MBBS CURRICULUM

Volume 1

INDEX

PLAN TO ORGANISE THE CURRICULUM DOCUMENTS

Organising the curriculum documents for the MBBS program at Muhammad Medical College, Mirpurkhas, in strict alignment with the PM&DC guidelines is essential for compliance and educational quality.

The provided document, "PM&DC GUIDELINES FOR UG M.EDUCATION," is the definitive framework. This guide will translate those instructions into a practical, actionable filing and management system.

Core Principles from the PM&DC Guidelines

The organisation of our documents must reflect these mandated principles from the guidelines:

1. PM&DC Compliance is Paramount: The entire structure must align with the PM&DC's National Medical & Dental Undergraduate Curriculum 2023. This is the non-negotiable foundation.
2. Centralised Repository: Use a shared digital drive (like Google Drive, SharePoint, or a dedicated server) with controlled access, supplemented by a physical master copy.
3. Accessibility: The right people (faculty, administrators, auditors) should be able to find the right document quickly.
4. Version Control: Maintain a strict system for updating documents. Every document should have a version number, date, and author.
5. Integrated, Spiral, & Competency-Based: The structure cannot be by isolated subjects. It must show integration (e.g., Anatomy, Physiology, Biochemistry taught together in system-based modules) and a spiral approach (where topics are revisited with increasing complexity).
6. Outcome-Driven: All documents must link back to the Exit Competencies (ECs) and Course Learning Outcomes (CLOs).
7. Accountable & Reviewed: There must be clear responsibility (Curriculum Committee) and a documented process for regular review and improvement.

Recommended Document Organisation Structure

On a shared digital platform (like a College SharePoint, Google Drive, or a secure network drive) with controlled access, top-Level Folder: MBBS_Curriculum_MMC (Contains the master document index and overall framework)

· 00_Curriculum_Governance
  · PM&DC_Undergraduate_Curriculum_Guide.pdf (The master reference document)
  · MMC_Curriculum_Committee_Charter.pdf (Terms of reference, membership)
  · Meeting_Minutes (Organised by year, e.g., 2024, 2025)
  · Institutional_Educational_Objectives_IEOs.pdf
  · Program_Exit_Competencies_Mapping.pdf (Master map to PM&DC's 7 domains)

· Academic_Calendar_5-Year_Rolling.pdf
· Curriculum_Amendment_Log.xlsx (Tracks all changes, dates, reasons)

· 01_Integrated_Curriculum_Map
  · Phase_I_Pre-Clinical_Map.xlsx (Years 1-2)
  · Phase_II_Clinical_Map.xlsx (Years 3-5)
  · Spiral_Curriculum_Matrix.xlsx (Shows how, e.g., "Cardiovascular," is taught across years)
  · Theme_Integration_Map.xlsx (For Ethics, Communication, Patient Safety, etc.)
  · Timetable_Master (Sub-folders for each Module/year)

This is the core of the organisation, showing how everything fits together.

· 2.1_Phase-Wise_Structure: Overview of Pre-clinical, Para-clinical, and Clinical phases.
· 2.2_Spiral_Curriculum_Map: A visual and tabular representation showing how key topics (e.g., Cardiovascular system) are revisited and deepened across the 5 years.
· 2.3_Competency_Framework: A matrix mapping PM&DC's core competencies to courses and assessments.
· 2.4_Theme_Integration_Maps: How horizontal themes (e.g., Ethics, Patient Safety, Research, Communication Skills) are integrated across subjects.

· 03_Year-Wise_Modules
  This is the core of the organisation, moving away from "Subjects" to "Integrated Modules" as per PM&DC guidelines.

Each Module Guide should be a standardized template containing:

· Year
· Module Title & Code
· Themes
· Credit Hours & Teaching Hours
· Module/Class Coordinator & Faculty
· Module Description & Learning Outcomes (SMART)
· Detailed Topic List with Teaching Methods
· Required Reading List (Textbooks, Journals)
· Assessment Blueprint & Schedule, logbook, attendance
· Weekly Teaching Schedule (Timetable)

  · ...
· 04_Teaching_Learning_Resources
  · Lecture_Slides (Organised by corresponding Module)
  · Small_Group_Learning
    · PBL_Cases (Problem-Based Learning)
    · TBL_Guides (Team-Based Learning)
  · Clinical_Skills
    · Skills_Lab_Protocols
    · OSCE_Stations

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· Early_Clinical_Exposure_Logbook.pdf
· Clerkship_Logbook.pdf (For Years 3-5)

· 05_Assessment_System
 · Assessment_Policy_MMC.pdf (Aligned with PM&DC Section 6)
 · Formative_Assessment_Bank (Quizzes, MCQs, Mock OSCEs)
 · Summative_Assessment_Bank (End-of-Module/Year Exams)
  · Blueprint (Assessment Blueprints for each module)
  · Question_Banks (Secure folder for MCQs, SEQs, etc.)
  · OSCE_Materials (Stations, checklists, guides)
 · Standardised_Answer_Keys_Marking_Schemes
 · Student_Performance_Analytics (Results, item analysis, pass/fail data)

· 06_Student_Facing_Documents
 · MBBS_Student_Handbook_MMC.pdf (A compiled, easy-to-navigate guide for students)
 · Module_Guides (A read-only copy for student access)
 · Forms (Leave, elective, appeal forms)

· 07_Quality_Enhancement
 · Student_Feedback_Reports (From each module)
 · Faculty_Feedback_Reports
 · Internal_Curriculum_Review_Reports (Annual)
 · Action_Plans_Improvement_Log.xlsx

.08._Faculty_Development

· 8.1_Curriculum_Orientation_Materials: To train new and existing faculty on the integrated curriculum.
· 8.2_Workshop_Materials: On assessment, PBL, etc.

Critical Content for Each "Module Guide" (Syllabus)

As per PM&DC guidelines, each module guide in the 02_Year-Wise_Modules folder must be a standardized document containing:

1. Module Identification: Title, Code, Academic Year, Module, Credit Hours.
2. Module Leadership: Name and contact of Module Coordinator and integrated faculty.
3. Module Description & Place in Curriculum: A brief overview and its link to the spiral curriculum.
4. Learning Outcomes (CLOs): Specific, measurable outcomes mapped to the PM&DC Exit Competencies (ECs). Use a table format.
5. Integrated Content Outline: A week-by-week schedule showing which disciplines (Anatomy, Physiology, Biochemistry, etc.) are taught together on a single topic.
6. Teaching-Learning Methods: Detail the mix of lectures, PBL, TBL, practicals, clinical sessions, and self-directed learning.

7. Assessment Strategy: A detailed blueprint showing how each CLO is assessed (Formative vs. Summative, e.g., MCQs, OSCE, Viva, Logbook).
8. Learning Resources: Required textbooks, recommended journals, and online resources.

Implementation Action Plan

1. Constitute the Curriculum Committee: As mandated by PM&DC, this must include basic scientists, clinicians, medical educationists, and student representatives. This committee will own and manage this structure.
2. Conduct a Gap Analysis: Audit our current syllabi and documents against the PM&DC template. Identify where integration is missing and where outcomes are not explicitly mapped to competencies.
3. Develop the Templates: Create the standardised templates for the Module Guide, Logbooks, and Assessment Blueprint.
4. Populate the Structure: Assign module coordinators for each year. Their first task is to work with an integrated team to create the new Module Guides using the templates and populate the folder structure.
5. Faculty Development: Train all faculty on the new integrated, outcome-based approach. They must understand the "why" and the "how."
6. Launch and Monitor: Implement the new organised curriculum with the incoming first-year class (a phased approach is best). The Curriculum Committee must meet regularly to review feedback and update the documents in the 06_Quality_Enhancement folder.

By adopting this structure, Muhammad Medical College will not only have a perfectly organised set of documents but will also have a curriculum management system that is audit-ready for the PM&DC and, more importantly, designed to produce competent, well-rounded medical graduates.

Organizing Competency-Based Medical Education: Implementing PMDC's Seven Core Competencies at Muhammad Medical College, Mirpurkhas

Author: Chancellor and Professor of Medical Education, Dr. Syed Razi Muhammad.

Affiliations: Muhammad Medical College, Ibn-e-Sina University, Mirpurkhas, Pakistan

Corresponding Author: Prof. Syed Razi Muhammad at chancellor@isu.edu.pk

Abstract

Background: In recent years, competency-based medical education (CBME) has moved away from discipline-based curricula toward clearly defined outcomes-based curricula. It stresses on the development of observable and measurable professional capabilities, making sure that fresh doctors can meet the real-world health care challenges. The Pakistan Medical and Dental Council (PM&DC) has listed seven core competencies that every new doctor in Pakistan should achieve.

Objective: This review article explains how the seven PM&DC core competencies are included in a vertically integrated, outcomes-based MBBS curriculum at Muhammad Medical College (MMC), Mirpurkhas, while focusing on the overall curricular framework and the teaching–learning strategies used.

Method: Nationally outlined and globally accepted benchmarks for competency-based medical education and accreditation were analyzed. This analysis considered the institutional framework, curriculum organization, teaching–learning methods, and assessment methods used at MMC.

Results: This model demonstrates the integration of the seven competencies outlined y the PM&DC—within a hybrid, vertically integrated spiral curriculum. Active learning was emphasized with clinical exposure from the onset, technology-enhanced learning, and multi-dimensional, competency-aligned assessment is included, which helps and guides learning.

Final thoughts: Vertically integrating the PM&DC's seven core competencies into a coherent, streamlined, outcomes-oriented MBBS curriculum helps the development of a clinically competent clinician who has a good grip of all three Bloom's domains. This model can be replicable in other medical colleges in Pakistan, which can produce doctors who can meet the country's diverse health care needs.

Introduction

In recent years, medical education has undergone a major global shift from traditional, discipline-based curricula to competency-based medical education (CBME) (1,8). This change identifies and stresses on well-defined educational outcomes—what learners can perform—instead of the time consumed in training. CME focuses on graduates' readiness to address real-world challenges (5). CBME

focuses on outcomes-based processes, their implementation, and evaluation, using competencies as measurable abilities that all learners should grasp. These competencies are directly relevant to the safety of the patients and quality of care (2,3,7).

The PMD&C has developed the "Seven Star Doctor" competency framework, which outlines the seven core, holistic competencies needed for practicing medicine in Pakistan (4). This framework requires a doctor to be Knowledgeable, Skillful, Professional, a Scholar & Researcher, a Critical Thinker, a Leader & Role Model, and a Community Health Promoter. This framework is closely related to the World Health Organization's "Five Star Doctor" model, while adding competencies that are related to the country's specific health care needs and socio-cultural context.

Muhammad Medical College (MMC), Mirpurkhas, is located in a socio-cultural diverse region of Sindh province with a poor financial background. Ibn-e-Sina University, Mirpurkhas (ISUM) is the first university of Mirpurkhas division, recognized y the Higher education Commission (HEC) (6). The college has developed various tools to embrace the PM&DC framework within its curricular and organizational planning to meet the PM&DC'S accreditation requirements and to address local health needs. MMC aims to develop operational competencies that reflect the full spectrum of professional expectations in contemporary medical practice, spanning multiple disciplines and domains.

This article presents MMC's experience in organizing and implementing a competency-based MBBS curriculum.

The PM&DC Seven Core Competencies Framework

These include:

1. **Knowledgeable** (Scientific Knowledge for Good Medical Practice) (11) This competency emphasizes the integration of foundational biomedical, clinical, and psychosocial sciences throughout the curriculum to support evidence-based diagnosis and management of health problems (9). MMC employs various methods of active learning, such as small group discussion, Case-Based Learning (CBL) (13) and Problem-Based Learning (PBL) (12). This is supported by a three-pronged system of "Survive". Survive was started at the beginning of COVID in March 2020, when face-to- face (F2F) teaching had become impossible for nearly the whole academic year. Since then, it has seen many transformations and currently consists of weekly assignments, weekly MCQs-based tests, and a post-test discussion which addresses the mistakes committedb y the learners in the weekly tests. The active learning, along with survive greatly helps the students to understand the molecular and pathophysiological mechanisms of disease, along with the application of pharmacological principles and clinical principles. This process brings together the basic medical sciences, clinical sciences, along with the behavioral and social sciences related to health and disease.

2. **Skillful** (Clinical, Cognitive, and Patient Care Skills)
In its quest to be a national/international leader in producing quality doctors, Muhammad Medical College, Inbe-Sina University has developed a state-of-the-art Skills Lab/ Simulation Centre and a unique Program of teaching and training the 64 Clinical skills required by a doctor. Each skill will be taught at the skill/ simulation lab and will be strengthened in the wards. Following is the schedule of the program. Each session may be preceded by a brief introduction/video. A printed as well as an electronic logbook is maintained by each student. Their record is automatically updated and kept in their e-file and some marks are awarded in each modular/ annual examination to the student.
64 skills are arranged as
   a. Patient assessment by the medical students-22 in number.
   b. Procedural Skills-12 in number.
   c. Patient care -7 in number.
   d. Prescribing -5 in number.
   e. Therapeutic procedures -18 in number.

3. **Professional (Professionalism, Ethics, and Communication (10**)
Along with other teaching and training to promote professionalism, our program of weekly mentoring greatly facilitates the components of professionalism in our students. Weekly mentoring is conducted between 1 to 2 pm every Wednesday. MThe mntoring program consists of
   1. Mentees 8-10 in one group.
   2. Mentor (one mentor for 8-10 mentees). There are 48 mentors in classes 1-4 of MBBS and 12 the in finaof I year MBBS.
   3. He/she submits a weekly report, which is discussed with the chief mentor between 1-pm on Thursday (next day).
   4. Class Coordinator (For a whole class). Will closely liaise with the mentors of his/her class and report to the Chief Mentor on a regular basis. If a mentor is not performing his mentoring duties or not filling the form, and the Class Coordinator fails to report to the Chief Mentor, he will be held responsible.
   5. Chief Mentor
   6. Program Supervisor.

This mentoring program greatly helps in promoting empathy, ethical conduct, patient-centered communication, collaboration, and professionalism. It is reinforced through teaching these topics in the classroom and wards. I have developed Ibne Sina University Mirpurkhas Scale of Affective domain (ISUMSAD) which has been proven to be highly reliable and valid. I have also developed a curriculum of the affective domain. In this curriculum, we are teaching medical ethics and bioethics, communication skills training, professional conduct sessions, interprofessional education, faculty role modelling, and reflective practice. This helps our students to properly respond to ethical dilemmas, demonstrate cultural sensitivity, respect confidentiality and the right of self-determination.

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4. **Scholar & Researcher (Research Skills and Scientific Inquiry) (19)**
   MMC has been holding an annual symposium for the last 27 years. It is compulsory for every student of fourth and final years to make a team of 3-4 students, choose a research project and present it. Other classes are encouraged to join too. Hence, every graduate of MMC has at least 2 research papers before graduating. Regular SPSS, biostatistics and research workshops are held too. Peer-reviewed Journal of MMC is recognized y the PM&DC as well as HEC.

5. **Critical Thinker (Clinical Reasoning and Problem Solving)**
   Analytical thinking, decision-making, problem-solving solving and reflective practice are promoted through problem-based learning (PBL), case-based learning (CBL), structured clinical reasoning activities, and exposure to uncertainty and complexity in patient care. Weekly Journal Club and case presentation by the students are held regularly.

6. **Leader and Role Model (Leadership and Management) (15)**
   MMC provides its students lots of opportunity to gain leadership and management skills. Students are represented in virtually every committee. Regular sports, debates and other co-curricular activities are held.

7. **Community Health Promoter (Community Orientation and Health Advocacy) (16)**
   Mobile Clinics by Students (MCS Program) is a manifestation of ISU's devotion to community-oriented medical education and social accountability. In collaboration with the Association of Pakistani Physicians of North America (APPNA), ISUM expanded the MCS Program from two to five health units covering impoverished villages in the Mirpurkhas District. APPNA donated three mobile clinic vehicles designed for the delivery of primary healthcare, making it possible to set up fixed health units in:

   1. 78 Mori Village – Inaugural camp served 680 patients

   2. Wahgreji Village – Inaugural camp served 617 patients

   3. Khirao Village – Inaugural camp served 1,039 patients (Mar 2018)

   4. Sultanabad Village – Inaugural camp served 1,282 patients (Mar 2018)

   5. Rakhel Lund Village – Inaugural camp served 450 patients (Nov 2018)

The mobile clinics operate on a predetermined cycle from Monday to Thursday, offering free medical consultations and medications, and making referrals to MMCH for patients needing higher-level care

Curriculum Organization and Delivery

Curriculum design principles
MMC follows an integrated hybrid spiral curriculum, guided by Harden's integration

ladder (14), which outlines levels of integration from a discipline-based approach to a fully integrated, student-centred model. This structure supports the vertical integration, where topics are revisited over time with increasing complexity (17,18. MMC organizes teaching into organ-system modules to promote inter-disciplinary contextual learning and support students develop the concepts derived from basic science to clinical medicine.

The total curriculum comprises of over 6,200 teaching hours, which fulfils the PM&DC and WFME guidelines, distributed across basic sciences, pre-clinical and para-clinical sciences, clinical rotations, community medicine, and elective experiences.

Innovative instructional strategies

Teaching at MMC uses a range of evidence-based methods to promote active learning, clinical integration, and competency development. Active learning approaches such as Problem-Based Learning (PBL), Case-Based Learning (CBL), Team-Based Learning (TBL), and flipped classrooms encourage students to participate actively rather than remain passive recipients of information. Small-group peer teaching, collaborative problem-solving, and structured discussions further support understanding and long-term retention. Early Clinical Exposure (ECE) introduces students to clinical settings from Year 1, with a gradual transition from simulation to real patient encounters. This longitudinal exposure strengthens their grasp of basic science concepts, supports professional identity formation, and builds clinical skills.

Technology-enhanced learning

Modern technologies are embedded throughout the curriculum. Campus Management System has been developed. Famous learning management systems (LMS), Moodle is used to organize resources, support online activities, and facilitate formative as well as summative assessment and feedback.

Clinical skills and simulation training

Skills development and simulation centre create realistic scenarios in which learners rehearse emergency management, critical decision-making, and teamwork in situations that simulate actual clinical practice.

Assessment strategies

Assessment framework
Assessment in MMC's CBME system is aligned with clearly defined competencies and uses Moodle for a range of MCQs ased tests and OSCE. Evaluation is continuous and combines formative assessment, which guides learning and improvement, with summative assessment, which informs decisions about progression and graduation. The assessment programme is designed to be valid, reliable, feasible, educationally impactful, and supportive of learning.

Formative assessment

The curriculum is structured to identify learning gaps early and provide timely

support. Continuous formative assessment provides regular feedback and encourages self-directed learning. Key elements include:

- Assignments through the learning management system (Moodle).
- Peer and self-assessment during group learning activities.
- Feedback from faculty during clinical skills sessions and simulations.
- Reflective writing tasks, particularly before major examinations, which are reviewed and commented on by instructors.

Summative assessment

Summative assessments determine whether students have achieved the expected level of competence to progress and ultimately to graduate. These include:

- Weekly MCQs tests are conducted in "Survive".
- Objective Structured Clinical Examinations (OSCEs) with multiple stations to assess clinical skills, communication, professionalism, and clinical reasoning.
- Workplace-based evaluations that capture performance in real clinical settings, such as:
    - Mini-Clinical Evaluation Exercise (Mini-CEX): observed clinical encounters with structured feedback on organization, clinical judgment, and professionalism.
    - Direct Observation of Procedural Skills (DOPS): assessment of technical and procedural skills, including consent, asepsis, and post-procedure care.
    - Case-Based Discussion (CBD): in-depth discussion of real cases managed by the student, focusing on reasoning and application of knowledge.
    - Multi-Source Feedback (360-degree evaluation): feedback from colleagues, peers, nurses, and other team members on collaboration and professional behaviour.
    - Reflective portfolios in which students document learning experiences, self-assess their competencies, and record community work and other professional activities.

Institutional support and quality assurance

Successful implementation of CBME at MMC relies on strong institutional commitment. This includes investment in infrastructure, sustained faculty development, appropriate resource allocation, and a culture that values ongoing quality improvement. Faculty development initiatives include a 20-week Certificate in Health Professions Education (CHPE), which trains cohorts of faculty members in:

- Principles of CBME and curriculum design.
- Contemporary teaching methods such as PBL facilitation, CBL, and flipped classrooms.
- Assessment design, including OSCEs, workplace-based assessment, and effective feedback.
- Teaching professionalism, ethics, and communication.

- Clinical mentoring and supervision.
- Educational scholarship and research in medical education.

Regular workshops, teaching-skills courses, peer masterclasses, and national and international medical education events support ongoing development. Recognition and rewards for good teaching encourage innovation and sustained engagement.

Sustained allocation and infrastructure of resources
To support CBME, MMC maintains:

- Clinical skills laboratories are equipped with task trainers, standardized patients, and simulation devices.
- Robust IT infrastructure with adequate bandwidth, computer facilities, learning management systems, and digital libraries.
- Access to journals and databases to enable evidence-based practice and research.
- Units that provide support in research methodology, biostatistics, and ethics.
- Community health centres and field-practice sites for community medicine teaching.
- Sufficient clinical training sites with adequate case mix for comprehensive clinical exposure.

Educational environment and culture
MMC promotes a student-centred educational climate where learners are actively involved in curriculum planning and quality improvement. The environment is designed to be psychologically safe, encouraging students to raise concerns, identify gaps, and seek help. Mentorship and feedback are embedded through:

- Peer-assisted learning, where senior students support juniors in academic and professional development.
- Interprofessional education alongside nursing, pharmacy, and allied health students.
- Well-being initiatives addressing mental health, stress management, and work–life balance.

Quality improvement within quality assurance
The curriculum committee leads continuous quality improvement by:

- Regularly reviewing and updating the curriculum in response to educational evidence and changing health system needs.
- Collecting feedback from students, faculty, alumni, employers, and patients.
- Analysing assessment data to identify trends, evaluate teaching methods, and detect at-risk learners early.
- Benchmarking against PMDC standards and international best practices.
- Conducting internal reviews and preparing for external accreditation visits.
- Supporting research in program evaluation and graduate outcomes.

Discussion and conclusion

The MMC experience shows that, when the PM&DC seven-star competency framework is applied deliberately, graduates are better prepared to handle the complex clinical, ethical, and social challenges. The model matches well with international competency frameworks such as ACGME, CanMEDS, and the WHO Five-Star Doctor, while remaining responsive to local priorities. MMC has een successful in embedding competencies within an integrated, curriculum. MMC makes sure that professionalism, research skills, and community orientation are never neglected and leave a lasting impression to its students.

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Title: Defining and Operationalizing Goals, Competencies, Objectives, and Learning Outcomes: A Framework for Competency-Based Medical Education at Muhammad Medical College, Mirpurkhas

Authors: Dr. Syed Razi Muhammad, Chancellor and Professor of Medical Education.
Affiliations: Muhammad Medical College, Ibn-e-Sina University, Mirpurkhas, Pakistan
Corresponding Author: Prof. Syed Razi Muhammad at chancellor@isu.edu.pk

Abstract

Background: Outcomes focused learning, and therefore integrative and outcome focused pedagogy, looks at the development of observable and measurable abilities that are required for practice in the profession. A critical element of competency-based medical education (CBME) hinges on the identification and differentiation of the roles of goals, competencies, objectives and learning outcomes in the design of the curriculum and assessment of the curriculum, as they are interrelated in fundamental ways.

Objective: This review article is intended to provide a framework for understanding and contextualizing the differential and hierarchical relationships within goals, competencies, objectives and learning outcomes in medical education. It details the goals, objectives and learning outcomes for the seven core competencies of the Pakistan Medical and Dental Council at the Muhammad Medical College (MMC), Mirpurkhas.

Methods: Using educational theory synthesis, the article incorporates practice, Bloom's Taxonomy, SMART (Specific, Measurable, Achievable, Relevant, Time-bound), and competency based education to provide a pathway towards curriculum design and definition of outcomes.

Results: The framework articulates the translation of generic institutional goals to the seven core competencies (Knowledgeable, Skillful, Professional, Scholar & Researcher, Critical Thinker, Leader & Role Model, Community Health Promoter) with specific objectives and defined outcomes for each. The model provides templates for designers of the curriculum to articulate the relationship between outcomes and assessments. Keeping the end goal in mind, educational activities for each competency must factor in time differentiation to achieve each goal's outcomes, objectives, competencies, and outcomes. Further delineation and custom completion resulting in goal differentiation. The MMC framework is an example for other medical schools to adapt towards the development of outcomes based on curricula for addressing the challenges of the health systems of Pakistan and other similar countries.

Keywords: Competency-based medical education; learning outcomes; Bloom's taxonomy; SMART objectives; medical curriculum; PMDC competencies; assessment; curriculum design

Introduction

Background: The ability to progress from conventional discipline-oriented curricula to a CBME thinks profoundly about training as a function of time and focuses as the unit of education on outcomes for each learner.[1,2] This is a situation of articulating with granularity what the learner should know, be and do at the end of their educational journey. However, the distinguishing elements of goals, competencies, objectives, and outcomes appears to be a source of frustration and confusion for many educators and may cause a lack of alignment in the various components of curriculum design, teaching, and assessment. [3,4]

Understanding the sequence in which the goals, competencies, objectives, and outcomes are organized which in education is shown as a hierarchy offers the structure within which to organize a curriculum to function as a unit. Frameworks in education represent the theory of action within which educational goals are actualized. Frameworks represent theory, with goals as vision, competencies acting as integrated capabilities for the learner to perform at professional levels. Objectives become the contiguous building blocks of competencies where the learner is expected to perform at observable levels, while outcomes become the evidence for completion of the educational unit.[6, 7]

The PMDC has outlined the 7 competencies as the pillars on which the medical graduate capabilities are built: Knowledgeable, Skillful, Professional, Scholar & Researcher, Critical Thinker, Leader & Role Model and Community Health Promoter.[8, 9] While these are broad competencies, the reality is to operationalize them involves articulating outcomes which are measurable, specific goals and objectives to inform curriculum design, teaching, and assessment.

The Muhammad Medical College (MMC) in Mirpurkhas has established an elaborate system that applies separately for each of the seven of the PMDC competencies along with the specific goals, objectives, and learning outcomes. This article offers medical educators the theoretical grounding necessary to grasp such educational elements, in addition to adaptable practical illustrations that can be employed in the design of different curricula in different institutions.

This review will attempt to: (1) clarify the conceptual distinctions of goals, competencies, objectives, and outcomes; (2) explain the different levels of a planning sequence that these elements may represent; (3) demonstrate the comprehensive goals, objectives, & learning outcomes, which have been constructed for each of the PMDC competencies offered by MMC; and (4) offer medical educators the means to pursue these same frameworks in their individual institutions.

Theoretical Framework: Defining Educational Components

The Hierarchical Sequence in Educational Planning

For competency-based medical education, the educational planning process can be from the general to the specific, as follows in the hierarchy: [5, 10, and 11]

   i)   Goals: General, overarching, and long-term statements describing the overarching purpose or goal of a course or a program of study.

   ii)   Competencies: The integrated knowledge, skills, attitudes, and behaviors associated with effective performance.

iii)   Objectives: The distinct, unambiguous, and observable statements describing the specific, immediate actions which the learners should be able to perform.

iv)   Outcomes: The statements providing evidence to demonstrate the measurability of the achievement of the objectives, competencies, and goals attained.

This order of the hierarchy ensures that there is cohesion between the vision of the institution, the educational activities, and the measures of the student's accomplishments that create the basis of constructive alignment in curricular design. [12]

Goals: Defining Educational Purpose

Goals are statement of a program's purpose, vision, or educational philosophy that are broad and high level. [15] Goals of an institution or program define what they would like to accomplish with their graduates. Goals serve as a guide for the construction of curriculum and define the scope of specificity that educational outcomes will have.

a) Effective goals are:

b) Broad and comprehensive

c) Long-term and visionary

d) Aligned with the institution's mission and the surrounding society

e) Indirectly measurable but provide a sense of direction

Applicable to an entire program or multiple courses within a program

A sample goal can be the following: "To provide MBBS graduates with a foundation and the requisite clinical competencies too systematically, critically, and efficiently approach the health and disease challenges of the Pakistani population and healthcare system and apply scientific methods to the proper management of health issues."

Competencies: Integrated Professional Capabilities

Goals refer to the fundamental purpose, vision, or philosophy an institution holds and provide large, overarching frameworks for the institution or program in question do to. [13, 14] These provide direction as to what they wish to achieve with their graduates. Goals function provide direction in the curricular development and determine the level of detail educational outcomes should focus on.

Key features of competencies:

i)   Being comprehensive in nature. Setting an enduring and far-reaching vision

ii)   Integrating with the purpose of the institution and the context of the society

iii)   Being indirectly measurable but still able to provide direction

iv)   Serving a single program or a group of courses in a program

An example of a goal might be: "To provide MBBS graduates with a clinical foundation and the competencies needed to systematically, critically and efficiently tackle the health and disease burden of the Pakistani population and healthcare system by employing the scientific approach to the appropriate management of health problems."

Objectives: Specific Learning Targets

Objectives refer to the immediate competencies that learners must be able to accomplish in order to develop the necessary skills to achieve broader learning goals, and these must be clearly defined, concise, and measurable.[15, 16] Objectives serve as discrete milestones on the way to achieving the ultimate learning goal, allowing for the division of broad and complex competencies into manageable, teachable and assessable entities.

Some of the common characteristics of a good objective include the following:

a) Clearly defined without any ambiguity

b) Focused on the learners and what they will achieve

c) Outcomes can be measured and tracked

d) Clearly states the action to be accomplished through the use of strong and concise verbs

e) A goal that can be accomplished in a short period of time

f) Positively correlated to the different levels of Bloom's taxonomy. [17,18]

Good objectives reflect the SMART criteria: Specific, Measurable, Achievable, Relevant, and Time-bound.[19, 20]

Example: Students will be able to explain the pathophysiological mechanisms of common diseases and clinical conditions.

Learning Outcomes: Measurable Evidence of Achievement

Learning outcomes are statements intended to be a demonstration of what the learner can do after the completion of the learning experience, indicating that the objectives, competencies, and goals have been achieved, and can be measured and documented.[6-7] Outcomes are focused on the learner and can be measured and documented using some assessment method of value.

i) Learning outcomes should have the following primary characteristics:

ii) Learner focused (student achievement is the primary focus)

iii) Specific and measurable

iv) Observable through some type of assessment

v) Action verbs from one of the taxonomies must be used

vi) Outcomes and assessment must be aligned

vii) Level of outcomes is appropriate

Learning outcomes address the fundamental question, "What should students be able to know and achieve by the end of the course or program?". [21]

An example of a learning outcome is "By the end of the MBBS Program, the students will be able to articulate the molecular, cellular, biochemical, and physiological pathologies that result in functional abnormalities in disease states."

Competency versus Outcome: Critical Distinctions
While competencies and outcomes are related, they serve different purposes in educational planning:[22]

Feature	Competency	Outcome
Definition	Broader ability to do something successfully, combining knowledge, skills, and behaviors	Specific, measurable statement of what a learner will demonstrate at program end
Conceptual focus	The "how" -- collection of abilities needed	The "what" -- concrete, observable evidence
Scope	Broad; encompasses range of abilities and applications	Narrow; precise and specific statement
Educational focus	Capability and application in real-world context	End goal achievement and measurability
Assessment	Performance-based evaluations, simulations, projects emphasizing application	Formative and summative assessments measuring specific achievements
Learning domains	Holistic integration of cognitive, affective, and psychomotor domains	Often measured across domains but may be assessed in specific categories
Learner role	Empowers ownership, self-paced learning, progress tracking	Structured and guided achievement
Measurement	Assessed through performance demonstrating application	Measured by specific, verifiable actions or results

Table 1: Comparison of competencies and learning outcomes
Think of competency as the "how" (the collection of abilities needed to succeed) and outcome as the "what" (the concrete, observable evidence of learning at program completion).

Application of Bloom's Taxonomy to Learning Outcomes
According to previous research, Bloom's taxonomy classifies learning objectives in an order from general to more sophisticated. [17, 23] Bloom's taxonomy was revised in 2001 by Anderson and Krathwohl, and the revised version contains six action-oriented verbs in each level of the taxonomy: to remember, to understand, to apply, to analyze, to evaluate, and to create.[24]
Cognitive Levels and Medical Education Applications

i) Remember: concepts, processes, patterns, and sequences (e.g., identify, state, define, name, list)

ii) Grasp the meaning and significance through explanation, classification, and summarization (e.g., summarize, explain, classify, describe, compare)

iii) Use knowledge and understanding in new tasks and situations (e.g., demonstrate, solve, apply, implement, use)

iv) Break the information down, and examine the relationships and components (e.g., analyze, differentiate, examine, compare, contrast)

v) Judgment and assessment based on the given criterion (e.g., evaluate, analyze, critique, assess, justify)

vi) Generation of new ideas, new meaning, and solutions through synthesis of the information (e.g., design, create, formulate, develop, construct)

Aligning the intended learning outcomes within the framework of the taxonomy of Bloom helps in progression from the lower-order thinking skills and knowledge and understanding (comprehension) to the higher-order thinking skills (analysis, evaluation, and the creation of new ideas) which plays a pivotal role in development of clinical reasoning and problem-solving skills.[18,25] Development of higher order thinking skills, critical thinking, and clinical skills as well as innovative solutions and decisions is the primary aim of the medical education.[26, 27]

SMART Principles for Objective Writing

The primary function of the SMART framework is to assist in the clarification and formulation of educational objectives: [19, 28]

i) Specific: objectives are transparent, fully articulated, and without confusion

ii) Measurable: can be assessed with certainty through particular evaluation mechanisms

iii) Achievable: the objective is pragmatic and can be accomplished in the proposed duration of time

iv) Relevant: comprehensive with respect to the competencies, objectives of the program, and requirements of the profession

v) Time-bound: goals can be accomplished in given periods of time or stages of learning

The SMART objectives allow and motivate end-users to establish targets and goals and assist in progress monitoring, evaluation of outcomes, and assessments of motivation and learning.[20, 29]

Goals, Objectives, and Outcomes for PMDC's Seven Core Competencies at Muhammad Medical College, Mirpurkhas

The subsequent sections outline the complete structure that MMC has developed for each of the seven competencies of the PMDC, indicating the order of depth of the relationships among the goals, objectives, and learning outcomes.

Competency 1: Knowledgeable (Scientific Knowledge for Good Medical Practice)

Goal:

To train MBBS graduates on the basic medical sciences and their related clinical knowledge that will assist them in the understanding, analysis, and application of scientific principles for the appropriate diagnosis and management of health and disease within the framework of the health and disease management in Pakistan.

Objectives:

The aims of the program include these objectives. It is expected that the participants should be able to:

i) Relay a comprehensive understanding of human body systems including their normal contructions and functions at molecular, cellular and systems levels

ii) Convey the understanding of pathophysiology related to common diseases and clinical conditions

iii) Foster understanding of the various biological and psychosocial factors that determine health and diseases at the individual and community levels

iv) Instill the ability to utilize evidence based biomedical knowledge to clinical scenarios including the application of the knowledge in a safe and ethical manner

v) Demonstrate knowledge and understanding of various therapeutic and pharmacological, surgical, psychological, social, and cultural approaches

vi) Prepare students for continuing education and independent learning based on a synthesis and critique of biomedical knowledge

vii) Provide students a sound understanding of the legal and ethical aspects of medical practice, including the issues of medical negligence and patient safety

Learn Outcomes:

The MBBS graduate will be able to:

1. Provide a comprehensive overview of normal anatomy, physiology, biochemistry and molecular biology that is pertinent to health and disease

2. Identify and explain the molecular, cellular, biochemical, and physiological pathologies that result in the dysfunction

3. Employ the ability to distinguish normal behavior and abnormal behavior with respect to its biological and psychological bases

4. Discuss various aspects of health and disease in relation to the process of growth, development, and old age

5. Identify various common causative agents and risk determinants of both communicable and non-communicable diseases

6. Thoroughly grasp the mechanisms, indications, and contraindications of the most commonly used drugs and apply this knowledge to guide therapeutic approaches.

7. Describe the impact of surgical, psychological, sociological, and cultural aspects on the overall management of the patient.

8. Show the ability to apply the principles of evidence-based medicine to select appropriate and safe diagnostic and therapeutic approaches within the most economical framework.

9. Understand the significance of compliance with medico-legal and patient safety regulations in the course of your medical practice.

10. Combine scientific knowledge and clinical evidence to improve the accuracy of the diagnosis and the development of the management strategy.

11. Assess the impact of lifestyle, heredity, environment, and social and cultural factors on the health of the people.

12. Engage with contemporary evidence to enable self-education and problem-solving in clinical settings.

Competency 2: Skillful (Clinical, Cognitive, and Patient Care Skills)
Goal: The aim is to cultivate skilled, safe, and self-assured medical graduates who can execute fundamental clinical, reasoning, and procedural skills required to provide optimal and efficient patient care in various healthcare contexts in Pakistan.
Objectives:

Graduates should be able to:

a. Teach students how to complete patient histories which take into account the bio-psycho-social factors involved.

b. Achieve competence in conducting the relevant physical, psychological, and clinical examinations.

c. Teach the ability to provide provisional diagnoses, and support the decision with relevant differential diagnoses.

d. Teach students how to request, do, and explain the results of relevant diagnostic studies.

e. Safely and competently perform common clinical procedures while adhering to infection prevention and control, and patient safety guidelines.

f. Teach the ability to formulate clinically appropriate management plans that are evidence-based and collaborative.

g. Encourage the ability to perform timely and routine clinical procedures.

h. Teach the ability to interact with patients in a skillful, ethical, and sensitive manner that demonstrates empathy and cultural respect.

Learning Outcomes:

By the end of the MBBS program, students will be able to:

1) Demonstrate focused clinical history with special attention to the patient's environment, culture, and psychosocial components of the clinical issue.

2) Accurately perform comprehensive physical and psychological clinical examinations, and other relevant procedures to identify and document abnormal clinical signs and conditions.

3) Demonstrate the ability to provide a provisional diagnosis and a comprehensive list of relevant differential diagnoses, based on clinical evidence.

4) Demonstrate the ability to request appropriate laboratory and imaging studies and provide a valid clinical interpretation of the results.

5) Demonstrate the ability to perform clinical procedures listed below in a competent and safe manner:

   i. Injection procedures: intramuscular, intravenous, subcutaneous, intradermal.Management of blood sampling, infusion lines, and blood transfusions

   ii. Cardiopulmonary resuscitation and the rest of basic life support

   iii. Management of wounds, dressings, and basic suturing of the skin

   iv. Airway management such as providing oxygen and using a nebulizer

   v. Catheterization of the bladder and proctoscopy

   vi. Blood sugar testing using a glucometer, and ECG

6) Develop and apply a management plan where patient safety, costs, and mitigating evidence of the problems of the plan are the priority

7) Understand the barrier of your abilities, and refer them to the proper professional, or ask them if the situation requires

8) Ensure that patients, caregivers, and other members of the health care team are able to communicate and understand each other to promote joint decision-making

9) Apply clinical procedures infection prevention measures

10) Be able to give emergency health care as basic support, triage, and stabilize the patient

11) Promote patient care partnerships while advocating for care that is ethical, and respectful of the culture, and rights of patients

Competency 3: Professional (Professionalism, Ethics, and Communication)
Goal: With the aim of forming medical graduates who embody the appropriate levels of professional values, behaviors, and attitudes with regard to the practice of medicine, including, but not limited to, lifelong learning, altruism, and empathy, along with ethical and accountable practice, effective communication and collaboration, and cultural sensitivity, as well as various aspects of community citizenship.
Objectives

At a professional level, the graduate should be able to:

1. Demonstrate professional values of honesty, integrity, responsibility, and accountability in all that they do operationally and in the professional sphere

2. Demonstrate empathy and a sense of altruism, as well as sensitivity to and respect for differences in culture and religion in the provision of patient care

3. Demonstrate ethical reasoning and make decisions based on the principles of autonomy, beneficence, and non-maleficence, justice, confidentiality, and informed consent

4. Demonstrate effective collaboration in an inter-professional team environment, exhibiting professional respect and collegiality to fellow team members and other professionals in the health system

5. Exhibit and practice effective communication through the use of suitable and appropriate verbal, non-verbal and written communication skills in a clear and compassionate manner to all members of the community, including patients and their families

6. Demonstrate and practice self-directed and lifelong learning, based on regular self-evaluation and reflection on knowledge and skills, obtaining constructive feedback, and ongoing professional development

7. Demonstrate and practice effective management of time and the responsibilities of patient care

8. Demonstrate effective resilience by owning responsibility for your mistakes and learning from them, and from feedback and critical incident reporting

Learning Outcomes

At the completion of the MBBS program, the graduate will be able to:

1) Demonstrate professional integrity and ethical conduct upheld within all clinical and academic domains and endeavors

2) Show understanding of, and sensitivity to, people and their cultures, and maintain their privacy and self-governance

3) Show understanding and capability to relate to and engage in conversations with people from various social and cultural backgrounds

4) Work and manage in teams from various disciplines with the focus on the patient

5) Accept the necessity of ongoing education and training in your area

6) Understand and comply with the laws and regulations governing medical practice in Pakistan

7) Demonstrate responsibility to the individual, the community, and the profession

8) Demonstrate the attributes of a professional in the way of rational comportment, attitudes, and actions in line with the requirements of the institution and the profession

9) Identify the boundaries of your knowledge and, when necessary, request help and/or refer the patient

10) Identify ethical issues and use appropriate clinical reasoning to resolve them

Competency 4: Scholar & Researcher (Research Skills and Scientific Inquiry)
Goal: To foster medical students that demonstrate academic qualities such as curiosity, questioning, creativity, and research thinking, and can engage with evidence-informed medicine and medical innovations for the duration of their careers.
Objectives:

The aim is that graduates will be able to:

1. Recognize research issues or deficiencies pertaining to health in a given clinical or community setting

2. Analyze scientific literature using suitable evaluation methods

3. Formulate precise, relevant, and researchable questions and hypotheses

4. Choose appropriate research strategies, including experimental, epidemiological, and qualitative research, and determine suitable statistical methods for appropriate research questions

5. Show competence in elementary epidemiology and biostatistics related to clinical and community research

6. Adhere to professional and scientific standards of research to collect, arrange, analyze and interpret research findings and data

7. Demonstrate the ability to articulate research results in a suitable manner, both verbally and in writing

8. Maintain high standards of ethics in the conduct and presentation of research, including due regard for intellectual property, and the rights of participants

9. Implement the findings of research in practice to enhance the provision of medical care based on evidence

Learning Outcomes

At the end of the MBBS program, students will be able to:

1) Devise appropriate research proposals and carry out exhaustive reviews of relevant literature to generate hypotheses pertaining to the medical practice

2) Use principles of epidemiology to plan and implement elementary research projects and incorporate high-quality data collection and biostatistical analysis

3) Analyze scientific evidence in a community and clinical health context, and construct evidence based on research

4) Uphold and advocate ethical principles of research including voluntary consent, confidentiality of the data, transparency, and respect for the intellectual property of others

5) Deliver research outcomes to different groups such as scholars, legislators, and non-specialized audiences.

6) Utilize research and inquiry outcomes to enhance health at both local and national levels and promote continuous scholarship

Competency 5: Critical Thinker (Clinical Reasoning and Problem Solving)
Goal: To cultivate graduates that utilize logical, analytical, and introspective approaches, as well as critical thinking, to assess and reflect on information, address clinical issues, and make decisions regarding patient management and other issues related to the profession.
Outcomes:

Graduates will be able to:

1. Utilize logical and systematic reasoning to articulate clinical cases within an evidence-based framework.

2. Recognize and synthesize pertinent, pertinent, and key competing information from various sources, and evaluate the sources.

3. Critically evaluate the underlying assumptions, and data, arguments, and viewpoint biases.

4. Formulate and analyze multiple clinical and ethical solutions while considering the potential advantages and disadvantages.

5. Formulate reasonable and defensible conclusions based on synthesis and the critical analysis of evidence.

6. Regularly evaluate their cognitive processes and the reasoning involved in the processes, to learn through reflection, to correct, and to improve through mistakes.

7. Collaborate while exercising individual critical reasoning to participate in multidisciplinary teamwork.

8. Demonstrate the ability to think critically and analyze complex clinical situations, including those that are ambiguous and unfamiliar.

Outcomes of Learning:

By the end of the MBBS program, the student will be able to:

1) Demonstrate analytical and independent thinking in clinical issue resolution and decision-making.

2) Identify cognitive biases and constraints in decision-making within individuals and in teams.

3) Use clinical and biomedical data to systematically analyze and support a differential diagnosis and engage in patient management.

4) Assess new evidence in the form of scientific discovery and clinical guidelines and evaluate the evidence for relevance, accuracy, and applicability to practice.

5) Demonstrate an ability to embrace ambiguity and complexity of patient management through a thoughtful and structured approach.

6) Demonstrate the ability to communicate in a reasonable and respectful manner, including presenting evidence-based ideas.

7) Systematically evaluate the quality of a decision to foster continuous improvement and engage in reflective practice for continuous improvement of outcomes.

Competency 6: Leader & Role Model (Leadership and Management)
Goal:
The goal of this program is to train future medical practitioners to manage healthcare teams and motivate them through ethical professionalism, advocacy for the patients, and caring for the community.

Objectives:

All graduates will have:

1. Demonstrated ethical and professional behavior with patients and with colleagues and other members of society.

2. Demonstrated ability to lead and inspire members of a health care team and promote their collaboration and appropriate delegation of shared tasks.

3. Demonstrated integrity and respect for other individual's values and a sense of responsibility in the exercise of leadership and in the health care problems confronting them.

4. Demonstrated the ability to inspire others in the profession through a positive disposition, dedication to the profession by acquiring new knowledge and skills on a continuous basis, and through a commitment to providing quality health care.

5. Demonstrated ability to advocate for and promote patient safety, and public health, equity and social justice.

6. Demonstrated ability to resolve conflict in a just and diplomatic manner and to foster a positive working environment.

7. Provided mentorship and support for the professional development of junior colleagues and other health professionals in a clinical setting.

8. Demonstrated flexibility in adapting their leadership approach to the different clinical and community situations, as well as to the different social and cultural backgrounds of the individuals involved.

9. Demonstrate a high degree of composure and sound judgement when making decisions under stress.

10. Demonstrate ability to articulate the vision, the mission and the values of the profession and of the institution.

Learning Outcomes:

By the end of the MBBS program:

1) Demonstrated leadership ability in world clinical practice and in team based care and community health activities.

2) Demonstrated professional values and ethical behavior in a way that others can use as a model.

3) Demonstrated effective coordination, management and assessment of collaborative working in a range of health care settings.

4) Provided mentoring, guidance and feedback to other health professionals who have less experience in their activities.

5) Advance the health interests of the community and patients with the respect of safety, ethical, and equitable concerns

6) Address and defend the disputes and difficulties in the health care teams, with respect and equity concerns of all participants

7) Speak with the teams, the public health meetings, and the patients with clarity, compassion, and self-assurance

8) Exhibit flexibility, oversight, and the best accomplishments under the difficult or changing health care conditions

Competency 7: Community Health Promoter (Community Orientation and Health Advocacy)

Goal: To equip medical graduates with the skills needed to become active promoters of disease prevention and health within communities, become facilitators of positive social transformation, and work collaboratively to resolve public health issues through education, advocacy, and leadership.

Objectives

Graduates should be able to:

1. Analyze community health needs using epidemiological techniques, as well as strategies involving community participation.

2. Determine the health-related social, economic, environmental, and cultural factors affecting the people within the community Plan, execute and assess health promotion and disease prevention activities for the various communities.

3. Work with the community, health facilities, and governmental organizations to strengthen public health programs Promote and advocate for the practice and maintenance of healthy environments at the individual, family, community, and policy levels.

4. Health education and health resource education on hygiene, nutrition, prevention, and health resource utilization Address public health crises and outbreaks, and incorporate the community for effective results.

5. Work with communities on health activities, and incorporate ethics and cultural sensitivities Gain and utilize inter-sectorial collaboration for health promotion purposes and the health improvement of the community (schools, workplaces, and other community organizations, and local health NGOs, to community people).

6. Health advocacy and targeted health programs for the inequitable, disadvantaged, and marginalized groups within the community.

Learning Outcomes By the end of the MBBS program, students should be able to:

1) Analyze and assess the community to detect health-related issues and utilize the health data for constructive intervention planning.

2) Formulate and assess health promotion and disease prevention programs to tackle community health issues.

3) Educate, empower, and support individuals, families, and communities to make healthy choices and practice health sustenance.

4) Collaborate with public health teams, NGOs, and local government to improve community health outcomes

5) Promote health equity, and social justice, and ensure all population groups have accessible health care

6) Demonstrate knowledge of public health policies, programs, and ethical frameworks pertaining to community health practice

7) Manage outbreaks of infectious diseases and health-related disasters and crises with appropriate community action

8) Demonstrate cultural competence and respect for diversity in all community health programs.

Implementation Considerations for Curriculum Developers
Alignment and Constructive Alignment:
1. Constructive alignment guarantees that learning outcomes, instruction, and assessment are interrelated.[12, 30] In a competency-based curriculum, it holds that::

2. Learning outcomes need to capture competencies and objectives

3. Teaching and learning activities should enable the development of competencies

4. Assessment of learning outcomes must be done

5. Alignment and transparency to learners must be done to all three components.

Progressive Development across Educational Levels
The learning outcomes should be at the right cognitive and skill levels at every stage of the medical education continuum: [31]

1) Early Years (Years 1-2): Knowledge, comprehension, and basic skill acquisition (Remember, Understand)

2) Middle Years (Years 3-4): Application, analysis, and integration of a clinical

3) Final Year (Year 5): Requires synthesis, independent performance, evaluation (Create)

Assessment Strategy Development
Assessment methods should be selected based on the cognitive level and competency domain being evaluated: [32, 33]

Competency Domain	Learning Outcome Level	Appropriate Assessment Methods
Knowledge (Knowledgeable)	Remember, Understand	MCQs, EMQs, SAQs, written exams
Clinical Skills (Skillful)	Apply, Demonstrate	OSCE, DOPS, clinical examinations, simulation
Professionalism	Model, Exhibit	Multi-source feedback, portfolio, direct observation
Research (Scholar)	Formulate, Design, Evaluate	Research project, critical appraisal assignments, presentations
Critical Thinking	Analyze, Evaluate, Interpret	Case-based discussions, PBL assessments, clinical reasoning exercises
Leadership	Lead, Coordinate, Advocate	Portfolio, peer assessment, workplace-based assessment
Community Health	Conduct, Develop, Collaborate	Community project reports, field work assessment, presentations

Table 2: Alignment of competencies, outcome levels, and assessment methods

Quality Assurance

Regular review and revision of goals, competencies, objectives, and learning outcomes ensures continued relevance and effectiveness: [34]

1. Conduct periodic curriculum mapping to identify gaps and redundancies

2. Gather stakeholder feedback from students, faculty, graduates, and employers

3. Analyze assessment data to evaluate achievement of learning outcomes

4. Benchmark against national standards and international best practices

5. Revise based on evolving healthcare needs and educational research

Discussion

The Critical Importance of Definitional Clarity

The confusion between goals and objectives, competencies and learning outcomes are perennial challenges in the education of physicians. [3, 4] This confusion contributes to a number of issues such as misalignment between curriculum and assessment, failure to measure educational outcomes, difficulty in accreditation, ineffective communication of expectations to students and faculty, etc.[35] The framework in this article responds to these challenges by offering definitional clarity with practical examples and a stepwise approach to curriculum development.

From Theory to Practice: The MMC Model

The Muhammad Medical College model illustrates the translation of theoretical competency frameworks into workable curriculum components.[9] Through the identification of specific

goals, objectives, and learning outcomes for each PMDC competency, MMC has been able to construct a template that:

1) Clarifies for curriculum developers, what needs to be taught

2) Assists faculty to design learning activities that are appropriate

3) Clarifies for students what is expected of them

4) Enables the development of appropriate assessment

5) Simplifies program assessment and improvement

6) Aids in accreditation and regulatory compliance

7) Streamlines quality improvement activities

Alignment with International Frameworks

The ACGME competencies (USA), education frameworks from Canada's CanMEDS and other countries such as the UK and Australia, and the rest of the world. Competency-based education framework [1,2,36] also follows the principles of education planning discussed in this paper. Such planning also contributes towards the development of Pakistani medical graduates, addressing the local health care system and societal priorities.

According to Bloom's taxonomy, learning outcomes should relate to the eventual goals of the program and should facilitate the movement of the learner from the acquisition of base knowledge to the mastery of higher-order skills that are required of the graduate in the field of practice. [17, 18, 25] The incorporation of SMART principles in the writing of objectives lends additional measurability and responsibility in medical education. [19, 20]

Challenges in Implementation

Medical institutions in the integration of this framework might face the following: [37]

1. Need for faculty development: Educators must be given training on the writing of effective learning outcomes, alignment of teaching to competencies, and the utilization of fit assessment methods

2. Cultural change: Movement from the traditional discipline-based silo mentality to an integrated, competency-based approach requires a change in the institutional culture

3. Resource implications: The extensive assessment of competencies requires the acquisition of clinical skills infrastructure, simulation, training in workplace-based assessment

4. Assessment workload: The multiplicity of assessment of competencies increases the burden on faculty and learners

5. Time involved: The articulation of a comprehensive set of goals, objectives, and outcomes for an entire curriculum is a labor intensive process

The above challenges lend themselves for resolution by the adoption of a phased approach to implementation, comprehensive faculty development, deliberate allocation of resources, and active institutional leadership championing educational change. [38]

Implications for Curriculum Design

The framework delineates how medical curricula should be designed and taught in the following ways. [39] Vertical integration: An entire curriculum should cover a specific set of competencies over a number of years and at increasing levels of complexity and clinical sophistication. For example, professionalism is addressed in the curriculum at Year 1 during the ethics lectures, practiced in Year 3, and at advanced levels is assessed in Year 5 via a portfolio and workplace assessments.

Horizontal integration: Within each academic year, related learning outcomes across different subjects should be taught in a coordinated fashion. For example, in the organ-system-based module, cardiovascular anatomy, physiology, pathology, pharmacology, and clinical medicine should be integrated rather than taught as isolated subjects.

Assessment drives learning: This principle states that students learn mainly the materials they are assessed on.[32] For example, if competencies of professionalism, leadership, and community engagement are illustrated as important, they should be assessed and taught, rather than just be instructed.

The Role of Stakeholder Engagement
The Importance of Stakeholder Involvement:

Achieving success necessitates the involvement of several stakeholders: [40]

1) Students: Must be cognizant of intended learning outcomes and how they relate to the assessment.

2) Faculty: Require adequate training and assistance to effectively teach and evaluate competencies.

3) Administrators: Must provide adequate resources, support for policy formation, and infrastructure.

4) Clinical Supervisors: Must be adequately oriented to the workplace assessment of competencies.

5) External Stakeholders: Health systems, regulatory authorities, and patient advocacy groups should be consulted regarding pertinent competencies.

Future Directions

The ongoing development of competency-based medical education systems should involve: [41, 42]

1. The longitudinal tracking of graduate outcomes in order to affirm the efficacy of competency development.

2. The assessment of complex competencies such as professionalism and leadership to determine the most effective approaches.

3. The creation of internationally accepted learning outcome competencies to promote cross-border education and ensure quality.

4. The addition of health informatics, global health, and planetary health as competencies.

5. Increased focus on competencies related to inter-professional education.

6. The modification of systems to postgraduate medical education and continuing professional development.

Conclusion

Effective competency-based medical education starts with articulating goals, competencies, objectives, and learning outcomes. Knowing the order and types of relationships between the different levels and components of the education system—broad goals of the institution, integrated competencies, objectives, and outcomes—helps the designers of the curriculum to construct a coherent system of education to produce graduates capable of meeting the needs of the health care system. .

The comprehensive framework developed at Muhammad Medical College for the operationalization of the seven PMDC competencies provides a model for other medical schools on how to transform broad competency statements into precise, measurable learning outcomes. This model gives medical educators a balance between theory and practice for the purpose of curriculum development, instructional design, and assessment.

1) Focusing on the following key principles will have the best impact when applying the system.

2) Be able to explain the differences between the following terms: goals (what is the main purpose), competencies (what are the interconnected abilities), objectives (what are the distinct aims), and outcomes (what are the quantifiable results).

3) Ensure vertical alignment bringing in outcomes to be achieved to the planning and implementation of the teaching and the evaluation (constructive alignment).

4) Bloom's taxonomy can be used to define outcomes to be achieved at varying levels of cognition.

5) SMART objectives improve outcomes in terms of being measurable and spcific.

6) Develop outcomes to be achieved at varying educational stages and are hierarchical in nature.

7) Choose evaluation techniques which truly reflect the competencies and outcomes you want to measure.

8) Involve stakeholders when designing and implementing the curriculum.

9) Continuously improve the system in terms of quality and output through systematic evaluation and revisions.

Providing our educational system with these tools will allow institutions to design and operate competency based medical curricula and the MMC model will provide a framework pertaining to the reform of medical education for developing countries like Pakistan. Medical education of this kind will produce a physician who is not only clinically proficient but is expected to be professional, scholarly, and demonstrate critical thinking, leadership, and a willingness to serve the community.

Achieving truly competency based medical education of this kind will be a journey. It will take a commitment to a constant and sustained focus on alignment and improvement. This framework will be the basis for the socially responsive medical education of the future.

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64 CLINICAL SKILLS IN SKILLS LAB OF MMC

Competence based medical education is being promoted by the World Federation of Medical Education and PM&DC. In its quest to be a national/international leader to produce the quality doctors, Muhammad Medical College, Inbe-Sina university has developed a state of the art Skills Lab/ Simulation Centre and a unique Program of teaching and training the 64 Clinical skills required by a doctor. Each skill will be taught at the skill/ simulation lab and will be strengthened in the wards. Following is the schedule of the program. Each session may be preceded by a brief introduction/video. A printed as well as the electronic logbook will be maintained for/ by each student. This record will be automatically updated and kept in the student's e-file and some marks will be awarded in each modular/ annual examination to the student.

Here, the skills have been divided according to

A. CLASS (64)

    a. 3rd Year **(10)-Preferably by SRs/APs**
    b. 4th Year **(18) Preferably by SRs/APs**
    c. 5th Year **(36) Preferably by Professors**

B. SUBJECT (64)

    a. Surgery **(20-2 workshops per week)**
    b. Medicine **(20-2 workshops per week)**
    c. Gynae & Obs **(9)**
    d. Paeds **(6)**
    e. Pathology **(6-all in 3rd year)**
    f. ENT **(2-3rd year)**
    g. Eye **(1-)**

C. Competence (64)

- Patient assessment by the medical students (22)
- Procedural Skills (12)
- Patient care (7)
- Prescribing (5)
- Therapeutic procedures (18)

Year wise

A. 3rd year

S. No.	Procedure	Description	Level of competence	YEAR/ MODULE	Subject	Link	Date	INSTRUCTOR/ SIGNATURE	DEPUTY DI SKILLS LA
1	History taking	Abdominal pain	Safe to practice under indirect supervision	3rd Year	Surgery				
2. .	Take baseline physiological observation and record appropriately	Measure temperature, respiratory rate, pulse rate, blood pressure, oxygen saturations, NG output and urine output.	Safe to practice under indirect supervision	3rd Year	Medicine/				
3	History taking	Biodata, Presenting complaint, H/o Presenting complaint	Safe to practice under indirect supervision	3rd Year	Medicine				
4	History taking	Remaining History	Safe to practice under indirect supervision	3rd Year	Medicine				

5	Blood sampling	Take samples of venous blood to test for the growth of infectious organisms in proper culture bottles	Safe to practice under direct supervision	3rd Year	Pathology				
6.	Carry out arterial blood gas and acid base sampling from the radial artery in adults	Insert a needle into a patient's radial artery (in the wrist) to take a sample of arterial blood and interpret the results. Use appropriate measures to prevent hematomaformation at the site	Safe to practice under direct supervision	3rd Year	Pathology				
7	Carry out venipuncture	Insert a needle into a patient's vein to take a sample of blood for testing. Make sure that blood samples are taken in the correct order, placed in the correct containers, that these are labelled correctly and sent to the laboratory promptly	Safe to practice under indirect supervision	3rd Year	Pathology				

8	Measure capillary blood glucose	Measure the concentration of glucose in the patient's blood at the bedside using appropriate equipment. Record and interpret the results.	Safe to practice under indirect supervision	3rd Year	Pathology				
9	Carry out a urine multi dipstick test	Explain to patient how to collect a midstream urine sample. Test a sample of urine to detect abnormalities. Perform a pregnancy test where appropriate.	Safe to practice under indirect supervision	3rd Year	Pathology				
10.	Take and/or instruct patients how to take a swab	Use the correct technique to apply sterile swabs to the nose, throat, skin and wounds. Make sure that samples are placed in the correct containers, that they are labelled correctly and sent to the laboratory promptly and in the correct way	Safe to practice under indirect supervision for nose, throat, skin or wound swabs	3rd Year	Pathology				

B. **4th Year**

S. No.	Procedure	Description	Level of competence	YEAR/ MODULE	Subject	Link	Date
1	Carry out abdominal and rectal examination and its interpretation.	Systemic approach in clinical examination Completes all steps of examination and document appropriately	Safe to practice under indirect supervision	4th Year	**Surgery**		
2	Carry out Inguinoscrotal examination and its interpretation.	Systemic approach in clinical examination Completes all steps of examination and document appropriately	Safe to practice under indirect supervision	4th Year	**Surgery**		
3	Carry out Neck examination and its interpretation.	Systemic approach in clinical examination Completes all steps of examination and document appropriately	Safe to practice under indirect supervision	4th Year	**Surgery**		

4	Carry out Breast examination and its interpretation.	Systemic approach in clinical examination Completes all steps of examination and document appropriately	Safe to practice under indirect supervision	4th Year	**Surgery**	
5	Interpretation of radiological examination of surgical including erect chest x ray, erect & supine abdominal x-ray, contrast x-rays including IVU, Double contrast Barium Enema, CT scans, MRI, Isotope Scans	Systemic approach in radiological examination.	Safe to practice under indirect supervision	4th Year	**Surgery**	
6	Interpretation of X-rays of upper and lower limbs	should be able to identify gross musculoskeletal pathology on X-rays including fractures & dislocations	safe to practice under indirect supervision	4th Year	**Surgery**	

7	Interpretation of x-rays of chest, abdomen and pelvis	should be able to identify rib fractures, hemothorax, pneumothorax, free air under diaphragm, pelvic fractures	safe to practice under direct supervision	4th Year	Surgery	
8	Carry out respiratory examination and its interpretation.		Safe to practice under direct supervision	4th Year	Medicine	
9	Carry out cardiovascular examination and its interpretation.		safe to practice under direct supervision	4th Year	Medicine	
10	Carry out Neurological examination and its interpretation.		safe to practice under direct supervision	4th Year	Medicine	
11	Carry out intravenous cannulation	Insert a cannula into a patient's vein and apply an appropriate dressing.	Safe to practice under direct supervision	4th Year	Medicine	

12	Carry out safe and appropriate blood transfusion	Following the correct procedures, give a transfusion of blood (including correct identification of the patient and checking blood groups). Observe the patient for possible reactions do the transfusion, and take action if they occur.	Experienced in a simulated setting; further training required before direct Supervision	4th Year	Medicine			
13	Carry out a 3- and 12- lead electrocardiogram	Set up a continuous recording of the electrical activity of the heart, ensuring that all leads are correctly placed.	Safe to practice under indirect supervision	4th Year (also in final year)	Medicine			
14	History taking	Gynae/ Obs	Safe to practice under indirect supervision	4th Year	Gynae/ Obs			
15	Obstetric & Gynecological Examination.	Perform Obstetric & Gynecological examination	Safe to practice under indirect supervision	4th Year	**Gynae/ Obs**		15	

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16	Ophthalmoscopy-Eye ward rotation	Perform basic ophthalmoscopy and identify common abnormalities	safe to practice under direct supervision	4th Year	Eye			
17	Otoscopy- ENT Ward	Perform basic otoscopy and identify common abnormalities	Safe to practice under indirect supervision	4th Year	ENT			
18	Basic ENT Examination	Should be ale to conduct asic ENT Examination	safe to practice	4th year	ENT			

5th Year

S. No.	Procedure	Description	Level of competence	YEAR/ MODULE	Subject	Link		Date
1	Carry out removal of Sutures and surgical drains	Firmly grasp drainage tube close to skin with dominant hand, and with a swift and steady motion withdraw the drain and place it on	Safe to practice under direct supervision	Final Year	**Surgery**			

		the waterproof drape/pad (other hand should stabilize skin with 4 x 4 sterile gauze around drain site). Remove sutures by following aseptic techniques				
2	Application of POP	Apply the POP on top of the cotton wool padding from distal to proximal, without applying tension to the roll, overlapping each layer by 50%.	Safe to practice under direct supervision	Final Year	Surgery	
3	Perform surgical scrubbing up	Follow approved processes for cleaning hands and wearing appropriate personal protective equipment before procedures or surgical operations	Safe to practice under direct supervision	Final Year	Surgery	

4	Digital rectal examination and Proctoscopy	Should know common causes of bleeding per rectum and common perianal diseases and be able to diagnose them by means of digital rectal examination and proctoscopy.	safe to practice under direct supervision	Final Year	**Surgery**	
5	Identifying and learning the use of basic surgical instruments.		Safe to practice under indirect supervision	Final Year	**Surgery**	**https://www.youtube.com/watch?v=U8tKeMLl5p4**
6	Taking informed consent		Safe to practice under indirect supervision	Final Year	**Surgery**	
7	Preoperative counselling		Safe to practice under indirect supervision	Final Year	**Surgery**	

8	Carry out male Urinary Bladder Catheterization	Insertion of a catheter tube through the urethra and into the bladder to drain urine.	Safe to practice under indirect supervision	Final Year	Surgery	
9	Carry out wound care and basic wound closure and dressing	Provide basic care of surgical or traumatic wounds and apply dressing appropriately.	Safe to practice under direct supervision	Final Year	Surgery	
10	Carry out nasogastric tube placement	Pass a tube into the stomach through the nose and throat for feeding and administering drugs or draining the stomach's contents. Should know how to ensure correct placement.	Safe to practice simulation	Final Year	Surgery	
11	Use local anesthetics	Inject or topically apply a local anesthetic. Understand maximum doses of local anesthetic agents.	Safe to practice under direct supervision	Final Year	Surgery	

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12	Apply splint for fractures POP,	Can apply routine splints for fractures like Thomas, - Neck of femur	Safe to practice under direct supervision	Final Year	**Surgery**	
13	Nebulization	Follow the directions for the specific brand of nebulizer machine and cup	Safe to practice under indirect supervision	Final Year	Medicine	
14	Set up an infusion	Set up run through and intravenous infusion. Have awareness of the different equipment and devices used.	Safe to practice under direct supervision	Final Year	Medicine	
15	Use correct techniques for moving and handling, including patients who are frail	Use, and/ or direct other team members to use, approved methods for moving, lifting and handling people or objects, in the context of clinical care, using methods that avoid injury to patients, colleagues, or oneself	Safe to practice under indirect supervision	Final Year	Medicine	

16	Breaking bad news (video)		Safe to practice under indirect supervision	Final Year	Medicine	https://youtu.be/MKnWkrPLGOs?si=JQKQ6bPznsfWhIRE	
17	Introduction to care of the elderly & dying (palliative care)(video)		Safe to practice under indirect supervision	Final Year	Medicine	https://youtu.be/Lbbd1uIwbxs?si=3ahg-eaZX-3_mNWm	
18	Instruct patients in the use of devices for inhaled medication	Explain to a patient how to use an inhaler correctly, including spacers, and check that their technique is correct. Should know about various types of Inhalers	Safe to practice under direct supervision	Final Year	Medicine		
19	Prescribe and administer oxygen	Prescribe and administer oxygen safely using a delivery method appropriate for the patient's needs and monitor and adjust	Safe to practice under direct supervision	Final Year	Medicine		

		oxygen as needed. Knows the exact volume given per Minute					
20	Prepare and administer injectable (intramuscular, subcutaneous, intravenous) drugs	Prepare and administer injectable drugs and prefilled syringes Knows about various channels of CVP	Safe to practice under direct supervision	Final Year	Medicine		
21	Measure CVP (central venous pressure)	should be able to measure, interpret and monitor central venous pressure readings	safe to practice under direct supervision	Final Year	Medicine		
22	Should be able to perform essential lifesaving procedure (BLS)	Tracheostomy, endotracheal intubation and chest intubation. Should be competent at Basic Life Support.	safe to practice under direct supervision	Final Year	Medicine		
23.	Nutritional assessment	Calculate BMI, carry out nutritional assessment of patients and guide them according to their caloric requirements	safe to practice under direct supervision	Final Year	Medicine		

24	Take HVS	To test vaginal discharge for the presence of vaginal thrush, bacterial vaginosis and trichomonas vaginalis. Carried out in clean conditions, using a speculum to look at the cervix and vagina.	Safe to practice under direct supervision	Final Year	**Gynae/ Obs**	
25	Positioning for breast feeding	Should be able to direct patient on positioning of breast feeding	Safe to practice under indirect supervision	Final Year	**Gynae/ Obs**	
26	Performing CTG and its interpretation		Safe to practice under direct supervision	Final Year	**Gynae/ Obs**	
27	Carry out female urinary catheterization	Insert a urethral catheter in both male and female patients. Should know its complications and	Safe to practice under direct supervision	Final Year	**Gynae/ Obs**	

28	Antenatal Care & calculating EDD	Should be able to direct patient on positioning of breast feeding	Safe to practice under indirect supervision	Final Year	**Gynae/ Obs**	
29	Normal Vaginal Delivery	Should be able to direct patient on positioning of breast feeding	Safe to practice under indirect supervision	Final Year	**Gynae/ Obs**	
30	Obstructed labour and assisted deliveries	Should be able to direct patient on positioning of breast feeding	Safe to practice under indirect supervision	Final Year	**Gynae/ Obs**	
31	History taking	All Paeds	Safe to practice under indirect supervision	Final Year	Paeds	
32	Paediatric Examination	All Paeds	Safe to practice under indirect supervision	Final Year	Paeds	

33	Dehydration and IV infusion	Paeds	Safe to practice under indirect supervision	Final Year	Paeds		
34	Nutritional Diseases	Paeds	Safe to practice under indirect supervision	Final Year	Paeds		
35	Infective Diseases & EPI	Paeds	Safe to practice under indirect supervision	Final Year	Paeds		
36	BLS- Paeds	All Paeds	Safe to practice under indirect supervision	Final Year	Paeds		

Subject wise:

Surgery & Allied

S. No.	Procedure	Description	Level of competence	YEAR/ MODULE	Subject	Link	Date
1	History taking	Abdominal pain	Safe to practice under indirect supervision	3rd Year	Surgery		
2	Carry out abdominal and rectal examination and its interpretation.	Systemic approach in clinical examination Completes all steps of examination and document appropriately	Safe to practice under indirect supervision	4th Year	Surgery		
3	Carry out Inguinoscrotal examination and its interpretation.	Systemic approach in clinical examination Completes all steps of examination and document appropriately	Safe to practice under indirect supervision	4th Year	Surgery		
4	Carry out Neck examination and its interpretation.	Systemic approach in clinical examination Completes all steps of examination and document appropriately	Safe to practice under indirect supervision	4th Year	Surgery		

5	Carry out Breast examination and its interpretation.	Systemic approach in clinical examination Completes all steps of examination and document appropriately	Safe to practice under indirect supervision	4th Year	**Surgery**		
6	Interpretation of radiological examination of surgical including erect chest x ray, erect & supine abdominal x-ray, contrast x-rays including IVU, Double contrast Barium Enema, CT scans, MRI, Isotope Scans	Systemic approach in radiological examination.	Safe to practice under indirect supervision	4th Year	**Surgery**		
7	Interpretation of X-rays of upper and lower limbs	should be able to identify gross musculoskeletal pathology on X-rays including fractures & dislocations	safe to practice under indirect supervision	4th Year	**Surgery**		

8	Interpretation of x-rays of chest, abdomen and pelvis	should be able to identify rib fractures, hemothorax, pneumothorax, free air under diaphragm, pelvic fractures	safe to practice under direct supervision	4th Year	**Surgery**	
9	Identifying and learning the use of basic surgical instruments.		Safe to practice under indirect supervision	Final Year	**Surgery**	**https://www.youtube.com/watch?v=U8tKeMLl5p4**
10	Taking informed consent		Safe to practice under indirect supervision	Final Year	**Surgery**	
11	Preoperative counselling		Safe to practice under indirect supervision	Final Year	**Surgery**	

12.	Carry out male Urinary Bladder Catheterization	Insertion of a catheter tube through the urethra and into the bladder to drain urine.	Safe to practice under indirect supervision	Final Year	**Surgery**	
13.	Carry out removal of surgical drains & Removal of sutures	Firmly grasp drainage tube close to skin with dominant hand, and with a swift and steady motion withdraw the drain and place it on the waterproof drape/pad (other hand should stabilize skin with 4 x 4 sterile gauze around drain site). Remove sutures by following aseptic techniques	Safe to practice under direct supervision	Final Year	**Surgery**	
14.	Application of POP	Apply the POP on top of the cotton wool padding from distal to proximal, without applying tension to the roll, overlapping each layer by 50%.	Safe to practice under direct supervision	Final Year	**Surgery**	

15.	Perform surgical scrubbing up	Follow approved processes for cleaning hands and wearing appropriate	Safe to practice under direct supervision	Final Year	**Surgery**	

		personal protective equipment before procedures or surgical operations					

16.	Carry out wound care and basic wound closure and dressing	Provide basic care of surgical or traumatic wounds and apply dressing appropriately.	Safe to practice under direct supervision	Final Year	**Surgery**	
17.	Carry out nasogastric tube placement	Pass a tube into the stomach through the nose and throat for feeding and administering drugs or draining the stomach's contents. Should know how to ensure correct placement.	Safe to practice simulation	Final Year	**Surgery**	
18.	Use local anesthetics	Inject or topically apply a local anesthetic. Understand maximum doses of local anesthetic agents.	Safe to practice under direct supervision	Final Year	**Surgery**	
19.	Apply splint for fractures POP,	Can apply routine splints for fractures like Thomas, - Neck of femur	Safe to practice under direct supervision	Final Year	**Surgery**	

S. No.	Procedure	Description	Level of competence	YEAR/ MODULE	Subject	Link	Date
20.	Digital rectal examination and Proctoscopy	Should know common causes of bleeding per rectum and common perianal diseases and be able to diagnose them by means of digital rectal examination and proctoscopy.	safe to practice under direct supervision	Final Year	**Surgery**		

A. **Medicine & Allied**

S. No.	Procedure	Description	Level of competence	YEAR/ MODULE	Subject	Link	Date
1.	Take baseline physiological observation and record appropriately	Measure temperature, respiratory rate, pulse rate, blood pressure, oxygen saturations, NG output and urine output.	Safe to practice under indirect supervision	3rd Year	Medicine		
2	History taking	Biodata, Presenting complaint, H/o Presenting complaint	Safe to practice under indirect supervision	3rd Year	Medicine		

3	History taking	Remaining History	Safe to practice under indirect supervision	3rd Year	Medicine	
4	Carry out respiratory examination and its interpretation.		Safe to practice under direct supervision	4th Year	Medicine	
5	Carry out cardiovascular examination and its interpretation.		safe to practice under direct supervision	4th Year	Medicine	
6.	Carry out Neurological examination and its interpretation.		safe to practice under direct supervision	4th Year	Medicine	
7.	Carry out intravenous cannulation	Insert a cannula into a patient's vein and apply an appropriate dressing.	Safe to practice under direct supervision	4th Year	Medicine	

8.	Carry out safe and appropriate blood transfusion	Following the correct procedures, give a transfusion of blood (including correct identification of the patient and checking blood groups). Observe the patient for possible reactions do the transfusion, and take action if they occur.	Experienced in a simulated setting; further training required before direct Supervision	4th Year	Medicine	
9.	Carry out ECG examination and its interpretation.		safe to practice under direct supervision	Final Year (also in 4th year)	Medicine	

10.	Nebulization	Follow the directions for the specific brand of nebulizer machine and cup	Safe to practice under indirect supervision	Final Year	Medicine	

11.	Set up an infusion	Set up run through and intravenous infusion. Have awareness of the different equipment and devices used.	Safe to practice under direct supervision	Final Year	Medicine	
12.	Use correct techniques for moving and handling, including patients who are frail	Use, and/ or direct other team members to use, approved methods for moving, lifting and handling people or objects, in the context of clinical care, using methods that avoid injury to patients, colleagues, or oneself	Safe to practice under indirect supervision	Final Year	Medicine	
13.	Breaking bad news (video)		Safe to practice under indirect supervision	Final Year	Medicine	https://youtu.be/MKnWkrPLGOs?si=JQKQ6bPznsfWhIRE
14.	Introduction to care of the elderly & dying (palliative care)(video)		Safe to practice under indirect supervision	Final Year	Medicine	https://youtu.be/Lbbd1uIwbxs?si=3ahg-eaZX-3_mNWm

15.	Instruct patients in the use of devices for inhaled medication	Explain to a patient how to use an inhaler correctly, including spacers, and check that their technique is correct. Should know about various types of Inhalers	Safe to practice under direct supervision	Final Year	Medicine		
16.	Prescribe and administer oxygen	Prescribe and administer oxygen safely using a delivery method appropriate for the patient's needs and monitor and adjust oxygen as needed. Knows the exact volume given per Minute	Safe to practice under direct supervision	Final Year	Medicine		
17.	Prepare and administer injectable (intramuscular, subcutaneous, intravenous) drugs	Prepare and administer injectable drugs and prefilled syringes Knows about various channels of CVP	Safe to practice under direct supervision	Final Year	Medicine		

S. No.	Procedure	Description	Level of competence	YEAR/ MODULE	Subject	Link	Date	INSTRUCTOR SIGNATURE
18.	Measure CVP (central venous pressure)	should be able to measure, interpret and monitor central venous pressure readings	safe to practice under direct supervision	Final Year	Medicine			
19	Should be able to perform essential lifesaving procedure (BLS)	Tracheostomy, endotracheal intubation and chest intubation. Should be competent at Basic Life Support.	safe to practice under direct supervision	Final Year	Medicine			
20.	Nutritional assessment/ Weight Management	Calculate BMI, carry out nutritional assessment of patients and guide them according to their caloric requirements	safe to practice under direct supervision	Final Year	Medicine			

B. Gynae/ Obs

S. No.	Procedure	Description	Level of competence	YEAR/ MODULE	Subject	Link	Date	INSTRUCTOR SIGNATURE

1	History taking	Gynae/ Obs	Safe to practice under indirect supervision	4th Year	Gynae/ Obs			
2	Carry out Obstetric & Gynecological Examination.	Perform Obstetric & Gynecological examination	Safe to practice under indirect supervision	4th Year	**Gynae/ Obs**			
3	Antenatal Care & calculating EDD	Should be able to direct patient on positioning of breast feeding	Safe to practice under indirect supervision	Final Year	**Gynae/ Obs**			
4.	Take HVS	To test vaginal discharge for the presence of vaginal thrush, bacterial vaginosis and trichomonas vaginalis. Carried out in clean conditions, using a speculum to look at the cervix and vagina.	Safe to practice under direct supervision	Final Year	**Gynae/ Obs**			

5.	Positioning for breast feeding	Should be able to direct patient on positioning of breast feeding	Safe to practice under indirect supervision	Final Year	**Gynae/ Obs**			
6.	Performing CTG and its interpretation	Should be able to direct patient on positioning of breast feeding	Safe to practice under indirect supervision	Final Year	**Gynae/ Obs**			

7.	Carry out female urinary catheterization	Insert a urethral catheter in both male and female patients. Should know its complications and Management	Safe to practice under direct supervision	Final Year	**Gynae/ Obs**			
8.	Normal Vaginal Delivery	Should be able to direct patient on positioning of breast feeding	Safe to practice under indirect supervision	Final Year	**Gynae/ Obs**			

S. No.	Procedure	Description	Level of competence	YEAR/ MODULE	Subject	Link	Date	INSTRUCTOR SIGNATURE
9.	Obstructed labour and assisted deliveries	Should be able to direct patient on positioning of breast feeding	Safe to practice under indirect supervision	Final Year	**Gynae/ Obs**			

C. **Paeds**

S. No.	Procedure	Description	Level of competence	YEAR/ MODULE	Subject	Link	Date	INSTRUCTOR SIGNATURE
1	History taking	All Paeds	Safe to practice under indirect supervision	Final Year	Paeds			
2	Paediatric Examination	All Paeds	Safe to practice under indirect supervision	Final Year	Paeds			
3	Dehydration and IV infusion	Paeds	Safe to practice under indirect supervision	Final Year	Paeds			
4	Nutritional Diseases	Paeds	Safe to practice under indirect supervision	Final Year	Paeds			

5	Infective Diseases & EPI	Paeds	Safe to practice under indirect supervision	Final Year	Paeds			
6	BLS- Paeds	All Paeds	Safe to practice under indirect supervision	Final Year	Paeds			

e. PATHOLOGY

1.	Blood sampling	Take samples of venous blood to test for the growth of infectious organisms in proper culture bottles	Safe to practice under direct supervision	3rd Year	Pathology			
2.	Carry out arterial blood gas and acid base sampling from the radial artery in adults	Insert a needle into a patient's radial artery (in the wrist) to take a sample of arterial blood and interpret the results. Use appropriate measures to prevent hematomaformation at the site	Safe to practice under direct supervision	3rd Year	Pathology			

3	Carry out venipuncture	Insert a needle into a patient's vein to take a sample of blood for testing. Make sure that blood samples are taken in the correct order, placed in the correct containers, that these are labelled correctly and sent to the laboratory promptly	Safe to practice under indirect supervision	3rd Year	Pathology			
4.	Measure capillary blood glucose	Measure the concentration of glucose in the patient's blood at the bedside using appropriate equipment. Record and interpret the results.	Safe to practice under indirect supervision	3rd Year	Pathology			
5.	Carry out a urine multi dipstick test	Explain to patient how to collect a midstream urine sample. Test a sample of urine to detect abnormalities. Perform a pregnancy test where appropriate.	Safe to practice under indirect supervision	3rd Year	Pathology			
6.	Take and/or instruct patients how to take a swab	Use the correct technique to apply sterile swabs to the nose, throat, skin and wounds. Make sure that samples are placed in	Safe to practice under indirect supervision for nose, throat, skin or wound swabs	3rd Year	Pathology			

		the correct containers, that they are labelled correctly and sent to the laboratory promptly and in the correct way						

D. **ENT. & EYE**

1	Ophthalmoscopy-	Perform basic ophthalmoscopy and identify common abnormalities	safe to practice under direct supervision	4th Year	Eye			
2	Basic ENT Examination		safe to practice	4th year	ENT			
3	Otoscopy-	Perform basic otoscopy and identify common abnormalities	Safe to practice under indirect supervision	4th Year	ENT			

COMPETENCE WISE

A. PATIENT ASSESSMENT BY THE MEDICAL STUDENTS

S. No.	Procedure	Description	Level of competence	YEAR/ MODULE	Subject	Link	Date
1.	Take baseline physiological observation and record appropriately	Measure temperature, respiratory rate, pulse rate, blood pressure, oxygen saturations, NG output and urine output.	Safe to practice under indirect supervision	3rd Year	Medicine/s urgery		
2	History taking	Biodata, Presenting complaint, H/o Presenting complaint	Safe to practice under indirect supervision	3rd Year	Medicine/s urgery		
3	History taking	Abdominal pain	Safe to practice under indirect supervision	3rd Year	Medicine/s urgery		
4	History taking	Remaining History	Safe to practice under indirect supervision	3rd Year	Medicine/s urgery		
5	History taking	Gynae/ Obs	Safe to practice under indirect supervision	4th Year	Gynae/ Obs		

6	History taking	All Paeds	Safe to practice under indirect supervision	Final Year	Paeds	
7	Carry out abdominal and rectal examination and its interpretation.	Systemic approach in clinical examination Completes all steps of examination and document appropriately	Safe to practice under indirect supervision	4th Year	**Surgery**	
8	Carry out Inguinoscrotal examination and its interpretation.	Systemic approach in clinical examination Completes all steps of examination and document appropriately	Safe to practice under indirect supervision	4th Year	**Surgery**	
9	Carry out Neck examination and its interpretation.	Systemic approach in clinical examination Completes all steps of examination and document appropriately	Safe to practice under indirect supervision	4th Year	**Surgery**	

10	Carry out Breast examination and its interpretation.	Systemic approach in clinical examination Completes all steps of examination and document appropriately	Safe to practice under indirect supervision	4th Year	Surgery	
11	Interpretation of radiological examination of surgical including erect chest x ray, erect & supine abdominal x-ray, contrast x-rays including IVU, Double contrast Barium Enema, CT scans, MRI, Isotope Scans	Systemic approach in radiological examination.	Safe to practice under indirect supervision	4th Year	Surgery	
12	Identifying and learning the use of basic surgical instruments.		Safe to practice under indirect supervision	Final Year	Surgery	https://www.youtube.com/watch?v=U8tKeMLl5p4

13	Taking informed consent		Safe to practice under indirect supervision	Final Year	**Surgery**	
14	Preoperative counselling		Safe to practice under indirect supervision	Final Year	**Surgery**	
15	Carry out respiratory examination and its interpretation.		Safe to practice under direct supervision	4th Year	Medicine	
16	Carry out cardiovascular examination and its interpretation.		safe to practice under direct supervision	4th Year	Medicine	
17	Carry out ECG examination and its interpretation.		safe to practice under direct supervision	Final Year (also in 4th year)	Medicine	

S. No.	Procedure	Description	Level of competence	YEAR/ MODULE	Subject	Link	Date	INSTRUCTOR SIGNATURE
18	Carry out Neurological examination and its interpretation.		safe to practice under direct supervision	4th Year	Medicine			
19	Ophthalmoscopy- Eye ward rotation	Perform basic ophthalmoscopy and identify common abnormalities	safe to practice under direct supervision	4th Year	Eye			
20	Basic ENT Examination		safe to practice	4th year	ENT			
21	Otoscopy- ENT Ward	Perform basic otoscopy and identify common abnormalities	Safe to practice under indirect supervision	4th Year	ENT			
22	Carry out Obstetric & Gynecological Examination.	Perform Obstetric & Gynecological examination	Safe to practice under indirect supervision	4th Year	Gynae/ Obs			

B. **PROCEDURAL SKILLS**

S. No.	Procedure	Description	Level of competence	YEAR/ MODULE	Subject	Link	Date	INSTRUCTOR SIGNATURE

1.	Blood sampling	Take samples of venous blood to test for the growth of infectious organisms in	Safe to practice under direct supervision	3rd Year	Pathology			
2.	Carry out arterial blood gas and acid base sampling from the radial artery in adults	Insert a needle into a patient's radial artery (in the wrist) to take a sample of arterial blood and interpret the results. Use appropriate	Safe to practice under direct supervision	3rd Year	Pathology			
3	Carry out venipuncture	Insert a needle into a patient's vein to take a sample of blood for testing. Make sure that blood samples are taken in the correct order, placed in the correct containers, that these are labelled correctly and sent to the laboratory promptly	Safe to practice under indirect supervision	3rd Year	Pathology			
4.	Measure capillary blood glucose	Measure the concentration of glucose in the patient's blood at the bedside using appropriate equipment. Record and interpret the results.	Safe to practice under indirect supervision	3rd Year	Pathology			

5.	Carry out a urine multi dipstick test	Explain to patient how to collect a midstream urine sample. Test a sample of urine to detect abnormalities. Perform a pregnancy test where appropriate.	Safe to practice under indirect supervision	3rd Year	Pathology			
6.	Take and/or instruct patients how to take a swab	Use the correct technique to apply sterile swabs to the nose, throat, skin and wounds. Make sure that samples are placed in the correct containers, that they are labelled correctly and sent to the laboratory promptly and in the correct way	Safe to practice under indirect supervision for nose, throat, skin or wound swabs	3rd Year	Pathology			
7.	Carry out a 3- and 12- lead electrocardiogram	Set up a continuous recording of the electrical activity of the heart, ensuring that all leads are correctly placed.	Safe to practice under indirect supervision	4th Year	**Medicine**			
8.	Carry out male Urinary Bladder Catheterization	Insertion of a catheter tube through the urethra and into the bladder to drain urine.	Safe to practice under indirect supervision	Final Year	**Surgery**			

9.	Nebulization	Follow the directions for the specific brand of nebulizer machine and cup	Safe to practice under indirect supervision	Final Year	Medicine			
10.	Carry out removal of surgical drains and sutures	Firmly grasp drainage tube close to skin with dominant hand, and with a swift and steady motion withdraw the drain and place it on the waterproof drape/pad (other hand should stabilize skin with 4 x 4 sterile gauze around drain site). Remove sutures by following aseptic techniques	Safe to practice under direct supervision	Final Year	**Surgery**			
11.	Application of POP	Apply the POP on top of the cotton wool padding from distal to proximal, without applying tension to the roll, overlapping each layer by 50%.	Safe to practice under direct supervision	Final Year	**Surgery**			

S. No.	Procedure	Description	Level of competence	YEAR/ MODULE	Subject	Link	Date
12.	Take HVS	To test vaginal discharge for the presence of vaginal thrush, bacterial vaginosis and trichomonas vaginalis. Carried out in clean conditions, using a speculum to look at the cervix and vagina.	Safe to practice under direct supervision	Final Year	Gynae/ Obs		

C. PATIENT CARE

S. No.	Procedure	Description	Level of competence	YEAR/ MODULE	Subject	Link	Date
1.	Perform surgical scrubbing up	Follow approved processes for cleaning	Safe to practice under direct supervision	Final Year	Surgery		
2.	Set up an infusion	Set up run through and intravenous infusion. Have awareness of the different	Safe to practice under direct supervision	Final Year	Medicine		

3.	Use correct techniques for moving and handling, including patients who are frail	Use, and/ or direct other team members to use, approved methods for moving, lifting and handling people or objects, in the context of clinical care, using methods that avoid injury to patients, colleagues, or oneself	Safe to practice under indirect supervision	Final Year	Medicine		
4.	Positioning for breast feeding	Should be able to direct patient on positioning of breast feeding	Safe to practice under indirect supervision	Final Year	**Gynae/ Obs**		
5.	Performing CTG and its interpretation		Safe to practice under direct supervision	Final Year	**Gynae/ Obs**		
6.	Breaking bad news (video)		Safe to practice under indirect supervision	Final Year	Medicine	https://youtu.be/MKnWkrPLGOs?si=JQKQ6bPznsfWhIRE	

S. No.	Procedure	Description	Level of competence	YEAR/MODULE	Subject	Link	Date	INSTRUCTOR SIGNATURE
7.	Introduction to care of the elderly & dying (palliative care)(video)		Safe to practice under indirect supervision	Final Year	Medicine	https://youtu.be/Lbbd1uIwbxs?si=3ahg-eaZX-3_mNWm		

D. **PRESCRIBING**

S. No.	Procedure	Description	Level of competence	YEAR/MODULE	Subject	Link	Date	INSTRUCTOR SIGNATURE
1.	Instruct patients in the use of devices for inhaled medication	Explain to a patient how to use an inhaler correctly, including spacers, and check that their technique is correct. Should know about various types of Inhalers	Safe to practice under direct supervision	Final Year	Medicine			
2.	Prescribe and administer oxygen	Prescribe and administer oxygen safely using a delivery method appropriate for the patient's needs and monitor and adjust oxygen as needed.	Safe to practice under direct supervision	Final Year	Medicine			

		Knows the exact volume given per Minute						
3.	Prepare and administer injectable (intramuscular, subcutaneous, intravenous) drugs	Prepare and administer injectable drugs and prefilled syringes Knows about various channels of CVP	Safe to practice under direct supervision	Final Year	Medicine			
4.	Interpretation of X-rays of upper and lower limbs	should be able to identify gross musculoskeletal pathology on X-rays including fractures & dislocations	safe to practice under indirect supervision	4th Year	**Surgery**			
5.	Interpretation of x-rays of chest, abdomen and pelvis	should be able to identify rib fractures, hemothorax, pneumothorax, free air under diaphragm, pelvic fractures	safe to practice under direct supervision	4th Year	**Surgery**			

E.   **THERAPEUTIC PROCEDURES**

S. No.	Procedure	Description	Level of competence	YEAR/ MODULE	Subject	Link	Date	INSTRU SIGNAT
1.	Carry out intravenous cannulation	Insert a cannula into a patient's vein and apply an appropriate dressing.	Safe to practice under direct supervision	4th Year	Medicine			
2.	Carry out safe and appropriate blood transfusion	Following the correct procedures, give a transfusion of blood (including correct identification of the patient and checking blood groups). Observe the patient for possible reactions do the transfusion, and take action if they occur.	Experienced in a simulated setting; further training required before direct Supervision	4th Year	Medicine			
3.	Carry out female urinary catheterization	Insert a urethral catheter in both male and female patients. Should know its complications and Management	Safe to practice under direct supervision	Final Year	Gynae/ Obs			
4.	Carry out wound care and basic wound closure and dressing	Provide basic care of surgical or traumatic wounds and apply dressing appropriately.	Safe to practice under direct supervision	Final Year	Surgery			

5..	Carry out nasogastric tube placement	Pass a tube into the stomach through the nose and throat for feeding and administering drugs or draining the stomach's contents. Should know how to ensure correct placement.	Safe to practice simulation	Final Year	**Surgery**			
6.	Use local anesthetics	Inject or topically apply a local anesthetic. Understand maximum doses of local anesthetic agents.	Safe to practice under direct supervision	Final Year	**Surgery**			
7.	Apply splint for fractures POP,	Can apply routine splints for fractures like Thomas, - Neck of femur	Safe to practice under direct supervision	Final Year	**Surgery**			
8.	Measure CVP (central venous pressure)	should be able to measure, interpret and monitor central venous pressure readings	safe to practice under direct supervision	Final Year	Medicine			

9.	Should be able to perform essential lifesaving procedure (BLS)	Tracheostomy, endotracheal intubation and chest intubation. Should be competent at Basic Life Support.	safe to practice under direct supervision	Final Year	Medicine			
10.	Digital rectal examination and Proctoscopy	Should know common causes of bleeding per rectum and common perianal diseases and be able to diagnose them by means of digital rectal examination and proctoscopy.	safe to practice under direct supervision	Final Year	**Surgery**			
11.	Nutritional assessment	Calculate BMI, carry out nutritional assessment of patients and guide them according to their caloric requirements	safe to practice under direct supervision	Final Year	Medicine			
12	Carry out female urinary catheterization	Insert a urethral catheter in both male and female patients. Should know its complications and Management	Safe to practice under direct supervision	Final Year	**Gynae/ Obs**			

12	Antenatal Care & calculating EDD	Should be able to direct patient on positioning of breast feeding	Safe to practice under indirect supervision	Final Year	Gynae/ Obs		
14	Normal Vaginal Delivery	Should be able to direct patient on positioning of breast feeding	Safe to practice under indirect supervision	Final Year	Gynae/ Obs		
15	Obstructed labour and assisted deliveries	Should be able to direct patient on positioning of breast feeding	Safe to practice under indirect supervision	Final Year	Gynae/ Obs		
16	Dehydration and IV infusion	Paeds	Safe to practice under indirect supervision	Final Year	Paeds		
17	Nutritional Diseases	Paeds	Safe to practice under indirect supervision	Final Year	Paeds		

| 18 | Infective Diseases & EPI | Paeds | Safe to practice under indirect supervision | Final Year | Paeds | | |
| 19 | BLS- Paeds | All Paeds | Safe to practice under indirect supervision | Final Year | Paeds | | |

The SRMLG Model: Five Pillars Supporting Competency-Based Medical Education at Ibne Sina University, Mirpurkhas

Authors: Chancellor and Professor of Medical Education, Dr. Syed Razi Muhammad
Affiliations: Muhammad Medical College, Ibn-e-Sina University, Mirpurkhas, Pakistan
Corresponding Author: Prof. Syed Razi Muhammad at chancellor@isu.edu.pk

Abstract
Background: The attainment of learning objectives in competency-based medical education (CBME) implementation requires additional support beyond classroom teaching of learning objectives. Innovations in education must attempt to align evidenced-based pedagogy with local context in resource-poor settings.

Objective: This review examines the model of educational support systems in five pillars designed to increase learning, professional development, social accountability, and student performance within the vertically integrated modular curriculum at Ibn-e-Sina University (ISU), Mirpurkhas, and in Pakistan.

Methods: The article provides an educational descriptive analysis of the five pillars (1) Survive - a triad of weekly assessments, assignments, and post-test discussion moderated through a learning management system (2) RLSE (Running Lives by Sharing Experiences) - a weekly structured mentoring system (3) MCS (Mobile Clinics by Students) - daily community-based clinical education (4) LBAS (Learner Based Annual Symposia) student-led research conferences, and (5) GSAT (Gastroenterology Sessions with Students as Teachers) annual peer teaching symposiums.

The SRMLG model has gained national recognition including Healthcare Excellence Award 2025 and 1st place by PAMI due to its successful examination outcomes. Other related benefits of the model include the fostering of active learning, critical thinking, peer learning, volunteering, and professional engagement. The SRMLG model effectively responds to educational needs and the shortage of resources in the local context.

The 5 Pillars of SRMLG are described as a model that can be adapted in a similarly simple and replicable way in the context of technologically integrated competency-based medical education involving mentoring, community service, and peer teaching. The model strongly supports the concept that quality educational support systems can be developed in resource-limited settings by constructing systems around the available resources, committed faculty, and learner-centered teaching.

Educational Innovations, Pakistan, Community Education, Learning Management Systems, Peer Learning, Mentoring, Medical Education, Competency Based Education, Community Education, Learning Management Systems, Peer Education, Mentoring, Medical Education, Competency Based Education.

Introduction

The world is experiencing a move towards CBME or competency-based medical education and hence, seeing education from the perspective of learning outcomes. This approach emphasizes the prioritization of developing specific competencies which are observable and required in the student's future medical role.[1, 2] Nevertheless, effective implementation of CBME necessitates more than just a mere redesign of the curriculum. It requires the implementation of support systems that enable active learning, ongoing assessment and feedback, professional development, and integration of medical education with the health needs of the community. [3, 4]

Institutions providing education in the health sciences in low and middle-income countries experience specific difficulties in implementing CBME which include but are not limited to, lack of sufficient educational resources, large class sizes, limited opportunities for faculty development and lack of proper infrastructure. [5, 6] However, these regions also have their own benefits lik strong relationships with the community, enthusiasm for the educational system and adaptability to new ideas which can assist in building relevant educational systems in these countries.[7]

Ibne Sina University Mirpurkhas, (ISUM) the first of its kind in Mirpurkhas Division, Sindh province Pakistan, has established a complete educational support system called the SRMLG model (with affectionate regards to "Syed Razi Muhammad's Learning Group"). This system captures five components to supplement the routine curriculum with modified health interventions aimed at addressing the core competencies of the World Health Organization and the Pakistan Medical and Dental Council while taking into consideration the surrounding environment, available resources, constraints, and strengths.

For the last thirty years, the development of the SRMLG model has been the result of the author's medical education scholarship, which includes the Instructor Certificates, Diploma, and Master's Med Ed programs, undertaken at the University of Dundee, Scotland, as well as his/her current PhD studies at the University of Cyberjaya, Malaysia. Current educational theories, such as Bloom's taxonomy of the domains of learning, the shift from the sage on the stage to the active learning model, and the support of educational technology, as well as evidence to support the use of educational technology, are integrated and adapted to the needs of the specific culture and the host institutions.

This article provides the first comprehensive elucidation of the SRMLG pillars, detailing their pedagogical theories, practical implementations, and outcomes and providing yet another contribution to the model of educational support system for medical education in the context of limited educational resources.

The Five Pillars of SRMLG

The SRMLG includes 5 pillars that together create an educational ecosystem supporting the 37-module, five-year vertically integrated curriculum at ISU: [8]

1. Survive - A trifold system of weekly quizzes, assignments, and post-test discussions.

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2. RLSE (Running Lives by Sharing Experiences)- An organized weekly mentoring program.

3. MCS (Mobile Clinics by Students)- Daily community-based clinical learning activities.

4. LBAS (Learner-Based Annual Symposia)- Learner-led annual research showcases.

5. GSAT (Gastroenterology Sessions with Students as Teachers)- A peer teaching symposium held every year.

Each of these pillars fulfills its own set of educational outcomes as well as functions seamlessly to enable overall growth in competencies. The structure, theories supporting their use, implementation, and outcomes of each of the pillars are covered below.

Pillar 1: Survive—Technology-Enhanced Continuous Assessment
Overview and Rationale
Survive features the first fully formalized learning system built using the Moodle learning management system (LMS), adapting the approach from the University of Dundee. During the COVID-19 pandemic lockdown in March 2020, we created what is now a 215-week (at the time of writing) fully integrated, fully online, and/or face-to-face educational system, which continuously evolves. Educational systems of the future need to be fully integrated and operational in face-to-face, hybrid, and fully online modalities. [8]

The system is built using the following triad: Weekly formative tests to assess mastery of the content, frequent assignments to encourage the learner to engage more deeply with the learning materials (now and in the future), and post-test discussion (PTD) to foster metacognition and to correct errors. [16]

Evidence Base for Online Learning:
The following evidence calms the initial faculty and student apprehension to the emerging paradigm of mass online learning: [13, 14, 17, 18]

The Brandon-Hall Study was the first to show the time advantage of online learners. It was shown that online learners use 40-60% less time than face-to-face learners while learning more.

Research by the Institute of America showed that online learners retain significantly more (25-60% retention) than face-to-face learners (8-10% retention) due to the ability to access the learning materials repeatedly.

Research by the Myers Corporation showed that online learners acquire 5 times more content than face-to-face learners in the same time.

Research by IBM showed that online learners acquire almost 5 times more content over the same time epochs as face-to-face learners. [18]

The Open University in the United Kingdom provided evidence that taking courses online utilizes and emits 90% and 85% (respectively), less energy and carbon dioxide towards each student's learning, thus offering benefits that enhance the sustainability of the environment. [19]

Implementation and Management

Managed through the Moodle LMS, all Survive activities allow for [15, 20]:

1. Centralized communication and notifications

2. Submission of assignments, including size and plagiarism checks

3. Assessment and grading with automation for instantaneous feedback

4. Forums for the academic discourse between students and professors

5. Student engagement tracking and performance analytics

The design of the academic year exceeds 40 weeks and allocates time for summative assessments to be completed multiple times in the curriculum. To be able to sustain to the rapid deployment, IT Support and Faculty Training worked together to assign large amounts of faculty time to initial iterations, focusing on grading and creation of MCQs, which through the process of peer review, turned to students taking on roles for greater participation. [8]

Pedagogical Principles and Active Learning

Higher-order thinking skills embraced by Bloom's Taxonomy students with the application of knowledge through analysis, synthesis, and evaluation, to move past comprehension are skills Survive explicitly aims to cultivate. [10, 21] This move addresses the major gap in the teaching of medical education in Pakistan where passive learning and rote memorization is the norm. [22, 23]

The system changes the role of students as King's "sage on the stage to guide on the side" [11]. Active learning is further promoted as Survive and the students move away from passive learning. In the 21st century, medical practice, innovative, and complex thinking is necessary. Individuals must "think for themselves, pose and solve complex problems, and generally produce knowledge rather than reproduce it" as emphasized by King. Survive supports these through:

1. Weekly assignments focus on synthesis and application of concepts. Not just simple recall tasks.

2. Post-test discussions are aimed at critical reflection on the mistakes made and the misconceptions.

3. Students are required to submit original handwritten work, which is then converted to PDF to combat copy-paste and plagiarism culture.

4. Standard textbooks are chosen to support the emphasis on understanding concepts rather than using low-quality guides that support rote learning.

5. Active discussions on difficult concepts are preferred to passive lectures.

Erica McWilliam speaks of the meddler in the middle which is also an inspiration for Survive's design. McWilliam positions faculty as active interventionists and knowledge co-

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creators with the students rather than guides on the side. The design of the course, with its high discussion component, keeps faculty on stage in the learning activity.

Outcomes and Impact

With each submission being graded and individually commented on, Survive has processed one million individual assignments during its operational period. This remarkable achievement represents the first time in over ten years in the history of formative assessment scale in medical education in Pakistan. This has led to:

1. Higher student achievement in summative exams

2. Greater student involvement in learning materials outside of class

3. Digital literacy and information technology (IT) competency needed in modern medicine

4. Academic honesty and originality

5. National Educational Innovation Awards [8]

The post-test discussion component is meant to ensure that assessment is indeed formative, as in, to identify and fill knowledge gaps so that the same errors are not made in the future, rather than simply being a score assigned to a piece of work. [26, 27]

Pillar 2: RLSE (Running Lives by Sharing Experiences)—Structured Mentoring
Overview and Framework
RLSE is a robust mentoring scheme with coverage of medical education that offers a range of professional, academic, and pastoral support.[28, 29] The scheme is multifaceted in its approach, focusing on various aspects of student development while delineating structures of roles and responsibilities, and accountability is in place.
Organizational Structure
The mentoring system's design incorporates an organizational/ mentoring hierarchy which enables functioning/purpose fulfillment at all levels simultaneously: 8

1. Mentees: Students under direct care/guidance.

2. Mentors: Individual faculty over groups of 5-10 mentees with weekly report submissions.

3. Class Coordinators: Supervising all year-mentor(s) in a cohort/ year, communicates with Chief Mentors.

4. Chief Mentors: Senior faculty with supervision over a number of mentors, performance oversight.

5. Program Supervisor: Responsible for effective leadership of the entire program.

There are about 48 mentors assigned to the first four years of the MBBS program, 12 to the final year of MBBS, 30-32 to the BDS (dentistry) program, and 15 to the Doctor of Physiotherapy (DPT) program.[8] Senior students are also allowed to mentor provided they are recommended by faculty and approved by Chief Mentors, thus facilitating near-peer mentoring which has proven valuable in medical education. [30, 31]

Scheduled Mentoring Activities
The program operates under protected time to ensure consistent functioning:

1. Mentees meet with Mentors for 1 hour on Wednesdays from 1-2 PM.

2. Mentors meet with Chief Mentors for supervision and support on Thursdays from 1-2 PM.

3. Mentoring venues are purposefully chosen to be within the medical college (1-4 years), hospital (final year), and dental college (BDS | dentistry) to enhance integration with clinical learning environment and ensure ease of access to participants.

Mentor Roles and Competencies
To fully achieve the educational and training goals of mentoring, effective mentors in the field of medicine develop and demonstrate the competencies outlined in the following research studies: [28, 29, 32]

1. Active listening and empathy – Providing and creating a safe space for protection while presenting concerns, fears, and worries.

2. Skilled questioning – Using inquiries that promote reflection and problem-solving at various levels.

3. Constructive feedback – Providing feedback which can be used to act for improvement.

4. Suspension of judgment – Refraining from drawing early conclusions and other biases.

5. Goal setting – Assisting mentees to develop and define goals which are clear and attainable.

6. Motivation – arousing students to confront and tackle learning challenges.

7. Experience sharing – Providing appropriate and relevant professional experiences.

8. Boundary awareness – Understanding and recognizing when issues are beyond the mentoring scope (and require referral to counseling or administration).

9. Confidentiality maintenance – Providing protection for disclosure while reporting concerns of students.

10. Recognition and celebration – Celebration and recognition of achievements and milestones.

11. Conducting and role modeling – reflection of professional values and conduct in the mentoring process and profession itself. [8, 28, 29]

Mentee Responsibilities and Development
Mentees are expected to fully and actively participate in the mentoring process: [8, 32]

1. Attendance at each scheduled session, and providing documentation

2. Active listening and consideration of directions and guidance from the mentor.

3. Objective, challenge, and concern setting that is clear.

4. Transparency so that mentors can offer support that is relevant and appropriate.

5. Openness to feedback that is constructive, in ways that is focused and non-defensive.

6. Demonstration of progress and effort.

7. Professional communication of mentors for the provision of feedback, and of the program.

8. Appropriate and respectful articulation of differences when there is a disagreement or other conflict.

9. Proactive and intentional pursuit of necessary knowledge along with support to facilitate the process of motivation.

10. Accountability and documentation of the entire process and of different aspects of the process to facilitate the process and for mentoring of the participant.

Documentation and Accountability
The program employs comprehensive documentation systems: [8]
Forms B and C are submitted by the mentors and details attendance and the performance of the mentee in the Survive tests, assignments, and general concerns of the mentee (to be submitted online by Wednesday evenings).

Form D is filled out by Chief Mentors assessing mentorship (the first three questions are addressed to the parents and the last three are considered confidential).

Such documentation addresses student challenges at an early stage, allows parents to be informed of the situation when documentation is available, and applies necessary accountability to the mentors. Class coordinators disseminate information via parent WhatsApp groups to sustain parent interest in their children's progress.

Recognition and Motivation
The program incorporates motivational aspects aimed to exceed expectations PM-8. These elements include the "Mentor of the Month" awards that are given each month for exceptional service. "Mentor of the Year" awards are given at the yearly ceremonies for continued exceptional service. Documentation of the mentor's activities, evidence of the mentee's progression, and involvement in the program's activities are standard procedures in

the evaluation. Achievements of the mentees and other milestones are documented and appropriately acknowledged.

Evidence Base for Mentoring

Mentoring programs for medical students have positively documented the fostering of new and enhanced clinical skills, development of an interest in some specialty areas, formation of a professional identity, improvement of support and well-being of students from diverse background, enhancement of the retention rate, and mitigation of academic burnout. The RLSE program fulfills the goals of successful programs in other countries and mentoring programs in the world while being sensitive to the culture and instituted in Pakistan PM-[28, 29, 33, 34].

Mentoring programs that are structured and have a set of expectations, scheduled meetings, and faculty involvement have been shown to yield much better outcomes than informal programs. The RLSE model provides the most evidence-based designed principles while also being resource sensitive PM-[28, 35].

Pillar 3: MCS (Mobile Clinics by Students)—Community-Based Education
Overview and Development

Mobile Clinics by Students (MCS Program) is a manifestation of ISU's devotion to community-oriented medical education and social accountability. In collaboration with the Association of Pakistani Physicians of North America (APPNA), ISU expanded the MCS Program from two to five health units covering impoverished villages in the Mirpurkhas District. [8]

Infrastructure and Reach

APPNA donated three mobile clinic vehicles designed for the delivery of primary healthcare, making it possible to set up fixed health units in:

6. 78 Mori Village – Inaugural camp served 680 patients Wahgreji Village – Inaugural camp served 617 patients\ \ Khirao Village – Inaugural camp served 1,039 patients (Mar 2018)

7. Sultanabad Village – Inaugural camp served 1,282 patients (Mar 2018) Rakhel Lund Village – Inaugural camp served 450 patients (Nov 2018)

The three mobile clinics operate on a predetermined cycle from Monday to Thursday, offering free medical consultations and medications, and making referrals to MMCH for patients needing higher-level care

Educational Integration

Medical students from the MBBS, BDS, and DPT programs engaged in MCS activities and acquired skills in: [36, 38]

1. Delivering primary healthcare – to manage common acute and chronic conditions in community settings \ Health education – disease prevention and health promotion counseling

2. Social Determinants of Health - The Impact of Poverty, Education, and Living Conditions on Health Outcomes

3. Community Engagement - Trust and Relationship Building with Marginalized Communities

4. Interprofessional Collaboration - Collaboration with Nurses, Pharmacists, and Community Health Specialists

5. Resource-limited Practice - Application of Clinical Judgment Relative to Available Resources

6. Cultural Competence - Delivery of Care that is Responsive to Existing Local Customs, varying Languages, and Practices [36, 37]

Social Accountability and Population Health

The MCS program is the embodiment of medical schools' social accountability, which is to steer teaching, research, and service activities to the priority health issues of the communities they are responsible for. This is in line with the suggestion by the WHO that institutions offering medical education should be responsive to the health needs of the communities and the equity in health. [41]

Students gain insight into population health by: [37, 38]

1. Recognizing the distribution and prevalence of certain illnesses in rural areas

2. Identifying barriers to accessing health care such as distance, expense, and socio-culture

3. Taking part in health promotion activities and monitoring the occurrence of diseases

4. Practicing preventive health care and early detection

5. Understanding community health assessment and prioritization.

Impact and Sustainability

1. Since its inception, MCS has offered and continues to offer healthcare services to underserved communities and areas and has provided healthcare services to thousands of patients each year. [8] The program has shown to be sustainable because of the following reasons:

2. Ongoing support and provision of resources by APPNA

3. Incorporation into the official educational curriculum which guarantees attendance and participation from students

4. Commitment to the program from faculty and staff

5. Community acceptance and use of the services provided

6. The institution's acceptance of the social responsibility's mission

The program was recognized in the Healthcare Excellence Award from ISU for the year 2025, recognizing the program for its contributions to and the intersection of medical education and community health services.[8]

Pillar 4: LBAS (Learner-Based Annual Symposia)—Research Culture Development
Overview and Structure
The Learner-Based Annual Symposium (LBAS) is one of the ways ISU is fostering interdisciplinary scholarly inquiry, developing research literacy, and promoting the communication of scientific ideas to all members of the ISU community. [42, 43] The 26th Symposium (October 2024) illustrated the full breadth of LBAS\'s activities: pre-symposium workshops, student research presentations, invited speaker sessions, and specialized society conferences. [8]

Pre-Symposium Workshops
LBAS encompasses extensive pre-symposium workshops that provide participants with instruction and experiential learning to enhance their clinical and professional skills. [8]

Department	Topic	Educational Objectives
Paediatrics	Neonatal Resuscitation	Hands-on training in neonatal life support procedures
Physiology	Team Building and Interprofessional Communication	Interactive sessions on effective teamwork and collaboration in healthcare settings
Oral & Maxillofacial Surgery	Primary Surgical Skills	Practical training in basic surgical techniques
Operative Dentistry	Technology in Dental Education	Exploration of dental informatics and comprehensive care technologies
Oral Surgery	Microabrasion	Techniques for teeth bleaching, microabrasion, and fluoride therapy
Medicine	Electrocardiography	Hands-on ECG recording and interpretation
Obstetrics & Gynaecology	Maternal Resuscitation	Life support procedures for obstetric emergencies
Research Department	Medical Writing	Scientific writing skills for healthcare professionals
Physiotherapy	Kinesiology Taping	Application of therapeutic taping techniques
Medical Education	Mentoring	Implementation of effective mentoring programs

Table 1: Pre-symposium workshops at LBAS 26th Annual Symposium

The workshops in question are structured around active and experiential learning approaches that include but are not limited to simulation, role play, and other forms of deliberate practice, thus serving as an alternative to standard unsupervised online learning. [44, 45]

Student Research Presentations

Prioritization of Student Research Presentations

LBAS holds optional student-led research presentation sessions where students have been assigned specific sessions, including but not limited to: [8]

1. Dental, Physiotherapy, and Nursing students – Free paper presentations

2. Fourth-year medical students – Oral and poster presentations of research

3. Final-year medical students – Presentations of Advanced Research Projects

4. The 26th symposium addressed topics across a broad spectrum, including: [8]

5. Medical education research (impact of nonverbal behavior, active learning, assessment, artificial intelligence)

6. Clinical research (sofosbuvir / velpatasvir, retreatment of HCV, effects of childhood trauma)

7. Health systems research (patient safety, workplace harassment)

8. Social research (career-marriage, emotional intelligence)

Assessment and Recognition

The peer reviewed student presentations are evaluated by senior faculty judges on the following criteria: [46]

1. Research methodology and design

2. Quality of the data analysis and interpretation

3. Cohesiveness, clarity, and organization of the presentation

4. Poster design and visual presentation (if applicable)

5. Responding to questions and defending research findings

6. The research studied is of significance in practice or education

Motivational and recognition accolades are presented in the form of awards for outstanding performance, both in verbal and poster presentations, and throughout the research studied. [8]

Invited Speaker Sessions and Conferences

LBAS features keynote addresses from and visiting experts from Sindh Province's (Karachi, Hyderabad, Nawabshah, Sukkur, Gambat) major teaching hospitals. The 26th symposium included also featured:

1. Breast Cancer Awareness Walk and Management Lectures

2. Society of Surgeons Pakistan (Mirpurkhas Chapter) Conference – presentations on innovations in surgery

3. Pakistan Society of Gastroenterology Conference – updates on hepatology and gastroenterology

4. These activities enable participants to build new networks while gaining knowledge of new clinically relevant advances, and new approaches to clinical research. [47]

Educational Impact

LBAS supports the development of competencies in the domain of the PMDC scholar & researcher, which includes [42,43, 48]:

1. Familiarity with research methodology and biostatistics

2. The ability to critique medical literature

3. Oral and written scientific communication

4. Public speaking and presentation skills

5. The ability to provide and receive constructive critique

6. Knowledge of research ethics

7. Interdependence with peers in research

8. Lifelong learning

Research exposure early on in medical school has been shown to increase the probability of engaging in research during residency and in subsequent practice throughout one's career, thus addressing the physician-scientist deficit. [49, 50]

Pillar 5: GSAT (Gastroenterology Sessions with Students as Teachers)—Peer Teaching
Overview and Educational Philosophy

The purpose of the Gastroenterology Sessions with Students as Teachers (GSAT) is to promote the philosophy of \'Students as Teachers where, instead of observing lectures, final-year medical students function as teachers. The 15th Annual Gastroenterology Sessions (April 2025) was the first to integrate the concept, providing 2 weeks of a gastroenterology and internal medicine course combined with student-led lectures.

Peer-Assisted Learning Evidence Base

Peer-assisted learning and near-peer teaching have made a positive impact on medical education: [51, 52, 53, 54]

1. Improved academic performance – Evidence shows students in the PAL group outperformed control group in various academic measures (d = 0.52, p < .003) [53]

2. Improved retention – Improved retention was observed in students instructed through PAL in assessments conducted 4 weeks after instruction [53]

3. Improved skills – PAL is more effective in teaching supportive skills and is therefore relevant for training in clinical education [53, 54]

4. Improved communication – Teachers have to integrate and reorganize their learning in order to explain concepts, and as a result, develop a deeper understanding of the subject [51, 52]

5. Adaptive teaching – Near-peer teachers are more likely to understand student's mental models and can adapt their teaching to fit the students' needs [54]

Two-Week Intensive Course Structure
GSAT involves significant preparatory teaching by visiting faculty:[8]

1. 10 lectures in gastroenterology and hepatology – Each 1 hour in duration

2. Thirty-four students' presentations – thirty-four students' presentations for 20 minutes each on general internal medicine topics and their medical emergencies and supervise by faculty members of the department

3. Two clinico-radiological meetings - An hour and half meetings which include some case discussions involving students and multidisciplinary faculty

4. Basic Life Support (BLS) workshop - Training by UK Resuscitation Council for final-year students including dental, physiotherapy, nursing students, and local hospitals practicing physicians

5. Post-course MCQ examination - 70 questions (35 gastroenterology, 35 general medicine) and there is a feedback session where answers would be explained in detail

Student-as-Teacher Mini-Symposium
The GSAT last stage is to have final-year students made formal presentations on medical, surgical and obstetric/gynecologic subjects/topics. [8]

1. Students have to organize in 4s

2. 24 different topics, making it a total of 24 presentations

3. Oral presentations and poster presentations

4. There is a standard criteria followed by faculty members for evaluation

5. The assessment covers classroom presentations, presentations made in MCQ tests, and presentations done in symposiums.

6. Out of the many presentations done for the 15th GSAT, the top ones include:

7. Best poster - Alcoholic Liver Disease (Maliha, Shurooq Siddiqua, Yogita Kumari, Tooba Sethi Khawaja) 8

8. Best oral presentation - Upper Gastrointestinal Bleeding (Maliha Jabbin, Muqqadas, Shawal, Umme Farwa)

9. Best overall performance - Wajeeha Jaafer (87/100 for all activities)

Professional Development Outcomes
1. GSAT is targeted towards a number of professional competencies. [51, 52, 55]

2. Teaching skills - These are the basic skills needed for a physician to have to be able to act as a clinical educator and patient educator

3. Communication skills - This fosters confidence in the individual and enhances public speaking and presentation skills

4. Collegial exchange positively affects distinct aspects of mastery at different levels:

5. Content mastery – Profound understanding via teaching preparation [56]

6. Leadership development – Planning and leading a team

7. Professional identity formation – Transition toward a physician identity via teaching [57]

8. Self-assessment skills – Identifying knowledge gaps and learning needs

Recognition and Institutional Support
Each participant gains recognition shields for their bravery to present in front of faculty and peers, highlighting the point that simply participation is already an achievement. This approach to recognition fosters psychological safety and subsequently participation in academic work. [58]

Senior institutional leadership—Chancellor, Vice Chancellor, Pro Vice Chancellor, Principal—are present at the award ceremonies, signifying the institution's esteem of participation in scholarly activities and peer teaching. [8] This form of support from the leadership is a motivator for the educational focus to be on the goals for the students. [59]

Integration of the Five Pillars with CBME Competencies
The SRMLG five-pillar model synergistically addresses multiple PMDC core competencies:[60,61]

PMDC Competency	SRMLG Pillar Contributions
Knowledgeable	*Survive*: Continuous assessment reinforcing knowledge acquisition; *GSAT*: Intensive courses in specialty areas

Skillful	*LBAS workshops*: Hands-on training in clinical procedures; *MCS*: Community-based clinical skills practice; *GSAT*: BLS certification and simulation training
Professional	*RLSE*: Mentoring addressing professionalism, ethics, communication; *LBAS workshops*: Professionalism and teamwork training
Scholar & Researcher	*LBAS*: Research presentation and medical writing; *Survive*: Critical appraisal through assignments; *GSAT*: Evidence-based medicine integration
Critical Thinker	*Survive*: Post-test discussions promoting reflection; *RLSE*: Mentoring facilitating metacognition; *GSAT*: Case-based learning
Leader & Role Model	*RLSE*: Mentoring relationships developing leadership; *MCS*: Community health leadership; *GSAT*: Peer teaching roles
Community Health Promoter	*MCS*: Direct community service and health education; *LBAS*: Population health research; *MCS*: Understanding social determinants

Table 2: Alignment of SRMLG pillars with PMDC core competencies

This integrated approach ensures that competency development occurs through multiple reinforcing mechanisms rather than isolated interventions, promoting transfer of learning and authentic application. [62, 63]

Discussion

Innovation in Education in Settings with Few Resources

Educational innovations of high quality can be achieved by institutions in resource limited settings by utilizing local resources, staff and evidence-based teaching methods as demonstrated by the SRMLG model. [5,6,7] Rather than attempting to imitate high income countries' resource heavy models, ISU has developed contextual innovations that deal with local issues and meets global standards of education.

Successful factors include these aspects: [64,65]

1. Strong institutional leadership: Inspirational educational values of excellence through vision, resource provision, and acknowledgement from chancellors and senior administration.

2. Faculty development: Formal and practical educational implementation of faculty development (Medical Education Certificate, Diploma, Master's, PhD) is ongoing and further enhancement is done.

3. Evidence-based design: Tailoring innovations to fit the local needs and context through educational theories and empirical research.

4. Leveraging Technology: Use of learning management systems, social and mobile technology to widen reach and improve efficiency.

5. Student engagement: Students are not merely receivers of education, but are active participants and partners.

6. Building for the Future: Ongoing improvement through feedback from experience and outcomes is embedded.

7. External partnerships: Resource and expertise provision through collaborations with organizations (e.g., APPNA).

Addressing Traditional Educational Limitations

1. The SRMLG model addresses these educational limitations endemic to Pakistan's medical education system and other similar contexts: Passive learning and rote memorization. Survive's focus on original assignments, critical reflective activities, and discussions posttests promotes engagement and thinking beyond mere memorization. [10,11,21]

2. Assessment-learning disconnect: Pakistani medical schools utilize high-stakes examinations that evaluate students' recall abilities without providing formative feedback to guide improvements. Survive streamlines a high-stakes continuous formative assessment through individualized feedback that students can use to serve their learning. [26,27]

3. Limited clinical exposure: MCS offers integrated longitudinal clinical clerkships that enhance hospital-based training in community and primary health care. [37,38]

4. Research culture deficit: Participatory research engagement remains a challenge in most medical schools in Pakistan. [68] LBAS systematizes opportunities for students to participate, present, and gain recognition, thus establishing scholarly work as a normal component of medical education. [42,43]

5. Weak mentoring systems: The lack of structured mentoring leaves students without professional guidance and support. [33,34] RLSE offers structured comprehensive mentoring with accountability systems that ensure consistent delivery. [28,29]

Alignment with Global Educational Trends

The SRMLG model reflects several recent trends in medical education around the world: [1,2,3,4]

1. Competency-based education: The five pillars translate abstract competencies to concrete learning experiences that can be evaluated through various mechanisms to create observable outcomes. [60,61]

2. Active learning: Several components of SRMLG employ demonstrably effective active learning strategies such as problem-based discussion, peer teaching, and experiential community learning. [11,12,24]

3. Technology-enhanced learning: Survive exemplifies integration of learning management systems to provide assessment, feedback and resource accessibility. [15,20,25]

4. Social accountability: MCS exemplifies medical schools' social accountability to respond to the community's healthcare needs and mitigate healthcare inequities. [36,39,40]

5. Near-peer teaching: GSAT utilizes the documented advantages of peer-assisted learning and the student-as-teacher model. [51,52,53,54]

6. Programmatic assessment: Survive's continuous assessment approach in which multiple data points inform learning outcomes parallels the cycle of programmatic assessment. [26,27,69]

Challenges and Mitigation Strategies

The SRMLG model is innovation in education and as such reflects the challenges of implementation of innovations in education. [64,65]

Faculty workload: The Survive assignment checking, mentoring, and LBAS organization is intensive and creates a challenge of considerable faculty time demand. Mitigation strategies can be faculty workload reallocation, using student peer reviewers, and educational contribution acknowledgment and reward. [8]

Student resistance: Traditionally passive students preferred lecture-based learning over assignments and weekly testing. Addressing this resistance involved educational rationale communication, active learning rationale presentation, and participation compliance. [8,11]

Technology access: Reliable internet access and IT skills for Survive participation were not available for all faculty and students initially.

The school assisted in finding ways to improve internet connectivity, offered instruction in IT, and set up computer labs for students to use. [8,25]

Cultural adaptation: The designing of mentoring activities included understanding of cultural dimensions in relations between students and faculty, and in the gender of mentors and mentees, and in communication styles. These matters were relatively well managed through having an explicit approach, appropriate delimitations, and confidentiality arrangements. [8,28]

Sustainability concerns: The ongoing justification of enthusiasm and quality requires awareness of faculty support, student involvement, sufficient resources, and active monitoring of the program to avoid the situation where efforts become mere box-ticking compliance rather than genuine action. [70]

Quality Outcomes and Recognition

The SRMLG framework has proven to have tangible success across several fronts: [7, 71]

1. Enhanced students' performance on final exams.

2. 2025 National Healthcare Excellence Award by Federal Minister of Health.

3. Innovation Award by Pakistan Association of Private Medical and Dental Institutions (PAMI).

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4. More than one million assignments with personalized feedback were processed via Survive.

5. Thousands of community members have been offered services through MCS.

6. Hundreds of students participated in the research presentation via LBAS.

7. All five pillars of the framework were sustained over several years.

Such outcomes reaffirm the positive impact of the model and encourage ongoing investments and refinements.

Transferability and Adaptation

The SRMLG model provides principles and elements that can other institutions use:[7,71]

Transferable principles:

1. The importance of active learning and higher-order thinking

2. The use of technology for efficiency and greater reach

3. Support systems (mentoring, peer teaching) that are structured as opposed to ad hoc

4. Community involvement as central to medical education

5. Engagement of students in research and other scholarly activities

6. Formative evaluations and assessment with feedback

7. Celebrating and acknowledging achievement

Adaptations to context are required:

1. Scale of pillars proportional to number of students and faculty

2. Choice of technology platform suited to available resources and financial plan

3. Mentoring systems shaped to cultural context and hierarchical strata of the institution

4. Community service collaboration with regional stakeholders

5. Research symposia within the scope of the research maturity of the institution

6. The rate of assessment and the mode of assessment designed for the curriculum

Those institutions wishing to implement similar models for the first time fundamentally need to start with evaluating the needs, engaging the stakeholders, a pilot of a few components with evaluation and refinement, scaling up progressively, as opposed to trying a comprehensive approach for instant implementation. [72]

Conclusion

The SRMLG five-pillar model comprising Survive, RLSE, MCS, LBAS, and GSAT indicates that comprehensive educational support systems can be successfully modernized in resource-constrained environments to advance competency-based medical education.

Addressing multiple dimensions of medical student development simultaneously is possible through the integration of several established components which include: technology-enhanced continuous assessment, structured mentoring, community-based learning, development of a research culture, and peer teaching.

Strong institutional leadership that is dedicated to educational excellence is a key factor, as is the evidence-based design derived from current educational theories. Other factors include the thoughtful application of technology to improve efficiencies and active partnerships with students in the learning process. Finally, a continuous cycle of quality improvement is necessary, guided by evidence and feedback. The national recognition of the model is an indicator of effectiveness and innovative.

For medical institutions, particularly in low- and middle-income countries, the SRMLG framework provides a valuable model as they seek to enhance educational support while addressing local contexts. The ISU experience shows that instead of viewing resource limitations as barriers, dedicated institutions can draw upon local assets: motivated faculty and students, community partnerships, culturally strong educational values, and a commitment to the development of quality educational systems. Resource limitations should be seen as a challenge, not a barrier.

To improve learning outcomes, active instructional approaches should replace passive paradigms, while the support of faculty, resource commitment, student engagement, and institutional perseverance are necessary to implement systems of support. The return on investment is graduates who are community-oriented, professional, and able to think critically. They are engaged in health leadership and able to meet the needs of a complex health system. Pakistan and the world will benefit from the investment.

Future studies ought to look at the long-term outcomes, including alumni outcomes in postgraduate studies and practice, influence on faculty D and S, sustainability in the long term, and adaptable to different institutional settings. Tracking the graduates' professional path, research output, civic engagement, and leadership to provide evidence of the model impact on the delivery of health care and advancement of the medical profession.

The SRMLG model adds to the international discussion on the implementation of competency-based medical education. It shows that educational victory is possible with innovation and commitment, and evidence-based practice, even in resource-poor settings.

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Vision & Mission of LUMHS & ISUM and 7 core-competencies defined by the PM&DC:

One of the difficulties that any medical/dental college faces in the transition period while switching from one University to another, is aligning the vision and mission of the two universities with the program outcome & Bloom's taxonomy. As Muhammad Medical & Dental Colleges' programs are well aligned with the LUMHS' vision and mission, and in near future, they have to be aligned with the ISUM's vision and mission, we expected that a fair amount of work will be needed. However, there are strikingly similarities in the contents and directions of the vision and mission of the two universities. These may be due to following facts

- Both are offering the same programmes of MBBS & BDS.
- Both are working in lines and directions given by the same regulatory bodies (PM&DC).
- Both are working to produce a Global Five Star Doctor award, first described by Dr Charles Boelen, then of WHO, in 2000, and is judged on the following five criteria:
  1. a CARE PROVIDER, who considers the patient holistically as an individual and as an integral part of a family and the community, and provides high-quality, comprehensive, continuous, and personalized care within a long-term, trusting relationship.

  2. a DECISION MAKER, who makes scientifically sound judgments about investigations, treatments and use of technologies that take into account the person's wishes, ethical values, cost- effective considerations, and the best possible care for the patient.

  3. a COMMUNICATOR, who is able to promote healthy lifestyles by effective explanation and advocacy, thereby empowering individuals and groups to enhance and protect their health.

  4. a COMMUNITY LEADER, who, having won the trust of the people among whom he or she works, can reconcile individual and community health requirements, advise citizen groups, and initiate action on behalf of the community.

  5. a MANAGER, who can work harmoniously with individuals and organizations both within and outside the health system to meet the needs of individual patients and communities

Pakistan Medical and Dental Council is the main governing and statutory body that ensures the ethical and standardized medical teaching, learning and practice all over the country. One of the major achievements of this council is to establish 7 core-competencies that a Pakistani doctor should achieve at the time of his graduation and named it as PM&DC's seven star doctor. These include all 7 attributes of a 5 star doctor and adds it to include researcher and lifelong learner. These attributes are meant to warrant the standardization and uniformity among the medical graduates.

1. Care Provider.
2. Decision Maker.
3. Communicator.
4. Community Leader.
5. Manager.
6. Researcher.
7. Lifelong learner.

They have now been replaced by:

1. Knowledgeable (SDG 4- Quality education)
2. Skillful (SDG 4- Quality education)
3. Professional
4. Scholar & Researcher (SDG 4- Quality education)
5. Critical thinker (SDG 4- Quality education)
6. Leader & Role model
7. Community Health Promotor (SDG 3- Good health and well-being

Hence once we have aligned the vision and mission of the one university with the program outcome & Bloom's taxonomy, we find that it is in line with the vision and mission of the other university too.

LUMHS'S VISION	ISU VISION	LUMHS'S MISSION	ISU MISSION
Liaquat University of Medical & Health Sciences seeks to be a top-tier healthcare institution, producing ingenious academic leaders, medical	To be an internationally recognized institution, famous for its ethical work, emphasizing the importance of integrity, honesty and moral principles, highlighting the University's commitment to	Fostering ideal learning environment to ensure modern scientific evidence based practices by imparting critical knowledge, analytical and psychomotor skills, and professional dedication among	Nurturing students' potential by providing them highest quality education thereby producing individuals with strong values, compassion, inclusiveness, leadership and professionalism, emphasizing community engagement particularly with marginalized segments of rural

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| researchers, and healthcare advocates to serve global community. | serving the community and producing unbiased and empathetic educated people, **who are inclusive and have leadership skills,** encouraging them to engage in research, critical thinking, innovation and evidence- based best practices. | healthcare students, under the umbrella of virtuous professional, moral and ethical standards. | population, encouraging students to become empathetic and socially responsible professionals by training them in the best evidence- based practice, capable of contributing to advancements through research and innovation. |

MUHAMMAD MEDICAL COLLEGE (MMC)
ALIGNMENT OF UNIUVERSITY'S VISION WITH MMC MISSION
ALIGNMENT OF UNIUVERSITY'S VISION & MMC MISSION AND MBBS PROGRAM OUTCOME
ALIGNMENT OF MBBS PROGRAM OUTCOME WITH KNOWLEDGE, ATTITUDES & SKILLS AND 7 STAR DOCTOR OF PMDC

University's Vision	University's Mission	MBBS Program Outcomes	Blooms Taxonomy	PMDC'S 7 STAR DOCTOR
Internationally Recognised Institute	Highest quality education	1. **Utilizing knowledge of basic and clinical sciences for patient care** 2. **Acquiring an integrated knowledge of organ structure, function**	Cognitive, Affective, Psychomotor	Care Provider. Decision Maker.

			and its regulatory mechanisms through the end of the integrated teaching 3. **Achieving competence in practice of holistic medicine, encompassing promotive, preventive, curative and rehabilitative aspects of common diseases**		
Ethical Work	Producing individuals with strong values		4. Exhibiting ethical patient-centred care based on integrity, humility, social accountability and high ethical values of this sacred profession	Affective	Care Provider.
Importance of Integrity,	Compassion	Professionalism	**5. Becoming exemplary citizens by**	Affective	Care Provider.

Honesty, Moral Principles			**observing medical ethics and fulfilling social and professional obligations, responding to national aspirations**		Communicator.
Commitment to Serving the Community	Emphasizing community engagement	Marginalised segment of rural population	**6. Taking focused history, performing physical examination, formulating diagnosis and management plan for common health problems.**	Cognitive	Community Leader. Communicator. Decision Maker. Manager.
Unbiased and Empathetic Educated People	Become Empathetic		**7. Demonstrating professional behaviors that embody lifelong learning, altruism, empathy and cultural sensitivity in provision of health care service.**	Cognitive, Affective	Care Provider. Communicator.
Engaged in Research	Contributing to advancements through research		8. Engaging in research activity aimed at improvement of quality of health care including behaviour modification of individual and community for quality life.	Cognitive, Affective, Psychomotor	Researcher. Lifelong learner.

Critical Thinking	Socially responsible professionals		9. Identifying problems, critically reviewing literature and disseminating knowledge. 10. Developing scientific temper, acquiring educational experience for proficiency in profession and promoting healthy living	Cognitive, Affective, Psychomotor	Decision Maker. Researcher. Lifelong learner.
Innovation	Training	Innovation	11. Committing to lifelong learning to keep up to date with developments in clinical practice and trends in disease at population level by strong leadership and management skills.	Cognitive, Affective	Researcher. Lifelong learner.
Evidence Based Best Practices	Best Evidence Based Practice		12. Applying evidence-based practices for protecting, maintaining and promoting the health of individuals, families and community.	Cognitive, Affective	Decision Maker.