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 of AI 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.

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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.

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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. 3.2 Implement 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.	5.1 Foster 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.

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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.