprehensive, relevant, and responsive medical education. This approach enhances learning, prepares students for real-world practice, and develops well-rounded, competent, and "practice-ready" doctors.

Further Reading

https://www.nmc.org.in/wp-content/uploads/2020/08/Alignment-and-Integration_03.10.2019.pdf

The integration ladder: a tool for curriculum planning and evaluation by R M Harden

https://pubmed.ncbi.nlm.nih.gov/10886638/

Theory of Self-Directed Learning (SDL)

SELF-DIRECTED-LEARNING TEACHING LEARNING METHODOLOGY

Self-Directed Learning (SDL) is a dynamic teaching-learning method gaining traction across various levels of medical education, notably in MBBS undergraduate programs in India. SDL involves individuals taking the initiative, either independently or with support, to diagnose their learning needs, set goals, identify resources, choose learning strategies, and assess outcomes. The concept aligns with experiential learning, emphasizing the learner's central role in the educational process.

Theories supporting SDL include cognitivism, wherein learners use cognitive tools like information processing and memory, and humanism, where learning is tied to personal growth. The essence of SDL lies in its learner-oriented, facilitated, and applicable approach, making it a key component in creating lifelong learners.

Challenges in MBBS Teaching-Learning in India

In the landscape of MBBS undergraduate medical education in India, several challenges hinder effective teaching and learning. These challenges include Large class size, vast curriculum delivered through vast methods, and emphasis on SGT brings SDL into centre stage. Students enter MBBS from directly after school where they are dependent on spoon feeding . Theres a need for them to transition to adult learners and be better life long learners in future (need for constant knowledge updates as needed by both PG studies and later career as physicians and academicians) as expected out of an IMG

Meeting these challenges through SDL

SDL emerges as a powerful solution to address the challenges in MBBS education. By instilling SDL skills in students, medical education can navigate through the vast curriculum, accommodate diverse learning styles, and empower students to take responsibility for their learning. SDL allows students to learn at their own pace, manage their learning activities, and update their knowledge autonomously needed to be life long learners. Moreover, SDL encourages a deep understanding of subjects, improves retention, and fosters critical thinking, thereby preparing students to adapt to the evolving landscape of medical knowledge and practice.

Steps to Design and Successfully Implement SDL Sessions for MBBS

Designing and implementing successful SDL sessions requires a strategic approach. Integrate SDL sessions into the MBBS curriculum, ensuring alignment with other teaching-learning methods. Distribute SDL sessions throughout the year to avoid clustering. Key steps to design and implement SDL include:

Selection of Topics: Choose topics that stimulate student interest and align with learning objectives. Topics should be manageable within the allotted time frame. In CBME 2024 revised competencies SDL is already added for relevant competencies and suggested Teaching Learning Methods

Designing Modules: Finalize the competencies to be used and create linked LOs, find relevant resources on selected topics and decide on the number and duration of contact sessions.

Conduct of Sessions:

1. First Contact Session: Introduce the topic, students set learning goals, and facilitator guides students to resources.
2. Intersession Period: Allow students to explore resources independently and monitor them during this period
3. Second Contact Session: Conduct debriefing, capture the learning opportunities, reinforce the correct part and provide constructive feedback, guide on assimilating key points.
4. Assessment and Evaluation: Implement various assessment methods, including project work, case presentations, quizzes, and examinations. Evaluation should consider the overall SDL program and may include facilitator feedback, logbook entries, and reflections.

Use of Digital Resources and Current Technologies in SDL

The role of digital resources and technology in SDL is pivotal, especially in the current era. Information technology facilitates online learning, virtual sessions, and resource sharing. Digital platforms, e-journals, e-books, and multimedia resources enhance the learning experience. Online tools, simulations, and collaborative platforms enable effective debriefing, feedback, and peer interaction. In the context of SDL, technology not only supports learning but also aids in monitoring and assessment.

Conclusion

SDL stands as a transformative approach to overcome challenges in MBBS undergraduate medical education in India. By fostering SDL skills, medical education can empower students to become self-directed, lifelong learners, equipping them to thrive in the complex and dynamic field of healthcare. The integration of digital resources further amplifies the impact of SDL, making it a cornerstone in the evolution of medical education in India.

Further Reading

https://www.researchgate.net/publication/350163386_Triple_Cs_of_self-directed_learning_Concept_conduct_and_curriculum_placement

https://www.nmc.org.in/wp-content/uploads/2020/01/UG-Curriculum-Vol-I.pdf

Theory of Early Clinical Exposure (ECE)

EARLY CLINICAL EXPOSURE (ECE) TEACHING LEARNING METHODOLOGY

Early Clinical Exposure (ECE) is a pivotal educational strategy in MBBS undergraduate programs, involving first phase MBBS students in India visiting patients in clinics/ exposure to clinical scenarios in class , observing clinical cases to gain exposure to clinical environments and patient care from the early stages of their medical education. The underlying theory of ECE is rooted in experiential and social learning theories. It recognizes the profound impact of hands-on experiences in enhancing students' understanding, fostering clinical reasoning, and nurturing essential communication and empathy skills. Also helps students connect subjects taught in-class to the real-time clinics and scenarios.

Challenges in MBBS Undergraduate Medical Education Teaching-Learning in India

students often struggle with the transition from theoretical knowledge to practical application, and there is a growing demand for a more patient-centred approach to learning and generating practice-ready IMGs (Indian Medical Graduates). Furthermore there's an inability to link a subject taught to real time application and the intricacies of patient-centric care.

Meeting these challenges through ECE:

ECE serves as a transformative solution to address challenges in MBBS education. By developing ECE skills, first phase MBBS students visit clinics, see patients/ cases from Day 1 which in turn can bridge the gap between theoretical knowledge and clinical practice, fostering a more patient-centric perspective. Exposure to real-life clinical scenarios enhances clinical

reasoning, communication skills, and instils a sense of professionalism. ECE cultivates early empathy, crucial for effective patient care, and nurtures a holistic understanding of medical practice.

Steps to Design and Successfully Implement ECE Sessions for MBBS Teaching-Learning in India: (add a flow diagram pic)

Successful implementation of ECE requires a structured approach:

Curricular Integration: Embed ECE seamlessly into the curriculum, aligning it with the learning objectives and core competencies.

Faculty Training: Train faculty members to facilitate ECE sessions effectively, emphasizing the integration of theoretical concepts with clinical experiences.

Clinical Site Selection: Identify diverse clinical sites/ cases those expose students to a spectrum of medical conditions and healthcare settings.

Patient Interaction Guidelines: Develop guidelines for respectful and ethical patient interactions, ensuring students understand the importance of confidentiality and empathy.

Feedback Mechanism: Establish a robust feedback mechanism, incorporating inputs from both students and clinical mentors, to continually enhance the ECE program.

Use of Media and Current Technologies in Early Clinical Exposure:

Incorporating media and current technologies enhances the impact of ECE. Use of clinical cases, Virtual Reality and simulated scenarios can help expose students to complex medical cases, providing a risk-free environment for skill development. Utilizing digital resources can complement ECE, offering additional resources, case studies, and interactive modules. Integrate clinics visits, telemedicine experiences, will allow students to observe patient consultations. Multimedia digital resources like cases, podcasts, clinical examination and skills training videos can supplement ECE sessions and reinforce key concepts. With large batch sizes bringing all students to clinics and giving clear detailed view becomes challenging

Conclusion

ECE emerges as a transformative strategy in MBBS education, addressing the challenges posed by the transition from theory to practice. By developing ECE skills and leveraging media and technology, medical education in India can foster a new generation of physicians equipped with not only theoretical knowledge but also the practical, empathetic, and patient-centered skills essential for modern healthcare practice.

References

https://www.nmc.org.in/wp-content/uploads/2020/08/Early_Clinical_Exposure-MBBS-07.08.2019.pdf

Theory of Case Based Learning

CASE BASED LEARNING TEACHING LEARNING METHODOLOGY

Case-Based Learning (CBL) is a pedagogical approach that introduces students to real or realistic clinical situations, requiring them to apply their theoretical knowledge to solve problems. Grounded in constructivist theories, CBL fosters active engagement, critical thinking, and collaborative learning. The method involves presenting students with authentic patient cases, encouraging them to analyse, diagnose, and propose solutions, simulating the decision-making processes they will encounter in their medical practice.

Challenges in MBBS Undergraduate Medical Education Teaching-Learning in India

MBBS education in India confronts multifaceted challenges, including the extensive curriculum, diverse learning styles, limited faculty resources, and the imperative need for continuous updates in medical knowledge. Moreover, the traditional lecture-based format often falls short in preparing students for the practical complexities of patient care, hindering the development of critical thinking and problem-solving skills.

Meeting these challenges through Case-Based Learning Skills Development

CBL emerges as a transformative solution to the challenges in MBBS education. By instilling CBL skills, students are better equipped to bridge the gap between theory and practice. Through the analysis of authentic clinical cases, students develop diagnostic skills, clinical reasoning, and a comprehensive understanding of patient-centred care. CBL also nurtures effective communication and collaboration, essential for future healthcare professionals.

Steps to Design and Successfully Implement Case-Based Learning (CBL) Sessions for MBBS Teaching-Learning in India

Efficient integration of CBL involves strategic planning. Steps below:

1. **Case Selection:** Choose diverse and relevant patient cases that align with learning objectives and competencies. Assign pre-reads and resources linked to the identified case
2. **Small Group Dynamics:** Facilitate small group discussions to encourage active participation, fostering collaborative problem-solving.
3. Facilitator Training: Train faculty as effective facilitators, guiding discussions, and providing insights without dominating the learning process.
4. **Assessment Strategies:** Develop assessment methods that evaluate both individual and group performance, ensuring a comprehensive understanding of the case.
5. **Feedback Mechanism:** Establish a robust feedback system, incorporating input from both peers and facilitators, promoting continuous improvement.

Use of Digital Resources and Current Technologies in Case-Based Learning:

Clinical Cases using multimedia resources, allows students to explore scenarios that may be challenging to recreate in a traditional setting. Digital resources can be utilized for case discussions, providing flexibility in scheduling and accessibility to a broader range of cases. Simulations can help create realistic scenarios, allowing students to practice clinical skills in a controlled environment. Interactive e-modules can incorporate videos, animations, and quizzes to enhance engagement and understanding.

Conclusion

Case-Based Learning emerges as a dynamic approach to reshape MBBS education, addressing challenges posed by traditional teaching methods. By cultivating CBL skills and integrating media and technology, medical education in India can produce graduates equipped not only with theoretical knowledge but also with the practical, analytical, and collaborative skills essential for modern healthcare practice.

References

https://www.researchgate.net/publication/329215566_Implementing_case-based_learning_in_medical_colleges_in_India

https://bmcmededuc.biomedcentral.com/articles/10.1186/s12909-019-1453-x

https://pubmed.ncbi.nlm.nih.gov/32583999/

Theory of Formative Assessments

FORMATIVE ASSESSMENTS

Definitions and Theories of Formative Assessments:

It's often said – "What you can't measure, you can't improve!" Hence the significance of assessments in Good Teaching Learning Practices. Formative assessments are a fundamental aspect of MBBS undergraduate medical education, encompassing a range of evaluation methods designed to monitor student learning progress during the instructional process. Rooted in educational theories such as constructivism and cognitive load theory, formative assessments focus on providing continuous feedback to students, guiding them toward mastery of essential competencies. These assessments are "assessments for learning" and not "assessments of learning". They aim to shape the learning journey of a student, foster a deeper understanding of undergraduate medical concepts, and thus enhance critical thinking skills.

Challenges in MBBS Undergraduate Medical Education Teaching-Learning in India

The challenges in MBBS education in India faces faculty shortages, time crunch, difficulty in managing frequent assessments for large group sizes (often comprising of 100-200 students per batch), providing quick personalised feedback to large number of students, identifying slow and advanced learners over a period of time, planning future classes and which topics to focus given compressed curriculum and limited time in a phase, need for continuous knowledge updates, and the demand for a more integrated and outcome-oriented approach to teaching.

Additionally, the traditional emphasis on summative assessments often falls short in providing timely and targeted feedback crucial for student improvement. There's a need for psychologically safe environment / assessments where the student can learn, get feedback and improve without bothering about the results as in summative assessments.

Like it's said assessments drive learning. Unless competency-linked assessments are implemented in day-day MBBS teaching learning, effective implementation of the new competency-based MBBS curriculum might fall short.

Meeting these challenges through Formative Assessments

Formative assessments serve as a solution to the challenges in MBBS education and implementation of CBME (competency based medical education). By cultivating formative assessment skills, students can actively engage in SGT, receive real-time feedback, and address their learning gaps promptly. These skills empower students to take ownership of their education, enhancing their ability to integrate knowledge, refine clinical reasoning, and ultimately contribute to a more patient-centric healthcare approach.

Steps to Design and Successfully Implement Formative Assessments Sessions for MBBS Teaching-Learning in India

The effective integration of formative assessments involves strategic planning and execution. Formative assessments become although more important given that each MBBS student must score minimum 50% in formative assessments as a qualifier to appear in the final university exams (summative assessments). Steps below:

Faculty Training: Equip faculty members with the skills to design and implement effective competency-based-formative assessments, emphasizing the importance of feedback in the learning process. Also, how faculty must analyse the results, derive actionable intelligence for themselves and effectively plan the future classes.

Competency Identification: Align formative assessments with identified competencies and learning objectives, ensuring a targeted approach to skill development. And it also provides time and opportunity for remedial measures for certifiable competencies.

Diverse Assessment Methods: Employ a variety of formative assessment methods, including quizzes, case-based discussions, peer evaluations, and reflective exercises, to cater to different learning styles.

Timely Feedback Mechanism: Establish a robust feedback mechanism, providing timely and constructive feedback to students, guiding them toward improvement and mastery.

Record keeping: To keep records of the formative assessments conducted during a professional year for further analysis and future records.

Integration into Curriculum: Seamlessly integrate formative assessments into the curriculum, creating a continuous and iterative learning cycle.

Use of Media and Current Technologies in Formative Assessments:

Leveraging media and technology makes it much easier and quicker for the faculty to design and implement formative assessments. Checking and providing personalised feedback is instantaneous and can be easily done for many students, at a time. Available digital resources offer quality, peer-reviewed, ready-made question bank linked to Bloom's taxonomy and Miller's pyramid and competencies as defined in the new MBBS curriculum. Utilizing these digital ready-made quality question banks with interactive quizzes, Multiple choice questions, clinical cases, subjective-type questions and multimedia resources, allows students to test their learning in given topic, get instant personalised feedback and do retrograde reading in the areas they need to improve. If the faculty wishes, s/he can also use the questions and cases on these digital resources as a stem to customise/ design their own questions. Furthermore, integrating clinical cases, skills videos, simulations can foster a realistic and immersive learning environment for clinical decision-making assessments. Image and video-based assessments can be used for skills evaluation, enabling students to showcase their clinical and communication skills in a controlled setting.

Digital assessments and assessments on mobile devices are quick, accessible, and interactive - catering to the mobile-centric learning preferences of today's learners.

Conclusion:

Formative assessments emerge as a cornerstone in reshaping competency based undergraduate medical education in India, addressing the challenges posed by traditional assessment methods. By developing formative assessment skills and embracing media and technology, medical education in India can nurture a cohort of proficient and self-directed learners, equipped with the competencies essential for real-time healthcare practice in India.

Annexure 1: Collection dashboards for various disease conditions and Template to create your own Digital TLMs

What are collection dashboards?

What was done: Making it super-easy!

Collection Dashboards are made with quick access direct URLs to help you quickly access all content & resources related to a specific topic / disease by India competencies within varied Elsevier e-resources

Specific topic/ Disease condition

Competencies for India undergraduate medical student

Elsevier E-solutions - CK Student, Osmosis & India Skills

Topic	Specialty	Competency code	Competency description	CK STUDENT				OSMOSIS	INDIA MBBS SKILLS
				Textbooks	Clinical cases	Videos	MCQs	Videos	Videos
Ischemic heart disease	Anatomy	AN5.6	Describe the concept of anastomoses and collateral circulation with significance of end arteries.	https://www.clinicalkey.com/student/content/book/3-s2.0-B9780702073861000531; https://www.clinicalkey.com/student/content/book/3-s2.0-B9780702073755000055		https://www.clinicalkey.com/student/content/video/23-s2.0-mm_9780323696616_0006	YAI_1567759755393; YAI_1588773564788		https://clinicalskills.clinicallearning.com/mod/url/view.php?id=155525 https://clinicalskills.clinicallearning.com/mod/url/view.php?id=155526
Ischemic heart disease	Physiology	PY5.6	Describe abnormal ECG, arrythmia, heart block and myocardial infarction.	https://www.clinicalkey.com/student/content/book/3-s2.0-B978813125409700016X			YAI_1561127228433; YAI_1561126556211	https://www.osmosis.org/learn/ECG_cardiac_infarction_and_ischemia	https://clinicalskills.clinicallearning.com/mod/url/view.php?id=155379
Ischemic heart disease	Biochemistry	BI4.4	Interpret laboratory results of analytes associated with metabolism of lipids and Explain the basis and rationale of biochemical tests done in the following conditions: diabetes mellitus, dyslipidemia, myocardial infarction, - renal failure, gout, proteinuria,- nephrotic syndrome, edema, jaundice, liver diseases, pancreatitis, disorders of acid- base balance, thyroid disorders.	https://www.clinicalkey.com/student/content/book/3-s2.0-B978070207341000007X; https://www.clinicalkey.com/student/content/book/3-s2.0-B978813125501800027 8#hl0008316			YAI_1595338246934; YAI_1561126803951; YAI_1561126659405; YAI_1561126807653	https://www.osmosis.org/learn/Fats_and_lipids	https://clinicalskills.clinicallearning.com/mod/url/view.php?id=155422 https://clinicalskills.clinicallearning.com/mod/url/view.php?id=155286
Ischemic heart disease	Pathology	PA27.5	Describe the epidemiology, risk factors, etiology, pathophysiology, pathology, presentations, gross and microscopic features, diagnostic tests and complications of ischemic heart disease	https://www.clinicalkey.com/student/content/book/3-s2.0-B978070207206200077#hl0000409; https://www.clinicalkey.com/student/content/book/3-s2.0-B9780702075590000 82;		https://www.clinicalkey.com/student/content/video/23-s2.0-mm_9781455726134_0004	YAI_1561126805219; YAI_1561127221257; YAI_1561127220039; YAI_1561127224869; YAI_1588776371664	https://www.osmosis.org/learn/Arterial_disease?from=/oh/foundationalsciences/pathology/cardiovascular-system/vascular-disorders/introduction-to-arterial-disease	
Ischemic heart disease	General Medicine	IM2.6	Elicit document and present an appropriate history that includes onset evolution, presentation risk factors, family history, comorbid conditions, complications, medication, history of atherosclerosis, IHD and coronary syndromes	https://www.clinicalkey.com/student/content/book/3-s2.0-B9780729544245000076#hl0000757	https://www.clinicalkey.com/student/content/book/3-s2.0-B9780323358095000412			https://www.osmosis.org/learn/Atherosclerosis_and_arteriosclerosis:_Pathology_review	
Ischemic heart disease	General Medicine	IM2.7	Perform, demonstrate and document a physical examination including a vascular and cardiac examination that is appropriate for the clinical presentation	https://www.clinicalkey.com/student/content/book/3-s2.0-B9780729544245000076#hl0000757	https://www.clinicalkey.com/student/content/video/23-s2.0-mm_9780323798709_0001				https://clinicalskills.clinicallearning.com/mod/url/view.php?id=155227

Direct URLs to quickly access content materials like Images, MCQs, Videos

To access and explore all Collection Dashboards on topics and disease conditions such as Ischemic Heart Disease, Tuberculosis, Diabetes, Anaemia, Thyroid, and more, along with the New MBBS Curriculum with updated competencies- please scan the QR code or visit link (https://www.elsevier.com/en-in/promotions/meded-playbook)

ClinicalKey Student foundation capabilities provides you with the latest content collection.

Annexure 2: Examples of Digital TLMs and Sample Lecture PPTs showcasing diverse teaching methodologies across various disease conditions

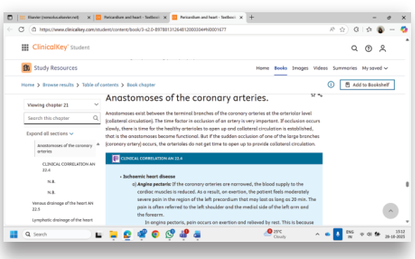
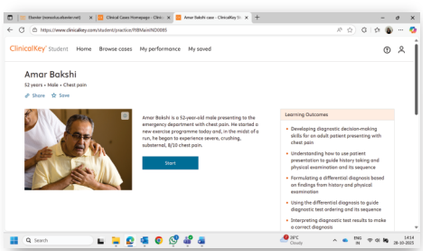
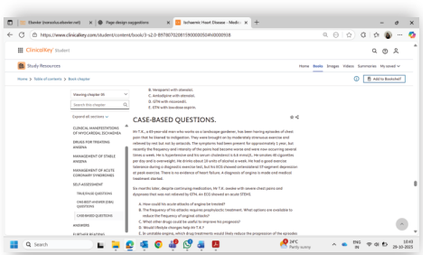
Discover and download more Digital TLMs and sample lecture PPTs by scanning the QR code or by using the link (https://www.elsevier.com/en-in/promotions/meded-playbook)

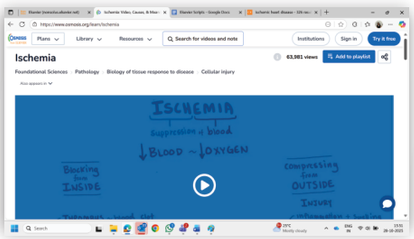
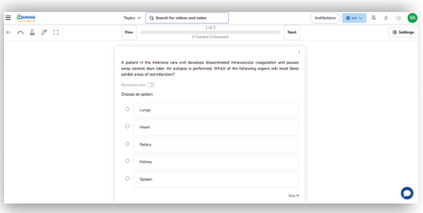
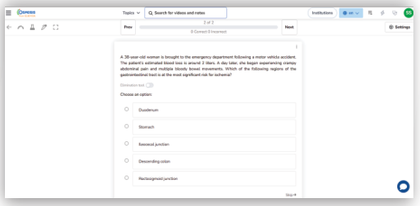
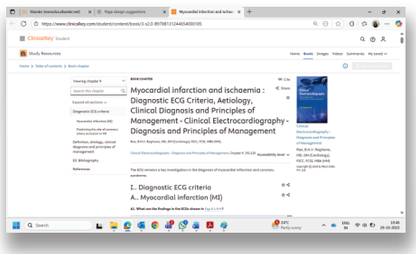
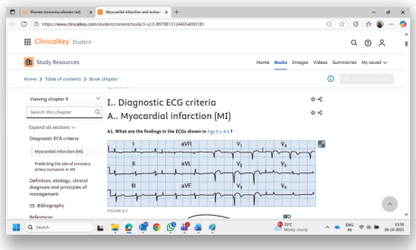
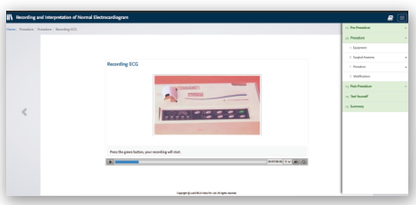
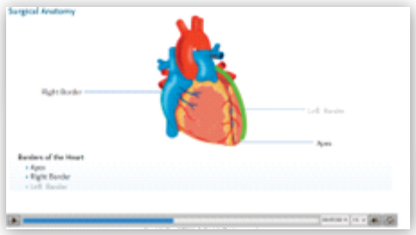
Digital Teaching Learning Module (TLM) for the teaching methodology Integrated Learning on Ischemic Heart Disease

Question 1 – Outline the teaching–learning- (formative) assessment methods you plan to use over the next class/ few weeks to complete the topic or module. Enumerate the steps you will follow during this period and the expected learning outcomes after each step.

Plan a session with multiple subject specialties leads. Learning Outcomes will be linked to each selected competencies

Question 2 – From the NMC MBBS curriculum, identify the competencies your group would like to address for the given topic. Design a digital teaching–learning module that incorporates e-resources. Use the collection dashboard provided to locate direct URLs of relevant content (cases, videos, skills videos, images, assessments) along with screenshots of the content you plan to use across subject(s).

IHD (Ischemic Heart Disease)	TLM	Assessment
LEAD: ANATOMY **AN5.6:** Describe the concept of anastomoses and collateral circulation with significance of end arteries. **AN5.8:** Define thrombosis, infarction, and aneurysm. **PA26.1:** Distinguish arteriosclerosis from atherosclerosis. Describe the pathogenesis and pathology of various causes and types of arteriosclerosis **PA5.5, PA5.6:** Define and describe Ischemia/infarction its types, etiology, morphologic changes and clinical effects; Identify and describe the gross and microscopic features of infarction in a pathologic specimen	**Provide Direct URLs of Clinical Corelation cases** https://www.clinicalkey.com/student/content/book/3-s2.0-B9788131264812000304#hl0001677  **Provide Direct URLs of Videos** https://www.osmosis.org/learn/Ischemia	**Provide Direct URLs of Case Based Question** https://www.clinicalkey.com/student/practice/PJBMainIND0085  https://www.clinicalkey.com/student/content/book/3-s2.0-B9780702081590000050#hl0000938 

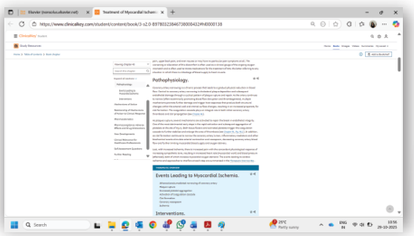
IHD (Ischemic Heart Disease)	TLM	Assessment
LEAD: PHYSIOLOGY **PY5.6:** Discuss physiological variations in ECG waveforms, abnormal waveforms and intervals, arrhythmias, heart blocks and myocardial Infarction **GM2.13:** Discuss and enumerate the indications for and findings on echocardiogram, stress testing and coronary angiogram	 **Provide Direct URLs of Clinical Corelation cases** https://www.clinicalkey.com/student/search?query=ischemic%20heart%20disease&source=search-results&facets=!ct-IM&savedContent=false	**Provide MCQs/ clinical oriented questions from pre-clinical years (Linker case)** **YAI_1606899440891**  **YAI_1635950935335** 
LEAD: PATHOLOGY **PA27.5:** Describe the epidemiology, risk factors, etiology, pathophysiology, pathology, presentations, gross and microscopic features, diagnostic tests and complications of ischemic heart disease	 **Provide Direct URLs of Angiogram/ ECG clinical Images** https://www.clinicalkey.com/student/content/book/3-s2.0-B9788131244654000185	
LEAD: MEDICINE **IM2.2:** Discuss the etiology of risk factors both modifiable and non-modifiable of atherosclerosis and IHD	 **Provide Direct URLs of Skills Videos for CBL/ PBL - Recording & Interpretation of normal ECG. Else lecture SGD** https://indiambbsskills.clinicalkey.com/local/courses/2535/s02_m06_dv_electrocardiogram/data/LandingPg.html	
	  **Provide Direct URLs of Lectures** https://www.clinicalkey.com/student/content/book/3-s2.0-B9780323846738000432#hl0000138	

IHD (Ischemic Heart Disease)	TLM	Assessment

LEAD: PHYSIOLOGY

PY5.6: Discuss physiological variations in ECG waveforms, abnormal waveforms and intervals, arrhythmias, heart blocks and myocardial Infarction

GM2.13: Discuss and enumerate the indications for and findings on echocardiogram, stress testing and coronary angiogram



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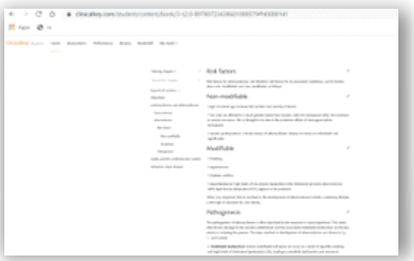
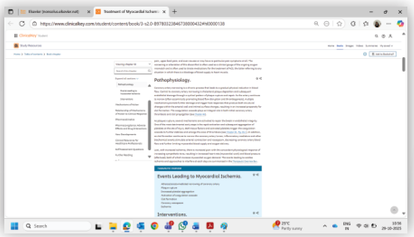


Provide Direct URLs for Lectures - IHD in India special features
https://www.clinicalkey.com/student/content/book/3-s2.0-B9780443115349000114#hl0000617

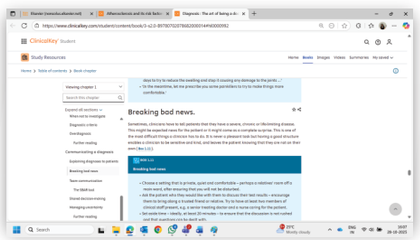


Question 3 – Also, please mention which other Medical Education teaching methodologies/ pedagogies you may like to pick to complete the topic/ module.

Small Group Discussion / Case based learning

Question 4 – If you were to include a component of AETCOM, please pick a resource and share the direct URL(s) + screen shots here.

https://www.clinicalkey.com/student/content/book/3-s2.0-B9780702078682000014#hl0000992



Question 5 – How would you define success for your students at the end of this topic/ module? How would you measure that?

All students must score more than 80% in the formative assessments assigned.

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Way forward

We are pleased to provide ready to use collection dashboards and a template for creating Digital TLMs. Please utilize this resource according to your requirements and feel free to share your adaptations to inspire others.

To make the most use of the Digital TLMs and sample lecture PPTs, you would need access to the Elsevier Digital Resources. Please email indiacontact@elsevier.com with the subject line “Request for Access to Digital Resources to use Medical Educator's Playbook”.

We encourage you to organize similar faculty development workshops at your respective colleges and in your regions to promote faculty development. Additionally, we are planning to conduct similar workshops across various regions in India soon.

If you are interested in collaborating with CMCL and Elsevier to conduct or attend such faculty development workshops focused on implementing the new MBBS curriculum through digitalization, kindly reach out to us at **indiacontact@elsevier.com** with the subject line: *“How to use Digital Resources to implement new MBBS curriculum and teaching methodologies?”*

Explore resources across key disease conditions like — Ischemic Heart Disease, Tuberculosis, Diabetes, Anaemia, Thyroid, and many more —and teaching methodologies such as Integrated Learning, Case-Based Learning, Self-Directed Learning, and Early Clinical Exposure, and more -each with built-in (self/ formative) assessments.

For any questions or concerns, reach out to the below contacts:

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