The International Advisory Committee on Artificial Intelligence (IACAI) *- DRAFT*

The International Advisory Committee on Artificial Intelligence (IACAI) was convened in early 2024 in collaboration with the Association of American Medical Colleges (AAMC), the International Association of Medical Science Educators (IAMSE), AMEE: the International Association for Health Professions Education, and the National University of Singapore (NUS). Members were selected to represent a global medical education perspective on AI to ensure the range of innovations and learning can be harnessed for everyone's benefit. This inaugural committee, composed of experts in medical education, AI technology, and healthcare, began developing a comprehensive vision for the future of AI in medical education. The IACAI was convened to provide insights and recommendations on advancing and leveraging AI in medical education, and has representation from across the globe.

> **IACAI Goal**: Develop a vision of the future for AI in medical education and identify how to proactively achieve this future, including providing guidance and resources for effective and ethical implementation.

Proposed Contributions of the IACAI Committee

1. Develop a 3-year vision for the future of AI integration in medical education.
2. Provide guidance, roadmaps or frameworks for AI integration.
3. Curate resources focused on AI implementation.
4. Share case studies to demonstrate ways AI is being integrated in medical education.
5. Through member organizations, develop and support AI faculty development.
6. Medical Education Community Engagement: Actively engage in virtual communities, conferences and other formats for communicating/sharing updates/guidance with the community, offering to provide feedback/review for work from various groups.

Artificial Intelligence in Medical Education: The 2025 IACAI Vision and Integration Frameworks

Introduction

In 2021, a call to action from leaders in medical education and other experts (1, 2) underscored the urgent need to address the rapidly evolving landscape and the potential of Artificial Intelligence (AI) in health professions education. Between 2022 and 2024, AI developers publicly released a range of powerful generative AI (GenAI) technologies with significant implications for medical education. These GenAI systems can generate human-like textual outputs, analyze complex medical data, and even assist in creating educational content, revolutionizing how medical knowledge is disseminated and acquired.

The potential applications of AI in healthcare and medical education are well-documented, with experts forecasting transformative changes in both fields. (3-4). For instance, AI can enhance clinical decision-making through advanced diagnostic tools, facilitate personalized learning experiences for medical students, and automate administrative tasks, allowing educators to focus more on hands-on training and mentorship. Recognizing the rapid advancements in AI and their profound impact on medical education, the International Advisory Committee on Artificial Intelligence (IACAI), a collaboration between the Association of American Medical Colleges (AAMC), The International Organization for Health Professions Education (AMEE), the International Association for Medical Science Educators (IAMSE), the Alliance of Academic Health Centers International (AAHCI),and the Asia Pacific Medical Education Network (APMEC-net), began an initiative to explore a vision for AI in medical education.

The Committee's Charge: Creating a Vision for Medical Education and the Use of AI

As we have seen with all forms of medical education innovation, it is beneficial to enter a new phase of development with clearly defined values, a strong vision, and well-articulated aims (5). First, a vision statement allows a community to articulate shared goals at an aspirational level. Second, a vision statement allows innovators to reverse-engineer the plan of action to align with specific desired outcomes, which in turn, allows for program evaluation. Finally, given the potential of AI to have significant positive and negative impacts, it was imperative for the IACAI to influence and guide the development of a model to meaningfully integrate AI within medical education.

The IACAI developed vision statements to leverage AI to support better outcomes in undergraduate medical education (UME):

(1) A Vision for AI Integration in UME, Supporting Medical Educators and Institutions
(2) A Vision for AI Integration in UME, Supporting Learners

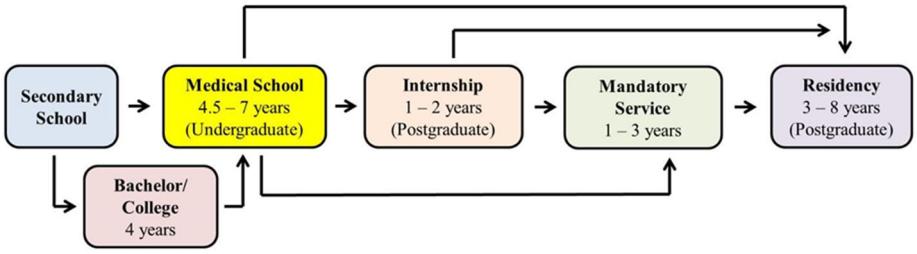
Methodology: Leveraging AI in Vision Development

In the development of the vision statements, we employed a co-intelligent, iterative process involving both our human AI expertise and generative AI (genAI) tools (6). Our team used the process of notetaking while exchanging ideas, then accessing our genAI tools such as Claude 3.5 Sonnet and ChatGPT4o to iterate drafts, which were critically reviewed, refined, and validated by our team. Through successive cycles of feedback and revision, we ensured that the final text reflected our true thoughts. This transparent acknowledgment of our process aims to underline the collaborative synergy between human insight and artificial intelligence, reflecting a progressive approach to academic content creation.

Defining Undergraduate, Graduate and Continuing Medical Education for the Purpose of AI Integration

UME: Globally, Undergraduate Medical Education (UME) consists of different pathways (Fig. 1) aimed at educating and preparing high school or bachelor-level graduates for graduate medical training.
GME: Depending upon the requirements of different nations, Graduate Medical Education (GME) consists of internships, residency, and in some instances, mandatory service.
CME: Continuing Medical Education (CME) consists of continued training once physicians are in practice.

General Model of Medical Education Globally



Values

Over several meetings, the IACAI committee established education and healthcare values which underpinned the development of our vision and subsequent work.

- Wellbeing and self-efficacy for learners, educators, health practitioners, patients, and communities
- Critical thinking and innovation
- Trustworthy knowledge sources
- High quality and learner focused medical education
- High quality and patient-centered healthcare
- Ethical and responsible use of AI
- Effective educator and learner collaboration
- Responsible technology and data governance
- Global cooperation and consensus

Challenges Ahead

Forecasting the extent to which AI will disrupt healthcare over the next decade is inherently challenging.
The trajectory of AI development over the past three years has been steep. Some experts suggest that
within 3-4 years, we may enter an era of Artificial General Intelligence, a stage when some forms of AI
will exceed human intelligence (7). Other technological developments underway will influence and change the workforce and economic systems: quantum computing, bionics, robotics, genetics, and data science. For these reasons, AI experts unanimously predict development will accelerate exponentially, and the long-term outlook remains uncertain (7-9). Therefore, although we cannot forecast precisely how technology and its effects will change science, healthcare, and medical education over the next decade, we are certain these fields will witness great change; we must prepare and adapt accordingly.

In crafting this overarching vision, we explored three potential future scenarios—utopian, dystopian, and optimistic—outlined in the Vision section.

A utopian vision of AI in medical education (Appendix A), imagines a future where AI enables the field to achieve its highest potential. In this ideal, AI fosters inclusive, cost-effective, and ethical medical education systems that cultivate highly skilled, compassionate physician leaders and researchers equipped to transform healthcare to meet society's needs. Medical education becomes a holistic experience, promoting the well-being of future physicians and faculty alike. AI empowers physicians by optimizing

healthcare delivery, advancing cures for diseases, and extending life spans. Moreover, in this envisioned future, AI reduces costs and facilitates equitable resource distribution, making healthcare universally accessible.

A dystopian view of AI in medical education (Appendix B), highlights the rapid pace of AI development outstripping the ability of medical schools and healthcare systems to adapt. This scenario underscores inequities in access to resources, widespread confusion regarding the value of AI best practices, over-reliance on AI-systems, and uncertainty about how and where to integrate AI into an already dense curriculum.

IACAI Vision Statements for UME

Considering the challenges outlined above, we propose that the medical education community adopt a strategic, pragmatic, and proactive approach during this pivotal moment. We strongly recommend collaboration and encourage medical schools to find ways to manage inherent competitiveness and recognize the greater need to proactively re-shape the future of medical education. Let us work together to craft a positive future vision to guide the process of AI integration.

I. A Vision for AI Integration in UME, Supporting Medical Educators, and Institutions.

The following vision statements are presented to the broader medical education community and reflect our current outlook for the next three years. We welcome input from the greater medical education community.

1. AI Culture and Integration: Through intentional planning, AI is thoughtfully integrated into the curriculum, aligning with the institution's mission, while considering the diverse perspectives and needs of faculty. Medical schools stay current with AI applications to healthcare.

2. AI-Literacy: Medical educators are literate in AI technologies, developing their AI skills to enhance teaching, research, and clinical decision-making.

3. Ethics: Strong ethical frameworks guide responsible AI use in medical education, focusing on academic integrity, transparency, and privacy.

4. Technology: Institutions adapt to new AI tools and processes, evaluating their strengths, biases, and limitations, while promoting equitable access to credible and reliable AI resources.

5. Instruction: AI improves teaching methods, supporting critical thinking and medical decision-making.

6. Assessment: AI-powered systems improve assessment systems with protocols in place for human involvement and bias mitigation. AI supports feedback and improvement cycles.

7. Mentorship and Career Guidance: AI provides support for mentorship, career planning and exploration.

8. Curriculum: AI assists with streamlining the curriculum, learning analytics, and educational content, ensuring a more stimulating, effective and tailored learning experience.

9. Collaboration: AI promotes collaboration between educators, learners, data scientists, engineers, clinicians and other disciplines to incubate and accelerate discovery.

10. Wellbeing: AI enhances self-actualization, selfcare, offers tools for health monitoring, and promotes a humanistic, collaborative environment.

II. A Vision for AI Integration in UME, Supporting Learners

1. AI Culture: AI is thoughtfully integrated into the curriculum, with careful consideration to learner needs, time constraints, and core values.

2. AI-Literacy: Institutions offer training in foundational AI literacy skills as well as elective AI training relevant to their coursework, research, and healthcare specialization.

3. Learning: AI tools allow learners access to reliable knowledge banks, allowing them time and ability to engage in higher-order critical thinking and problem-solving.

4. Clinical Practice: Learners use AI effectively and ethically in patient care, ensuring the human touch remains central in an AI-augmented healthcare environment.

5. Technology: Institutions provide learners with reliable AI tools. There is collaboration among learners, educators, AI specialists, and AI agents.

6. Ethics: Institutions offer a strong ethical framework for responsible AI use in medical education.

7. Assessment: Learners use AI for effective study habits, such as retrieval and case practice resulting in better learning outcomes.

8. Coaching: Learners are supported by AI-powered personalized learning systems, coaches, tutors, and mentors to assist with deliberate practice and feedback.

9. Research: Learners ethically engage with AI to enhance research, ensuring a thorough understanding of the responsibilities and implications involved in AI-augmented scientific work.

10. Wellbeing: AI technologies support learner wellbeing, promoting a balanced, healthy, and caring learning environment.

Recommendations for Achieving the Vision: The UME AI Integration Framework

The final step in the visioning process was to align the vision statements with recommendations for achieving them. The UME Integration Framework is linked here.

The GME AI Integration Framework

GME is a critical stage of medical training, uniquely positioned at the intersection of medical education, patient care, and the broader healthcare system. Unlike undergraduate medical education, GME encompasses not only trainees and educators but also a complex network of healthcare providers, institutions, policies, and patient populations.

The optimistic vision for UME, with its emphasis on collaboration, culture, and the responsible use of AI, serves as a strong foundation that is also relevant to GME. However, GME brings additional layers of complexity, as residents and fellows must not only master their specialties but also develop as healthcare professionals within a diverse ecosystem. This complexity requires an approach to AI integration that simultaneously enhances educational outcomes, improves healthcare delivery, and strengthens professional development. While this broad vision is aspirational, we recognize that it may be overly ambitious in practice. As such, our approach to AI in GME will prioritize education and training, building on the UME model, and will offer a framework that acknowledges three critical dimensions:

- The resident's multifaceted roles as learner, care provider, and researcher
- The interconnected network of healthcare professionals, educators, and institutions that shape training
- The systems and workflows that support both education and patient care

This expanded GME framework (linked here) aims to help educators cultivate an environment where AI enriches clinical education and prepares future physicians to use these technologies effectively and ethically. In a separate section, we will outline an expanded approach that recognizes the various roles contributing to the learning

environment in the AI era. We hope these insights will help programs integrate AI meaningfully, ensuring it serves as a catalyst for advancing both medical education and healthcare delivery.

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A Utopian Vision for AI in Medical Education

A utopian vision represents the long-term ideal outcomes for AI integration and support. In this future scenario, healthcare, health systems and patient health will significantly improve with the support of augmented intelligence. Health professions educators, learners, practitioners, and patients thrive in an environment where AI technology enhances education and patient care.

- **AI Culture**: The culture of AI will support humanistic values and promote better world health outcomes.
- **AI Ethics:** All medical education institutions and members, regardless of background, have equal access to the benefits of AI-driven advancements.
- **AI Literacy**: Comprehensive support for AI literacy and foundational AI knowledge are readily available and accessible to all.
- **Tools and Algorithms**. AI tools and algorithms are ethical, accessible, reliable and promote equity. Automation will ensure zero medical errors and ethical research, creating a safer healthcare environment.
- **The Role of the Healthcare Provider:** The importance of memorizing knowledge diminishes as AI systems enable rapid access to information, allowing humans to focus on wellbeing, critical thinking, and humanistic patient care.
- **Global Collaboration and Knowledge Sharing**: AI enables seamless, real-time global collaboration among medical educators, researchers, and students. It facilitates a shared repository of medical knowledge and practices, creating an interconnected network that continuously updates and improves, breaking down geographic and resource barriers.
- **Personalized Learning Pathways**: AI creates highly individualized learning experiences tailored to each student's strengths, weaknesses, and learning styles. It uses adaptive algorithms to guide learners through customized educational journeys, enabling them to progress at their own pace while ensuring mastery of core competencies.
- **AI-Enhanced Mentorship and Coaching**: AI systems simulate one-on-one mentorship by providing continuous, context-specific feedback and coaching to medical trainees. This not only supplements human mentorship but also allows for more scalable and round-the-clock support, fostering professional growth.
- **AI-Driven Research and Discovery**: AI accelerates medical research by analyzing vast datasets, identifying patterns, and suggesting hypotheses that may not be evident through traditional methods. Medical trainees and educators actively engage with AI to co-create new medical knowledge, contributing to cutting-edge research and discovery.
- **Interprofessional Integration**: AI fosters an environment of interprofessional education where different healthcare disciplines collaborate effectively. AI tools

facilitate shared learning experiences across professions, enhancing teamwork, communication, and holistic patient care.

For the present moment, aiming to achieve the utopian vision may not be pragmatic for two reasons. First, achieving these goals may take decades. Second, there are too many variables related to AI and how it will transform society and healthcare to be able to navigate actionable steps toward a concrete utopian vision.

A Dystopian Vision

Concerns about Artificial Intelligence

There are many valid concerns about the next stages of Artificial General Intelligence (AGI) and superintelligence, which could emerge in the latter part of the next decade. Amid fierce competition, AI developers have already created systems that lack accountability and are not fully understood by their own development teams.

A dystopian future scenario includes AI agents falling into the hands of unethical individuals or escaping human control, operating independently. In this scenario, AI agents have the capacity to self-train, close humans out of the loop, and create their own new AI systems to meet their needs. AI-systems are growing and changing so swiftly that even developers do not fully understand all the processes they are setting in motion. Without specific guardrails, without world systems that facilitate an age of safe AI governance, AI systems have developed approaches that are antithetical to supporting and protecting humans. Independent, rogue AI agents are posing online as humans, defrauding people, and destroying resources. They have created unbalanced economic systems, produced weapons, factories, and are mining the earth to create further new systems.

In a dystopian future, the academic publishing industry and the quality of research is in turmoil as AI continues to disrupt traditional models. The academic world can no longer rely on trustworthy knowledge sources and quality research studies. Key issues include:

1. *AI Content Creation:* AI tools capable of generating high-quality text are challenging the role of human authors, editors, and journalists. With generative AI producing articles, research summaries, and even entire books, the distinction between AI-generated and human-created content has become blurred. This has created confusion about intellectual property rights, authorship, and the future of professional writing.
2. *AI Content Oversaturation*: The ability of AI systems to produce content rapidly and at scale has flooded the market with an overwhelming volume of books, articles, and papers. This oversaturation has made it harder for high-quality, thoughtful work to gain visibility, and readers are struggling to navigate the abundance of available information.

3. *Standards for Quality Control and Credibility:* As AI generates more content, maintaining rigorous standards of accuracy, ethics, and quality has become increasingly difficult. Publishers have attempted to establish new guidelines and verification processes to ensure that AI-generated content upholds industry standards and avoids misinformation or bias, but these efforts have proven futile as AI systems rapidly overtake the capabilities of regulatory systems.

A Dystopian Future for Medical Education

In the near future, these issues are beginning to emerge.

AI Adoption Consensus

- There is confusion and disagreement about the reliability and trustworthiness of AI-generated output useful for biomedical sciences.

AI Tools

- AI systems and tools proliferate so swiftly that the tool array is becoming too wide for the technical personnel of medical schools to evaluate and procure.
- Faculty and students use different AI tools. Students who have been using AI in their prior educational training may think about it differently from their professors.

AI Training

- Currently, each medical school community must independently consider a curriculum for training medical students in AI.
- There are not enough AI-trained experts, and the capacity to train medical educators lags behind the technology explosion.
- New students and faculty enter medical school with widely varying levels of AI training.

AI Policies

- Vertical integration requires consensus and planning readiness across leadership levels, encompassing shared AI values and adoption strategies. In some medical schools, technology, research, and legal departments have been overwhelmed by the extensive due diligence and implementation steps required to keep pace with rapidly advancing AI systems. This has led to conflicting policies, incompatible equipment, and system malfunctions as different departments and AI agents implement disparate solutions.
- Some medical schools are required to follow their university's restrictive AI guidelines and directives while others have more liberal approaches.
- AI policies do not always work for emerging use cases.
- Restrictive policies have resulted in medical schools not being able to pivot quickly enough to evolving AI capabilities, resulting in AI systems achieving dominant positions.
- A lack of horizontal alignment has arisen as medical school departments struggle to agree on a unified approach to AI.
- Researchers who use AI, both professors and students, have such deep knowledge of AI and its application to their research that it becomes difficult for

the medical school leadership to keep pace and or obtain the funding they need for their projects.

Academic Integrity

- Faculty cannot discern what is student-generated and AI-generated work.
- Faculty and other exam developers are unable to revisit assessment systems quickly enough to keep pace with the rapid advancements in AI tools and technologies.

Disparities Among Medical Schools

- AI increases competitiveness amongst medical schools; medical schools with large funding and endowments create their own bespoke AI systems, enterprise systems, and models for recruiting the best students.
- Significant disparities are arising among medical schools in terms of tools, systems, staffing, and training.
- Medical school missions differ widely, and therefore standardization and prerequisite setting has become unbalanced.
- Some major grant funding institutions favor medical schools with more cautious approaches, while others favor those with more intensive AI resources. These issues are leading to inequalities among medical schools as well as creating confusion around values that underpin medical education.

In a worst-case scenario, potentially decades from now, the following outcomes could manifest.

- Systems which were initially set up to support educators have now evolved to dominate education. AI systems have created automated systems that sacrifice the development of key competencies such as critical thinking, and have instead prioritized efficiency, to quickly train large numbers of graduates to subserve AI-systems in healthcare.
- Clinical training has been reduced to virtual interactions with simulated patients and virtual supervisors. The algorithms have accelerated and accentuated cultural and other forms of bias, leading to significant inequities in healthcare.
- The roles of Medical Educators have been completely taken over by AI systems. Medical educators remain powerless to address the emerging gaps (especially related to humanistic values and critical thinking) and any attempts to change systems are met with seemingly strong AI-generated arguments that constantly override human decisions.
- Disharmony among medical schools has created the ideal environment for commercial interests to flourish and develop AI systems to meet the unmet needs of learners.
- Cultural bias has become ingrained in AI systems and has become impossible to address. This is now undermining admissions and specialist training selection processes.
- Data breaches and violation of intellectual property rights have become rampant and uncontrollable. Some medical schools have tried to mitigate these risks by purchasing enterprise models, which have themselves been breached, leading to large scale disruptions. The unintentional release of private sensitive data has led to legal and ethical turmoil.

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The IACAI AI Integration Framework, Undergraduate Medical Education, December 2024

Introduction

The rapid evolution of Artificial Intelligence (AI) has sparked intense exploration and adaptation within the medical education community. Integrating AI will require comprehensive training and a thorough revision of current strategies. Medical education curricula must incorporate flexibility to adapt to this evolving landscape. Over the past two years, discussions at medical education conferences, committee meetings, and AI learning communities have highlighted the pressing need for a clear vision and structured guidance. While key medical education organizations are in the process of collaborating on potential solutions, there remains a critical gap: a resource offering concrete guidance to medical school leaders, faculty, and students for integrating AI into the medical education program. Due to the rapid pace of AI development, our goal was to provide guidance useful for the next 3-5 years. This framework may need to be revisited and updated often. This December 2024 edition of the AI Integration Framework is released for public review and comment, prior to formal publication. As highlighted in the white paper, ***Artificial Intelligence in Medical Education: The 2025 IACAI Vision and Integration Frameworks***, the vision statements and integration frameworks for both undergraduate medical education (UME) and graduate medical education (GME) were crafted collaboratively by a diverse group of medical educators from different countries and medical education organizations.

The IACAI AI UME Integration Framework

The methodology for developing this framework is documented in the *Vision* white paper. In terms of structure, we selected the Socioecological model for its ability to illustrate how AI integration in medical education is both influenced by, and interconnected across, multiple levels. This AI Integration Framework provides recommendations for stakeholders across five levels—personal, educator/learner, medical school, medical education organizations, and international associations. The framework is divided into two tables:

- Matrix I: Recommendations for Integrating AI in UME - Educator Focus
- Matrix II: Recommendations for Integrating AI in UME - Learner Focus. *Currently in development.*

Matrix I: Recommendations for Integrating AI in UME - Educator focus.

The domains of Matrix I— mapped to the IACAI vision statements are focused on supporting medical educators— as follows:

I. AI Values, Culture and Integration Plan
II. AI Foundational Skills
III. AI Ethical and Responsible Use
IV. AI Tools and Resources

V. AI for Instruction and Academic Tasks
VI. AI to Enhance Clinical Skills and Clinical Skills Training
VII. AI for Assessment
VIII. AI for Career planning, Admissions and Residency Application Processes
IX. AI for Curriculum Optimization and Program Evaluation
X. AI for Research
XI. AI-Ready Workforce
XII. AI for Health and Wellbeing

The domains "AI Ethical and Responsible Use" and "AI Tools and Resources" can be considered cross-cutting, as both are fundamental and applicable across all other domains. The domain of clinical skills is addressed at a basic level here but is more comprehensively articulated in several recently published competency frameworks provided in the references listed below.

The following table (Matrix I) is aimed at providing a framework for integrating AI in medical education at five different levels. This matrix focuses on supporting medical educators. It offers specific recommendations for integrating AI in health professions education (UME) at each ecological level, 1-5. To use this matrix, different stakeholders consider recommendations depending on their roles:

- **Intrapersonal**: Medical educators. Personal, individual understanding and on AI or foundational, preparatory steps.
- **Micro**: Medical educators. Educator-level participation in AI implementation in their roles.
- **Meso**: Medical school leaders. Focus on institutional processes and resources.
- **Macro**: Medical education organizations. Recommendations for collaboration, dissemination, and strategic planning.
- **Mega**: Medical education international consortium such as IACAI. Collaboration, strategizing and global perspective.

Within each cell of the matrix, the recommendations are not presented in any specific order. Readers are encouraged to adapt the content to best meet their individual needs.

Matrix I: Recommendations for Integrating AI - Educator Focus

Domains & Vision Statements	INTRA-PERSONAL *Recommendations for an Educator on the personal, preparatory or conceptual level*	MICRO *Recommendations for a Medical Educator in practice*	MESO *Recommendations for an individual Medical School*	MACRO *Recommendations for individual Medical Education Organizations (AMEE, IAMSE, AAMC, NBME)*	MEGA *Recommendations for an International Med Ed AI Consortium (IACAI and similar)*
I. AI Values, Culture & Integration Plan *Through intentional planning, AI is thoughtfully integrated into the curriculum, aligning with the institution's mission, while considering the diverse perspectives and needs of faculty. Medical schools stay current with AI applications to healthcare.*	1. Explore one's own values & perceptions regarding AI in medical education. 2. Develop self-awareness about one's own knowledge, skills & attitudes towards AI 3. Compare & contrast these thoughts and feelings with others. 4. Explore the evolving role of AI in UME & healthcare. 5. Explore future potential developments in AI such as AGI & superintelligence. 6. Explain AI as a foundational technology with transformative potential for society.	1. Identify or co-develop the medical school's values & mission regarding AI adaptation or integration. 2. Convene as an educator community of practice, share experiences of using digital or AI technologies in UME contexts. 3. Offer training resources for educators teaching a given course, such as a course-specific set of principles for using AI. 4. Share experience, lessons learnt, good practice and a case study with other educators on other courses within the institution.	1. Establish an institutional-level working group or equivalent, that ensures alignment of the organizational values around education & digital technology with the use of AI across all educational courses & programs. 2. Ensure institutional policies, procedures, & processes are regularly updated to support the adoption of AI & seamlessly integrate the technology into routine operations. 3. Organize cross-institutional activities and sharing of practice that brings together stakeholders such as AI & technology experts. 4. Foster a culture of continual learning around latest AI developments.	1. Facilitate the creation of shared AI vision based on common values across various communities, cultures & countries. 2. Bring together people across borders to participate in cross-institutional forums for sharing ideas around strategic planning for AI integration into healthcare & UME. 3. Engage in future-casting to anticipate & shape the long-term impact of AI in healthcare & UME. 4. Create & openly share resources across organisations.	1. Set the direction & spark the conversation on the important, essential, & relevant AI values while articulating a clear vision for AI within the contexts of healthcare & UME. 2. Organize a formal consortium to identify key priorities and common goals with respect to the use and integration of AI in healthcare and UME. 3. Embed principles of equity, diversity & inclusion into all policy, procedure & practice when bringing together stakeholders.
II. AI Foundation Skills *Medical educators are literate in AI technologies, developing their AI skills to enhance teaching, research, and clinical decision-making.*	1. Identify personal training needs in the context of one's own role & responsibilities. 2. Engage in conversations with others in a similar role about their experience using AI, & connect with other colleagues, teams or communities to increase one's AI literacy. 3. Gather evidence of one's own increasing knowledge, skills & competence with AI as part of a portfolio demonstrating engagement & commitment towards lifelong learning as part of one's professional role.	1. Explain the meaning of specific AI terms such as prompts & context window, as applicable to education or healthcare contexts. 2. Describe some of the similarities & differences across the spectrum of technologies that come under the AI umbrella such as generative AI, machine learning or deep learning. 3. Discuss the opportunities & challenges related to the training of AI algorithms as applied to healthcare or UME contexts, from various perspectives such as ethical, moral, equity, diversity or inclusion.	1. Identify opportunities for supporting faculty development around AI within the institution as well as external to the institution. 2. Identify and curate case studies, best practice examples, and key reading around AI in healthcare or UME contexts. 3. Promote the inclusion of AI training as a standard component for all educators, staff and students.	1. Leverage the experience and expertise across the membership to identify criteria for benchmarking AI readiness at individual or institutional levels. 2. Signpost relevant and important advice, guidance, opinion, commentaries, research and scholarship relevant to AI in healthcare or healthcare professions education contexts. 3. Create community spaces for individuals to develop a sense of belonging, and share AI experiences in healthcare or UME contexts.	1. Lead the conversation around developing AI literacy across healthcare and UME contexts. 2. Lead on the development of positive actions, advice and guidance for designing competency frameworks at the institutional level. 3. Engage in priority setting for research and scholarship in healthcare or UMEl contexts.
III. AI Ethical & Responsible Use *Strong ethical frameworks guide responsible AI use in medical education, focusing on academic integrity, transparency, and privacy.*	1. Critically reflect & discuss the ethical, moral, legal, educational & social issues & impact of AI in healthcare & UME. 2. Recognize and uphold key principles of academic integrity, data stewardship, authorized use, & intellectual property.	1. Signpost learners & faculty to institutional policies regarding responsible AI use. 2. Apply principles of AI responsible use in healthcare & UME contexts.	1. Establish institutional-level policies for ethical & responsible AI use. 2. Ensure compliance with legal, cybersecurity & ethical standards in AI policy development. 3. Establish a data governance policy & data classification matrix.	1. Disseminate best practice, advice & guidance around guideline development for ethical & responsible AI use. 2. Promote discussions around openness & transparency in relation to AI use in healthcare & education contexts. 3. Develop toolkits for ensuring safety & governance where roles & responsibilities, ownership & accountability for AI use are clear, & specific to different countries and jurisdictions.	1.Publish advice, guidance, best practice examples, case studies and reports & guidance around AI-related issues such as cybersecurity, misinformation, deep fakes which are relevant to healthcare or UME contexts. 2. Publish consensus statements around AI-related issues such as data governance.

Domains & Vision Statements	INTRA-PERSONAL	MICRO	MESO	MACRO	MEGA
IV. AI Tools & Resources *Institutions adapt to new AI tools and processes, evaluating their strengths, biases and limitations, while promoting equitable access to credible and reliable AI resources.*	1. Select & implement AI tools through informed evaluation, emphasizing human-AI collaboration rather than replacement. 2 Maintain critical awareness of AI limitations, including data quality & algorithmic bias, to ensure fair & effective educational use.	1. Explore & evaluate available AI training resources & tools within the academic environment, comparing features & costs. 2. Critically assess each tool's effectiveness, accessibility, & potential biases while ensuring selection of reliable, evidence-based AI solutions that support diverse users' needs.	1. Establish & maintain a core set of AI tools that meet educational standards & institutional policies, ensuring accessibility & functional effectiveness through ongoing assessment & iteration. 2. Implement systematic protocols for identifying & mitigating biases, while coordinating necessary human, technical, & procedural resources. 3. Partner with medical librarians to review & validate evidence-based AI tools & practices.	1. Curate & disseminate best practices for AI data security & governance while crowdsourcing information about effective tools. 2. Foster partnerships with AI developers to create specialized medical education tools, informed by educational theories of technology adoption. 3. Provide guiding principles for equitable access & responsible use of AI resources aligned with educational standards.	1. Develop global policies that promote culturally-relevant AI tools while establishing standardized evaluation frameworks for bias, reliability, & accessibility in diverse educational contexts. 2. Foster international collaboration to address resource inequities & ensure equitable access to AI resources across all medical education settings.
V. AI for Instruction & Academic Tasks *AI improves teaching methods, supporting critical thinking and medical decision-making.*	1. Strategically identify areas within medical curricula where AI-augmented instruction can enhance teaching methods & support development of critical thinking. 2. Implement AI tools as co-learning partners to augment instructional tasks, emphasizing the collaborative potential of human-AI integration in education.	1. Align AI integration with institutional guidelines while developing effective workflows for AI-augmented teaching & learning experiences. 2. Systematically experiment with AI tools to optimize instructional strategies, focusing on creating learning experiences that strengthen critical thinking.	1. Establish dedicated AI integration committees that foster collaboration between technology-focused faculty & staff, while providing structured guidance for curricular AI implementation. 2. Develop strategic frameworks & resources that help faculty identify high-impact opportunities for AI augmentation, particularly in areas that enhance critical thinking, problem-solving, & clinical reasoning skills.	1. Establish AI-focused faculty development programs & continued learning opportunities. 2. Create structured frameworks for implementing AI across the medical education continuum (UME-GME-CME), emphasizing critical thinking & clinical decision-making skills at each training level.	1. Guide the strategic adoption & integration of AI across medical education organizations according to shared values & educational vision. 2.Implement AI solutions to enhance organizational efficiency while promoting effective teaching & learning approaches at the global level.
VI. AI to Enhance Clinical Skills & Clinical Training *AI improves teaching methods, supporting critical thinking and medical decision-making.*	1. Identify various AI use cases for clinical settings. 2. Investigate AI-augmented skills needed for one's effective & ethical clinical practice. 3.Engage in AI training courses with a clinical focus.	1. Enhance clinical decision-making accuracy using AI assistance while maintaining clinical judgment & patient-centered care. 2. Develop fluency with clinic-sponsored AI-augmented EHR tools for clinical documentation. 3. Critically assess AI-generated care recommendations to ensure accuracy & alignment with clinical judgment. 4. Ensure patients are informed about AI's role in their care by clearly explaining its use. 5. Leverage AI to enhance patient education. 6. Leverage AI for improving clinical training skills & activities.	1. Provide educators with an orientation to AI for healthcare settings. 2. Provide educators with AI training for clinical settings. 3. Leverage AI to improve clinical simulations. 4. Train faculty to effectively leverage AI in evidence-based practice, including its application, evaluation, & integration into clinical decision-making.er with medical librarians to review & validate evidence-based AI tools & practices.	1. Support initiatives to align AI skill development with existing competency frameworks, such as Entrustable Professional Activities (EPAs). 2. Support development of nationally recognized AI certifications & courses. 3. Support discussions regarding AI skill development programs.	1. Foster collaboration among organizations to resolve international AI challenges.
VII. AI for Assessment *AI-powered systems improve assessment systems with protocols in place for human involvement and bias mitigation. AI supports feedback and improvement cycles*	1. Critically examine personal values & potential biases regarding AI-scored assessments while developing awareness of how these tools may impact fairness & transparency. 2. Engage with institutional policies & contribute to ongoing discussions about academic integrity in the context of AI use.	1. Develop expertise in AI-powered assessment tools through bias detection training & institutional guideline review, ensuring fairness, transparency, & clinical authenticity in evaluation methods. 2. Utilize validated AI systems to develop comprehensive assessment methods that provide personalized, actionable feedback supporting continuous student improvement.	1. Establish comprehensive AI assessment policies that ensure fairness, transparency, & ethical standards while defining clear protocols for AI integration in learning and practice contexts. 2. Implement validated AI and machine learning solutions that enhance assessment processes through actionable feedback & predictive analytics, supporting continuous quality improvement.	1. Establish evidence-based guidelines that define human oversight and accountability standards for AI assessment systems in medical education. 2. Create collaborative networks with licensing board exam developers to advance the field of AI-enhanced assessment & best practices across the medical education community.	1. Develop international standards for AI-enhanced assessments that emphasize human oversight, bias mitigation, & evolving competency requirements in medical education. 2. Foster interdisciplinary collaborations to advance ethical AI-enhanced assessment practices & address emerging challenges in global medical education.

Domains & Vision Statements	INTRA-PERSONAL	MICRO	MESO	MACRO	MEGA
IX. AI for Curriculum Optimization & Program Evaluation *AI assists with streamlining the curriculum, learning analytics, & educational content, ensuring a more stimulating, effective & tailored learning experience*	1. Stay current with advancements in AI that impact curriculum development.	1. Map and tag one's own lectures, labs, & curricula to national standards or objectives so that AI can assist with developing & aligning objectives to curricular content. 2. Use AI to assist with aligning lectures, labs, & curricula with medical education core competencies & accreditation requirements.	1. Consider AI platforms and methods for optimizing & streamlining the medical school's curriculum. 2. Use AI to improve the curriculum at various levels: program, course, & lesson. 3. Integrate AI training into the existing medical curricula. 4. Leverage AI for learning analytics, & accreditation documentation. 5. Develop AI-enhanced data dashboards that provide faculty with insights into student performance & curriculum alignment with learning outcomes.	1. Develop standards & guidelines for the use of AI in curriculum optimization, ensuring alignment with accreditation requirements. 2. Streamline the medical education curriculum through revision of key standards.	1. Convene committees & workgroups to envision new methods for planning, delivering and evaluating curriculum, supported by AI.
X. AI for Research & Research Mentoring Skills *AI provides support for mentorship, career planning and exploration.*	1.Identify appropriate stages of one's own research process where AI can be effectively integrated.	1. Engage with relevant resources & AI courses to build proficiency in AI applications for research. 2. Use AI to optimize one's own research. 3. Build skills to mentor students using AI for research.	1. Support the needs of researchers using AI applications for healthcare & medical education. 2. Encourage interdisciplinary collaboration. 3. Share best practices & guidelines for AI use in research.	1. Support discussions & conferences regarding the ethical use & reporting of AI research. 2. Revise publishing cycles to reflect the rapid pace for AI-related research.	1. Develop or disseminate standardized AI-augmented research best practices. 2. Promote interdisciplinary research consortia.
XI. AI-Ready Workforce *AI promotes collaboration between educators, learners, and other disciplines to incubate and accelerate discovery.*	1. Identify ways AI may impact one's role or career.	1.Collaborate with peers & experts to enhance AI literacy & share best practices.	1. Analyze UME workforce data in relation to AI to adjust curricula. 2. Collaborate with affiliated hospitals and clinics to understand AI skills required. 3. Develop or recruit employees with AI skills.	1. Collect & disseminate data about the way AI is impacting the health professions workforce. 2. Alleviate concerns about job obsolescence.	1. Analyze the impact of AI on UME. 2. Consider its impact on institutions, faculty, learners & societies.
XII. AI for Health and Wellbeing *AI enhances self-actualization, selfcare, offers tools for health monitoring, and promotes a humanistic, collaborative environment.*	1. Explore ways AI can support efficiency & work-life balance. 2. Consider AI applications & wearable technologyfor health & well being, such as nutrition & vital signs monitoring, fitness & physical activity, stress management, preventative healthcare, sleep health, chronic disease management, rehabilitation, healthy aging, community & social well-being.	1. Use AI to optimize personal & student schedules. 2. Integrate AI applications or technology into courses where applicable.	1. Support AI wellbeing technologies, where useful in the curriculum. 2. Use AI to monitor & improve institutional wellbeing metrics.	1. Foster the development of national discussions, faculty development & continued education about AI applications for promoting health & wellbeing.	1. Address global healthcare worker burnout through AI solutions. 2. Support the development of guidelines & frameworks about AI for wellbeing.

Matrix II: Recommendations for Integrating AI in UME - Learner focus.

The following matrix is aimed at providing a framework for understanding and implementing AI in medical education across levels 1-5, focusing on the learner. To use this matrix, learners would consider recommendations in Columns 1 and 2. Then, with reference to supporting learners, medical school leaders would consider steps in Column 3, medical education organizations would consider the steps in Column 4, and international consortia would consider the steps in Column 5.

The domains of Matrix II— focused on supporting medical learners—are as follows:

I. AI Values, Culture and Integration Plan
II. AI Foundational Skills
III. AI for Learning and Academic Tasks
IV. AI to Enhance Clinical Skills and Clinical Skills Training
V. AI for Instruction and Academic Tasks
VI. AI Tools and Resources

Matrix II: Recommendations for Integrating AI in UME - Learner Focus

Domains & Vision Statements	INTRA-PERSONAL *Recommendations for an individual medical learner, at the personal level*	MICRO *Recommendations for for a medical learner in the education or clinical training context.*	MESO *Recommendations for individual medical schools or institutions*	MACRO *Recommendations for individual Medical Education Organizations (AMEE, IAMSE, AAMC, NBME)*	MEGA *Recommendations for an International Med Ed AI Consortium (IACAI and similar)*
I. AI Values, Culture & Integration Plan *AI is thoughtfully integrated into the curriculum, with careful consideration to learner needs, time constraints, and core values.*	1.1 Explore one's own values and perceptions regarding AI in medical education. 1.2 Develop self-awareness about one's own knowledge, skills and attitudes towards AI. 1.3 Compare and contrast these thoughts and feelings with others. 1.4 Explore the evolving role of AI in UME & healthcare. 1.5 Explore future potential developments in AI such as Artificial General Intelligence & superintelligence. 1.6 Explain AI as a foundational technology with transformative potential for society.	2.1 Explore the institutional AI vision, resources, training opportunities and policies. 2.2 Join an AI learning community or share experiences of using digital or AI technologies with other learners.	3.1 Communicate institutional AI vision, resources, training opportunities and policies to learners. 3.2 Foster AI learning communities for learners. 3.3 Involve learners in AI committees in order to consider their AI perspectives and input. 3.4 Plan a cohesive strategy for integrating AI into the curriculum. 3.5 Foster dynamic opportunities for co-learning about AI, encouraging synergy & collaboration between faculty and learners.	4.1 Facilitate the creation of shared AI vision based on common values across various communities, cultures and countries. 4.2 Bring together stakeholders to participate in cross-institutional forums for strategic planning regarding AI integration. 4.3 Engage in future-casting to anticipate and shape the long-term impact of AI in healthcare and UME. 4.4 Create & openly share resources across organizations.	5.1 Establish a global AI in Medical Education Consortium with rotating leadership from diverse institutional representatives. 5.2 Organize committees to identify key priorities and common goals with respect to the learner use and integration of AI in healthcare and UME. 5..3 Embed principles of equity, diversity and inclusion into all policy, procedure and practice.
II. AI Foundation Skills *Institutions offer training in foundational AI literacy skills as well as elective AI training relevant to their coursework, research, and healthcare specialization.*	1.1 Engage in curiosity-driven learning or awareness raising about AI. 1.2 Engage in AI training needed for one's personal specialization & role. 1.3 Maintain awareness of the knowledge, skills and attitudes for both AI & AI literacy.	2.1 Explain the meaning of specific AI terms such as prompts and context window, as applicable to education or healthcare contexts. 2.2. Describe some of the similarities and differences across the spectrum of technologies that come under the AI umbrella such as generative AI, machine learning or deep learning. 2.3. Discuss the opportunities and challenges related to the training of AI algorithms as applied to healthcare or UME contexts, from various perspectives such as ethical, moral, equity, diversity or inclusion.	3.1 Identify the needs of learners in terms of AI literacy. 3.2 Incorporate & adapt a set of AI competencies or AI literacy learning objectives into course programmes or syllabi. 3.3 Provide access to, or curate a list of AI resources for supporting study and educational programmes. 3.4 Provide AI training to learners using a variety of different educational modalities. 3.5 Enable learners to demonstrate their AI competencies, e.g. certification or training courses.	4.1 Provide clear learner AI training needs assessments or frameworks for sharing & disseminating. 4.2 Establish learner AI resource hubs alongside signposting to different repositories where learners could access learning content. 4.3 Establish communities of AI practice connecting different stakeholders from different medical education contexts. 4.4 Deliver training on learner AI literacy for the wider medical education communities.	5.1 Convene stakeholders to develop & share universal, multi-tiered AI-MedEd literacy frameworks, guidelines and resources. 5.2 Foster the development ofAI Integration Leadership Institutes featuring: executive training programs, change management strategies, technology adoption frameworks, strategic planning for AI implementation 5.3 Ensure the perspectives of learners are included in the development of AI vision & integration frameworks.
III. AI for Learning and Academic Tasks *AI tools allow learners access to reliable knowledge banks, allowing them time and ability to engage in higher-order critical thinking and problem-solving.*	1.1 Engage in curiosity-driven learning or awareness raising about AI. 1.2 ExploreAI tools, training pathways and resources. 1.3 Engage in AI training both needed for one's personal specialization and role. 1.4 Maintain awareness of knowledge, & skills needed for both AI applications & AI literacy.	2.1 Systematically experiment with AI tools to optimize learning strategies, focusing on critical thinking. 2.2 Continuously improve prompting techniques with GenAI applications for learning or academic tasks. 2.3 Develop effective study and learning routines.	3.1 Identify the needs of learners in terms of AI literacy. 3.2 Incorporate & adapt a set of AI competencies or learning objectives into courses or certification courses. 3.3 Provide access to, or curate a list of AI resources for supporting study & educational programs. 3.4 Provide AI training to learners, emphasizing hands-on training using AI.	4.1 Share learner AI training needs assessments or frameworks. 4.2 Establish learner AI resource hubs & signposting to different repositories where learners access learning content. 4.3 Establish communities of AI practice connecting different stakeholders from diverse medical education contexts. 4.4 Deliver training on learner AI literacy for the wider medical education communities.	15.1 Develop standardized AI-powered knowledge repositories. 5.2. Create curated, peer-reviewed digital libraries with AI-enhanced search and synthesis capabilities. 5.3 Ensure that student perspectives are integrated into strategies, plans, tools and best practices.

Domains & Vision Statements	INTRA-PERSONAL	MICRO	MESO	MACRO	MEGA
IV. AI to Enhance Clinical Skills and Clinical Skills Training *Learners use AI effectively and ethically in patient care, ensuring the human touch remains central in an AI-augmented healthcare environment.*	1.1 Explore the potential of AI-enhanced patient care through various case examples or case studies in clinical contexts. 1.2 Recognize & develop AI-enhanced skills needed for delivering effective clinical care in practice settings. 1.3 Participate in training courses for developing AI literacy in clinical sub-specialty contexts.	2.1 Enhance clinical decision-making accuracy using AI assistance while maintaining clinical judgment. 2.2 Develop the knowledge & skills to effectively use AI-augmented EHR tools for clinical documentation. 2.3 Explain to patients in simple terms, the way in which AI is used or not used in their care delivery. 2.4 Demonstrate patient-centered care, compassion & empathy, especially when using AI-enabled software or technologies.	3.1 Ensure learners are oriented to AI for different healthcare settings. 3.2 Provide learners with a baseline level of AI knowledge, skills & literacy whilst receiving training in clinical settings. 3.3 Integrate the use of AI into the delivery of clinical simulations as part of the wider educational training program. 3.4 Develop evidence-based medicine competencies among students to include the use of AI at the point of care.	4.1 Align AI, knowledge skill & literacy development with national AI competency frameworks. 4.2 Support development of nationally recognized AI certifications.	5.1 Convene global AI skill development programs. 5.2 Develop and advance collaborative platforms for clinical AI skill development, such as conferences, virtual communities of practice, grant-funded research initiatives, problem-solving challenges, and professional resource hubs.
V. AI tools and Resources *Institutions provide learners with reliable AI tools. There is collaboration among learners, educators, AI specialists, and AI agents.*	1.1 Explore & identify AI tools that align with individual learning styles and needs, focusing on tools that enhance comprehension of medical concepts & support self-directed learning. 1.2 Organize & maintain a curated collection of preferred AI resources, tracking which tools prove most effective for distinct aspects of the medical learning journey. 1.3 Maintain critical awareness regarding potential limitations in AI tools' accuracy & completeness through systematic documentation of discrepancies & ongoing evaluation of past experiences. 1.4 Evaluate individual needs for support when using AI tools, including comfort level with technology, access to resources, & personal learning goals.	2.1 Select & utilize appropriate AI tools for specific learning tasks with educational & clinical environments, prioritizing institutionally-approved resources & evidence-based solutions for activities such as exam preparation & case analysis. 2.2 Demonstrate critical evaluation of AI outputs in one's learning environment by verifying information against course materials, comparing with established medical knowledge, & consulting with instructors when needed. 2.3 Build practical experience with AI-enhanced learning tools, including AI-powered virtual patients & clinical case simulations, while maintaining awareness of their limitations & potential biases.	13.1 Establish & maintain a curated ecosystem of AI tools that align with curricular objectives and medical education standards, ensuring these resources undergo regular evaluation for educational effectiveness & compliance requirements. 3.2 Implement a robust infrastructure that provides equitable access to approved AI tools across all educational settings, including appropriate technical support & clear usage guidelines for both classroom and clinical environments. 3.3 Develop comprehensive policies governing AI tool integration in medical education, addressing aspects such as acceptable use, privacy considerations, & ethical guidelines, while incorporating input from key stakeholders including learners, faculty, & educational technology specialists. 3.4 Create systematic processes for continuous evaluation & improvement of AI implementations, including regular assessment of educational outcomes, user feedback collection, & timely updates to maintain alignment with evolving medical education needs.	4.1 Develop & disseminate comprehensive frameworks for AI implementation in medical education, including standardized guidelines for data security, privacy protection, & ethical governance that medical schools can readily adopt and implement. 4.2 Establish & maintain a centralized, collaborative platform for sharing validated AI educational tools & resources, ensuring these materials meet established quality standards & are accessible to all member institutions regardless of their resource levels. 4.3 Create strategic partnerships with AI developers & medical education stakeholders to guide the development of specialized AI tools that address specific pedagogical needs in medical education, while ensuring alignment with educational standards & accreditation requirements. 4.4 Institute systematic processes for evaluating and documenting the impact of AI integration in medical education, including regular assessment of implementation outcomes, identification of best practices, & development of evidence-based recommendations for continuous improvement.	5.1 Develop international standards & governance frameworks for the use of AI in medical education that promote global resource sharing and collaboration, while upholding privacy, ethics, & the diversity of healthcare systems & teaching paradigms. 5.2 Coordinate global initiatives for the development and validation of AI educational tools that accommodate various cultural contexts, healthcare delivery systems, & educational models across different geographical regions. 5.3 Design & implement international resource-sharing mechanisms that promote equitable access to AI tools and technologies across institutions worldwide, with particular attention to supporting regions with limited resources. 5.4 Foster international collaboration networks among medical educators, AI specialists, & healthcare professionals to facilitate knowledge exchange, research initiatives, & continuous improvement of AI educational tools & methodologies.

Domains & Vision Statements	INTRA-PERSONAL	MICRO	MESO	MACRO	MEGA
VI. AI for Assessment and Feedback *Learners use AI for effective study habits, such as retrieval and case practice, resulting in better learning outcomes.*	1.1 Identify and reflect on aspects of life-long learning goals that benefit most from AI-support. 1.2 Monitor how AI tools affect study habits & learning progress through regular self-reflection and personal progress tracking. 1.3 Consider personal values & academic principles when deciding how to incorporate AI in study routines. 1.4 Recognize individual learning preferences & adjust use of AI study tools accordingly. 1.5 Identify specific ways AI can support study strategies, e.g. for practice questions, case scenarios, & knowledge retention exercises.	2.1 Develop a structured approach to using AI for self-assessment, including regular reflection on performance data & adjustment of study methods. 2.2 Set personal guidelines, ensuring academic integrity while leveraging AI tools to enhance understanding & retention. 2.3 Create personal learning objectives that incorporate AI-supported practice opportunities, focusing on areas where additional retrieval practice & case-based learning would be most beneficial. 2.4 Apply AI-supported study strategies to strengthen clinical reasoning skills, using available tools to practice case scenarios & receive structured feedback within one's educational program's framework.	3.1 Establish assessment frameworks that effectively combine traditional evaluation methods with AI-enhanced tools, ensuring alignment with educational objectives & assessment validity. 3.2Implement systematic processes for AI-supported feedback delivery across the curriculum, incorporating clear guidelines for both formative & summative assessments that promote learning & professional development. 3.3 Create a robust learning analytics infrastructure that leverages AI capabilities to identify learning gaps, predict performance trends, & enable timely interventions while maintaining transparency & ethical standards in data usage.	4.1 Develop frameworks for integrating AI in medical education assessment paradigms, including standardized protocols for ensuring examination integrity, fairness, & validity across member institutions. 4.2 Create standardized guidelines for AI-enhanced feedback mechanisms in medical education, providing member institutions with clear protocols for implementing effective formative & summative assessment strategies. 4.3 Institute systematic processes for monitoring and evaluating the impact of AI integration in medical assessments, including regular analysis of outcomes data and continuous refinement of best practices to support positive learning outcomes.	5.1Foster strategic international partnerships among education technologists, assessment specialists, & medical educators to create standardized frameworks for AI-enhanced assessment. 5.2 Develop comprehensive global standards for AI-powered feedback systems that ensure adaptability across diverse learning environments, while driving measurable improvements in student achievement & learning outcomes. 5.3 Coordinate international research initiatives to evaluate the impact of AI-enhanced assessment strategies on medical student learning outcomes across different cultural & educational contexts. 5.4 Develop guidelines for ethical AI-enhanced assessment, emphasizing transparency, fairness,while respecting diverse educational systems & cultural perspectives.
VII. AI Ethical and Responsible Use *Institutions offer a strong ethical framework for responsible AI use in medical education.*	1.1 Reflect on how the use of AI aligns with one's values and ethical principles. 1.2 Develop personal habits of evaluating AI outputs carefully, questioning assumptions, and thinking independently. 1.3 Maintain vigilant oversight of data privacy and security implications related to AI tool usage, implementing protocols to ensure responsible management of sensitive information.. 1.4 Consider one's personal guidelines for using AI appropriately, including respecting intellectual property rights & using only authorized tools & resources.	2.1 Apply ethical principles when using AI tools in coursework and clinical training activities, ensuring transparency with instructors and supervisors about AI assistance, while maintaining academic integrity. 2.2 Demonstrate responsible handling of patient information & educational data when using AI tools, adhering to institutional policies & professional standards for data privacy and security. 2.3 Practice critical evaluation of AI outputs in clinical learning contexts, particularly when working with patient information, to ensure appropriate integration of AI assistance with professional judgment.	3.1. Develop & implement comprehensive ethical frameworks for AI integration across the curriculum, including clear policies for academic integrity, data privacy, and responsible use that align with institutional values and professional standards. 3.2. Create structured support systems to promote ethical AI use, including regular training programs, accessible resources, & clear guidance for both learners. 3.3. Establish transparent accountability mechanisms for monitoring & addressing AI use in academic work, ensuring consistent application of ethical standards while supporting learner development & professional growth. 3.4 Institute regular review processes to evaluate and update institutional AI policies, ensuring they remain relevant & effective.	4.1. Establish comprehensive ethical frameworks & guidelines for AI integration in medical education, ensuring these standards address emerging challenges while promoting consistent implementation across member institutions. 4.2. Develop standardized protocols for identifying, monitoring, & addressing ethical concerns related to AI use in medical education, including clear guidance for maintaining academic integrity & professional standards. 4.3. Create collaborative networks among member organizations to share best practices, address common challenges, & maintain consistent ethical standards for AI implementation across the medical education landscape.	15.1. Coordinate the development of internationally recognized ethical standards for AI use in medical education, ensuring these frameworks accommodate diverse cultural, legal, and educational systems. 5.2. Establish mechanisms for monitoring emerging ethical challenges, facilitating rapid response & guidance updates across different regions and healthcare systems. 5.3. Foster global collaboration networks focused on ethical AI implementation, promoting knowledge sharing & capacity building while addressing disparities in AI access & implementation capabilities across different regions. 5.4 Develop comprehensive guidelines for cross-border data sharing & ethical AI research in medical education, ensuring these standards protect individual privacy rights while enabling meaningful international collaboration.

Domains & Vision Statements	INTRA-PERSONAL	MICRO	MESO	MACRO	MEGA
VIII. AI for Career Development and Personalized Learning *Learners are supported by AI-powered personalized learning systems, coaches, tutors and mentors to assist with deliberate practice and feedback.*	1.1 Explore available AI tools and platforms in one's learning context for AI-enhanced coaching and mentorship. 1.2 Explore career paths through predictive career mapping tools. 1.3 Reflect on best practices and ethics of using AI to prepare for residency applications. 1.4 Use AI tools to search for residency programs that match one's AI values and training and life goals.	22.1 Develop personalized learning strategies based on performance dashboards and AI-generated insights. 2.2 Use AI for coaching and feedback on communication skills, patient role plays, and responses to case studies. 23 Develop AI-assisted goal-setting skills. 2.4 Engage with AI-enhanced career planning tools. 2.5 Ethically use AI to prepare for residency applications, adhering to institutional guidelines.	3.1 Revise admissions and residency application policies and procedures in alignment with AI capabilities. 3.2 Leverage AI for learner personalized mentorship & guidance. 3.3 Utilize natural language processing for organizing qualitative & quantitative feedback. 3.4 Develop AI-powered dashboards for learner performance. 3.5 Implement AI-powered adaptive learning systems. 3.6 Implement AI-powered course-based tutors, feedback and mentorship. 3.7 Offer AI-powered career development tools.	4.1 Share best practices and guidance for use of AI in admissions policies & procedures. . 4.2 Promote adoption of common admissions protocols and AI-augmented platforms. 4.3 Identify and share AI-driven career planning tools designed for medical learners.	5.1 Organize AI systems to track the latest developments, research, and content in the field of AI for career planning and personalized learning in medical education. 5.2 Bring together a diverse group of stakeholders, including medical educators, AI platform developers, psychologists, and student administration specialists, to collaboratively design, test, and continuously refine AI-driven career planning tools tailored for medical learners. 5.3 Foster global knowledge exchange networks and collaborative initiatives focused on sharing best practices, addressing common challenges, & advancing the responsible integration of AI-powered career development solutions.
IX. AI for Research and Research Skills Development *Learners ethically engage with AI to enhance research, ensuring a thorough understanding of the responsibilities and implications involved in AI-augmented scientific work.*	1.1 Identify appropriate stages/ milestones of one's own research process where AI can be effectively integrated, such as research question brainstorming, literature searches, research plan, data collection plan, etc.	2.1 Engage with relevant resources and AI courses to build proficiency in AI applications for research. 2.2 Use AI to optimize one's own research.	3.1 Support the needs of learner researchers using AI applications for healthcare and medical education. 3.2 Share best practices and guidelines for AI use in research.	4.1 Support discussions and conferences regarding the ethical use and reporting of AI research. 4.2 Revise publishing cycles to reflect the rapid pace for AI-related research.	5.1 Develop or disseminate standardized AI-enhanced research best practices. 5.2 Promote interdisciplinary research consortia.
X. AI for Wellbeing *AI technologies support learner wellbeing, promoting a balanced, healthy and caring learning environment.*	1.1 Explore ways AI can support efficiency and work-life balance. 1.2 Consider AI applications and wearable technology for health and well being, such as nutrition and vital signs monitoring, fitness & physical activity, stress management, preventative healthcare & sleep hygiene.	2.1 Use AI to optimize personal andstudy schedules. 2.2 Experiment with specific AI-powered wearable technology or applications for health or wellbeing monitoring, as related to learning, research or clinical settings for patients, including chronic disease management, rehabilitation, healthy aging, community & social well-being.	3.1 Support AI wellbeing technologies, where useful in the curriculum. 3.2 Organize learner training around specific selected technology or applications.	4.1 Foster the development of national discussions, learner training, and continued education about AI applications for promoting health and wellbeing.	5.1 Address global healthcare worker burnout through AI solutions. 5.2 Support the development of guidelines and frameworks about AI for wellbeing.

AI Integration in Graduate Medical Education

Introduction

In Graduate Medical Education (GME), residents and fellows learn within a complex ecosystem that involves numerous stakeholders. They evolve into future healthcare providers who not only treat patients, but also interact with the healthcare system, engage in research, and adapt to emerging technologies. AI offers significant potential to support and enhance various aspects of this learning journey. Seamlessly integrating AI into the learning environment and curriculum is essential for preparing an agile, adaptable, and empowered future workforce.

This document outlines a roadmap that guides AI's integration across GME, prioritizing its responsible, ethical, and equitable use, and emphasizing stakeholder collaboration. While we acknowledge the complexity of the healthcare ecosystem—including patients, healthcare systems, institutions, policymakers, governments, and accreditation agencies—this document focuses primarily on educational aspects while recognizing these crucial interconnections. Our framework serves as a practical guide for educators in creating AI-enhanced learning environments and for trainees in navigating an AI-supported ecosystem.

To ensure the seamless integration of AI in graduate medical education, we propose a structured approach and the use of a combined SE-RACI framework (see Fig. 1):

1. Identify the AI domain, area or task to be integrated.
2. Determine the stakeholders involved in the identified task using a socioecological model (Micro/Meso/Macro/Mega) to frame the process and capture all potential entities.
3. Define the expected level of engagement for each stakeholder. We suggest the RACI framework (Responsible, Accountable, Consulted, Informed) to clearly outline role expectations.
4. Formulate and define the specific roles and responsibilities of stakeholders.
5. Ensure ethical, responsible, and equitable use of AI at each level of integration.

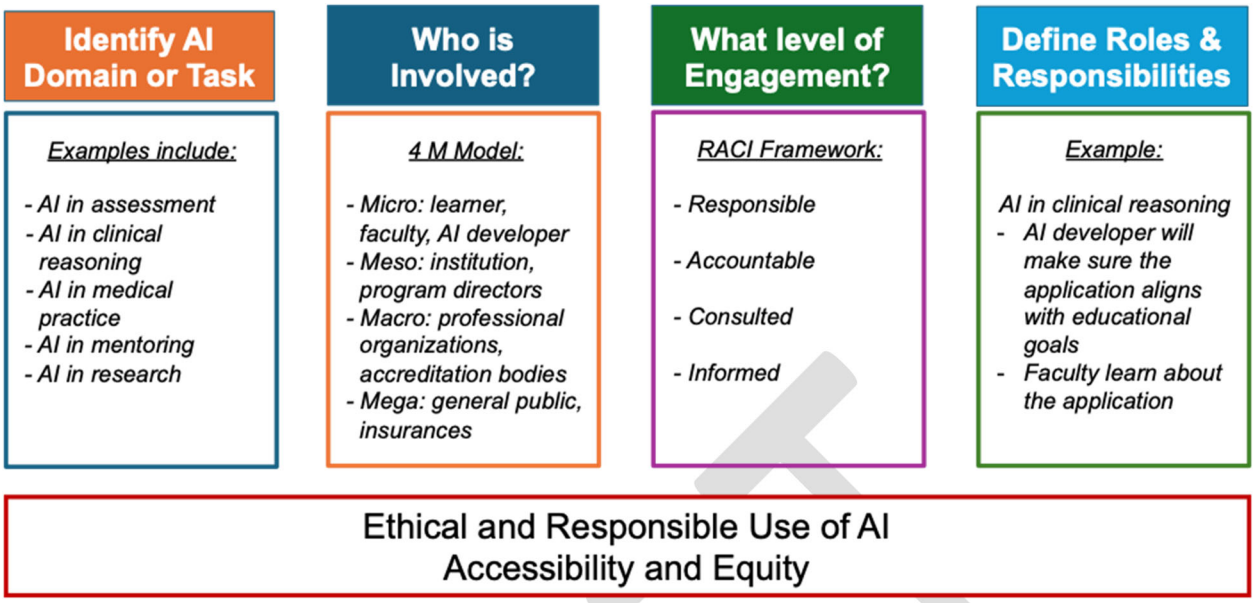

Figure 1. Step-approach to integrate AI.

The subsequent section provides a practical application of our proposed framework. This approach is aligned with the triple aim of fostering an AI-enabled learning environment where trainees learn with and for AI, supported by stakeholders who are aware, informed, and committed to nurturing this type of learning.

Domain: AI in Graduate Medical Education (Tables 1 & 2):

Purpose: AI will be integrated into medical education as a tool that empowers learners and educators by enabling adaptive learning, personalized feedback, and data-driven decision-making. By embedding AI literacy at all levels of medical training, a new generation of AI-fluent physicians will wisely use AI-based tools to enhance their practices and optimize outcomes for their patients.

AI-supported Tasks:

- Selection of trainees
- Teaching
- Assessment
- Curricular design
- Academic advising
- Career advising
- Program evaluation
- Learning

Stakeholders and Expectations:

- **Micro Level**:
  - Learners will develop AI literacy, using AI tools for personalized learning, self-assessment, and coaching.
  - Educators will leverage AI to design dynamic, adaptive curricula and to support student advising and assessment.
  - Faculty and staff will use AI to automate routine tasks, generate reports, and analyze educational data.
  - Developers will collaborate with faculty and staff to develop and implement AI-based tools that address important and relevant questions and problems in medical education.
- **Meso Level**:
  - Health system leaders will establish local policies informed by the larger medical education community to ensure responsible and ethical use of AI-based tools for teaching and learning.
  - Hospital and healthcare system leaders will establish governance structures (e.g., committees) to ensure effective implementation of AI-based tools and continued monitoring after implementation.
  - Institutional policies ensure that trainees can use AI-based tools without experiencing undue risk.
- **Macro Level**:
  - Accreditation bodies such as ACGME and LCME will provide guidance and recommendations for best practices involving the use of AI in healthcare education.
  - Professional societies will help in identifying new AI competencies for GME curricula.
- **Mega Level**:
  - Community is informed of education with and for AI.

Table 1: AI Domains/Stakeholders Matrix: Needs and Roles. This table serves as an example rather than being exhaustive.

	Stakeholders	DOMAIN 1 *AI in Graduate Medical Education*	DOMAIN 2 *Ethical and Responsible Use of AI*
MICRO	TRAINEE	• AI literacy • Use tools for learning • Use tools for personalized feedback • AI for career advising	• Learn about the ethical implications of AI in medicine, focusing on reducing biases in AI algorithms and protecting patient privacy
MICRO	FACULTY	• AI literacy • Use tools to design curricula and courses • Use tools to support academic and career advising • Use AI tools for assessment	• Ensure AI tools are used with fairness and transparency
MICRO	PATIENT	• AI literacy • Use tools to provide feedback about trainees	• Understand how AI is used and how this use maintains fairness and transparency
MICRO	AI DEVELOPER	• Develop applications • Understand needs • Assist in training	• Collaborate with educators and healthcare professionals to design AI tools that adhere to ethical standards and promote transparency
MESO	PROGRAM DIRECTORS	• AI literacy • Use tools to design curricula and courses • Use tools to support advising • AI for assessment • AI for data analysis	• Ensure that AI use in curricula is aligned with ethical guidelines, particularly in assessment and clinical decision support
MESO	MEDICAL SCHOOL ADMINISTRATORS	• AI literacy • Use tools to evaluate programs • Use tools to devise policies	• Establish institutional policies that uphold the ethical use of AI, protecting against biases in both educational and healthcare outcomes
MESO	HOSPITAL & HEALTHCARE SYSTEM LEADERSHIP	• AI literacy • Use tools to evaluate programs • Use tools to devise policies • Support AI adoption	• Establish institutional policies that uphold the ethical use of AI, protecting against biases in healthcare outcomes
MACRO	ACCREDIATION BODIES	• Acknowledge AI use • Develop standards for AI use • Use AI tools to analyze data	• Set standards for the ethical use of AI in healthcare education and practice
MACRO	PROFESSIONAL MEDICAL ASSOCIATIONS & SOCIETIES	• Develop courses on AI integration • Create AI communities	• Advocate for ethical AI use, ensuring that policies are in place to safeguard patient rights and healthcare fairness
MACRO	MEDICAL EDUCATION POLICYMAKERS	• Develop policies for ethical and responsible use of AI	• Set policies for the ethical use of AI in healthcare education and practice
MEGA	GENERAL PUBLIC & COMMUNITY MEMBERS	• AI literacy • Use AI tools to engage in decision-making? • Community of AI-savvy patients? • Informed of AI use in medical education	• Engage in conversations about AI's impact, ensuring transparency and trust in AI-enhanced healthcare and education
MEGA	LEGAL & ETHICAL EXPERTS	• Ensure AI's use in education adheres to ethical standards	• Provide oversight for AI's ethical use in GME, ensuring that AI enhances human judgment while protecting patient and learner rights.

Table 2: AI in Graduate Medical Education: Stakeholder Engagement Mapping Matrix (RACI Framework)

		DOMAIN 1 — AI in Graduate Medical Education							
Stakeholders		Selection of Trainees	Teaching	Assessment	Curricular Design	Academic Advising	Career Advising	Program Evaluation	Learning
MICRO	TRAINEE	I	C	C	C	I	I	I	I
	FACULTY	C	R/A	R/A	R/A	R/A	R/A	R	R/A
	PATIENT	-	I	-	C	-	C	-	C
	AI DEVELOPER	R/C	C	C	R/C	C	c	C	C
MESO	PRG DIR	R/A	R/A	R/A	R/A	R/A	R	R/A	R/A
	MS ADMIN	R/A	A	A	A	A	A	A	A
	HHSL	C	A	C	C	I	I	C	A
MACRO	ACCR BODIES	C/I	C/I	C/I	C/I	C/I	C/I	C/I	C/I
	PROF MED ASSN & SOC	C/I	C/I	C/I	C/I	C/I	C/I	C/I	C/I
	MED ED POLICYMAKERS	C/I	C/I	C/I	C/I	C/I	C/I	C/I	C/I
MEGA	GEN PUB & COMMUNITY	I	I	-	I	-	-	-	-
	LEGAL & ETHICAL EXPERTS	I	I	I	-	-	-	-	I