Utilizing AI for the Medical Education Classroom

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Speakers

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AI Uses in Medical Education at UMMSM

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Categories of Use

• Learning and Assessment
• Curriculum Operations and Administration
• Academic Activities
Learning and Assessment

• Developing OSCEs and Clinical Vignettes for testing clinical skills
• Learning Specialists using Chat GPT for clinical context when supporting students
• Summarizing key messages
  – Student feedback- Courses, AAMC GQ
  – Qualitative studies- Qualtrics- using homegrown model
• MSPE finalization
  – Preceptor notes> Summary Notes (Phase 3)
  – Summary narratives> MSPE narratives (Phase 2)
Learning and Assessment

• Facilitating Adaptive Learning
  – ASLS blended course with UM Gordon Center and American Heart Association- aligns training with learner knowledge level using AI, content tailoring, and individualized instruction for stroke management

• AI- OSCE
  – Developing AI supported application to augment OSCE assessments/ ratings for observers

• Interprofessional Session on Visual Thinking strategies using AI tools and AR/VR
  – Med Ed Portal submission in the works
Curriculum Operations and Administration

• Task automation
  – ECC meeting minutes using a protected version of Co-Pilot

• Student chatbots
  – Home-grown system for medical knowledge- customizable
  – Enhancing communication with the students just in time

• Standardizing meeting transcripts, minutes
Enhancing communication

• Students do not read messages from administration
• They report lack of satisfaction without being aware
• Student chat bots
  – Recruitment
  – Ongoing communication
  – Just in time access to relevant information
Plans for the near future

• Performance Tracking across competencies
• Predictive Analytics for early at-risk identification
• Analysis of communication skills- speech patterns, tone and body language
Academic work


• Two distinct roles for AI
  – What AI training do health professionals need?
  – How can we use AI to improve such training?

The impact of facial recognition technology in a prehospital setting: A randomized control simulation-based study

- Misra A, Cabeceiras R, Rodriguez R et al, UMMSM and Gordon Center for Simulation and Innovation in Medical Education
- Can paramedics’ use of facial recognition technology improve the identification of unknown patients and their medical histories?
- The experimental group was 13.9 and 15.8 times more likely to self-report identifying the patient and their important medical information, respectively.
- 4.1 times more likely to transport the patient to their choice hospital.
- 80% participants reported the technology could benefit their day-to-day work

Society for Simulation in Health Care 2024
New EPAs that may arise

<table>
<thead>
<tr>
<th>EPA</th>
<th>Description</th>
<th>Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>Proficient use of health care technologies</td>
<td>The medical graduate should be able to use current and emerging technologies effectively and responsibly in health care, including electronic health record, telemedicine platforms, and AI-driven diagnostic tools, to enhance patient care and improve health outcomes.</td>
</tr>
<tr>
<td>15</td>
<td>Understanding and applying health informatics</td>
<td>The medical graduate should be able to understand and apply principles of health informatics, including data management, data privacy, and the use of data for quality improvement and research.</td>
</tr>
<tr>
<td>16</td>
<td>Demonstrating team skills for transdisciplinary interactions in health care settings</td>
<td>The medical graduate should be able to effectively collaborate within transdisciplinary health care teams, which include other health care professionals as well as experts from other disciplines such as data scientists and bioinformatics specialists.</td>
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</table>
Figure 1. Integration of emerging EPAs into different EPA clusters

**Cluster 1: EPAs Align Well with Current Curricula**
- Learners have time and opportunity to practice
- Significant direct observation and feedback

- **EPA 1:** Gather a history and perform a physical examination
- **EPA 2:** Prioritize a differential diagnosis following a clinical encounter
- **EPA 5:** Document a clinical encounter in the patient record
- **EPA 6:** Provide an oral presentation of a clinical encounter
- **EPA 7:** Form clinical questions & retrieve evidence to advance patient care
- **EPA 9:** Collaborate as a member of an interprofessional team

**Cluster 2: EPAs mostly found in senior undergraduate curricula**
- Activities may lack sufficient practice opportunities, supervision, or feedback

- **EPA 3:** Recommend and interpret common diagnostic and screening tests
- **EPA 4:** Enter and discuss orders and prescriptions
- **EPA 8:** Give or receive a patient handover to transition care responsibility

**Cluster 3: Systems level EPAs often absent or underdeveloped in undergraduate curricula**

- **EPA 10:** Recognize a patient requiring urgent or emergent care and initiate evaluation and management
- **EPA 11:** Obtain informed consent for tests and/or procedures
- **EPA 12:** Perform general procedures of a physician
- **EPA 13:** Identify system failures and contribute to a culture of safety and improvement

*indicates EPA proposed in this paper
New skills needed for HP graduates

- Skills to evaluate new technologies
- Skills to interpret outputs from AI understanding sources of error, bias and context appropriateness
- Skills to communicate AI facilitated results to patients
- Skills to advocate for ethical and equitable systems ensuring data security and privacy for patients
Additional thoughts

• Data security
• Costs
• Equitable access
• Ability to customize based on experience
• Threats to “experts”, job loss
• AI integration into EMR
• Black box
• Knowledge management vs information acquisition
Utilizing AI in the Medical Education Classroom

Ron Rodriguez, M.D., Ph.D.
Professor, Medical Education & Urology
Ashbel Smith Professor of Urologic Science
Disclosures & Disclaimers: None.
Goals:

• Where is AI heading in Med Ed

• What Students and Faculty need to know about AI

• Examples of AI Development at UTHSA

• What role should physicians have in the development of AI Tools

• Why did we develop a Dual Degree Program MD/MSAI?
Where is AI heading in Med Ed
AI in Med ED: Use Cases

- Active Learning
- Role Playing & Simulations
- Student Note Evaluation
- Curricular Alignment in of Sequenced Content
  - Milestone Assessments
  - Mastery of Material
- Personalized Tutor
- Adaptive Learning Tools
- Procedural Proficiency Assessments
SORA
Prompt: A gorgeously rendered papercraft world of a coral reef, rife with colorful fish and sea creatures
What Do Students and Faculty Need to know About AI?
LLM Limitations

• Information is only as recent as the day the training started
• GPT-4 Trained Sept 2021, updated Jan 2022, released March 14, 2023
• Very Expensive to create pre-trained LLMs and tedious
• Does not have expert content
• Content not vetted for accuracy.
• When the information is sparse for a knowledge representation, it is prone to “hallucinations”
• When it gives incorrect answers, the language can be extremely compelling (i.e., not always possible to tell when it is correct if you are not already knowledgeable.) This is because the statistical models of the groups of words generated as optimized to sound good together.
• LLM performance can be improved by “fine-tuning” information

• Specialty Content can be used by Retrieval Associated Generation (RAG), which incorporates a secondary knowledge graph

  • KG encapsulates the specialty knowledge
  • The specialty knowledge is used to find detailed information, and uses the LLM base model to interpret and generate response.

• Fine-tuning and RAG are not mutually exclusive. Likely specialty apps will incorporate BOTH as hardware and software tools improve.
What role should physicians have in the development of AI Tools?
Physicians Should Lead to Prevent:

- Propagation of Systemic Bias
- Over reliance on technology (prevents practitioners from mastering their trade)
- Inappropriate liability of AI generated responses
- Health Inequity from access to care with these technologies
  - Creation of two tiered healthcare system
  - Use cases driven by the financial incentives
  - Use by third party payors in models which parse benefits in unethical ways
Financial Concerns about AI in Healthcare

• The race is on to capitalize on AI in Healthcare
• The “game” had always been controlled by big Tech, but not anymore
• Current costs for EMRs have been skyrocketing.
• Average cost for EPIC is $8,000-$10,000 per user per year
• Next Gen AI for EPIC (DAX) is currently estimated at $10,000 per user per year
• The current emphasis for companies developing in this space is NOT to reduce healthcare costs but to optimize profits

• Our data is the currency for these companies to gain proficiency
• Our expertise is necessary to provide meaningful RLHF and fine-tuned models
Examples of AI Development at UTHSA

Content trained LLMs as general information source (answers vetted)

Objective Structured Clinical Examination

Independent Learning Tools with Adaptive Learning

Dual Degree Program with Masters in AI
  Requires integration of training from UTHSA & UTSA
  Capstone requires two mentors across campuses
  Capstone II option, thesis with submission for publication
Summary

• AI is already here; we can’t stop it or ignore it
• The most important steps necessary for accuracy and cost-control will be how we handle our data and our expertise
• Institution of FHIR by CMS occurred in Dec 2023.
• After this, it will be ILLEGAL to block our access to the data as providers AND patients.
• Healthcare costs are already too high, and the current models for advancing AI will exacerbate this, unless we intervene
  • As users, we are best positioned to advance these technologies responsibly:
    • Patient centered
    • Improves outcomes
    • Enhances care
    • Advances Education
    • Advances Science
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Applying AI in the Classroom

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Learning Objectives

- AI can search curriculum standards and suggest objectives based on your topic and learners
- AI can help refine objectives
Planning and creating activities

• AI can't replace your creativity, but it can search for lesson ideas, suggest activities that align with your objectives, and even generate quizzes or worksheets.

• Consensus (Semantic Scholar), Evidence Hunt (PubMed), and other AIs embedded search engines can help with researching topics

• AI embedded in modern LMS can create modules, discussion boards, and quiz questions.
Beyond Text

- Virtual Patients and simulations
- Images creation
- Sound enhancement
Moving forward

• Lifelong learning
• HIPPA, FERPA, Data Security
• Who is making the decisions
• Human touch
AI and the Medical Student Perspective

“Utilizing AI for the Medical Education Classroom”
AAMC AI in Academic Medicine Webinar Series

Annelise M. Silva, MD EdM
Financial Disclosures

- None
Objectives

1. Discuss current perspectives and opinions about AI from the medical student perspective
2. Identify examples of current uses of AI by medical students pre-clinically and clinically
3. Discuss AI’s potential impact on medical student education
4. Suggest opportunities for increased support in medical student AI use
Pulse Check

- Medical students are overwhelmingly aware, but lack training for effective utilization.
- Some students express wariness on accuracy or comprehensiveness of responses:
  - ‘Is this just another resource for us to learn how to use?’
- Other students use it to augment learning – and this is trending.
Benefits for Studying

- Breaks down difficult topics
- Devises study plans
- Creates content for flash cards (ANKI)
- Creates virtual patients for feedback and practice
- Easy to share with other students

ChatGPT
Certainly! Let's create a virtual patient.

Name: Sarah Johnson
Age: 32
Occupation: Marketing Manager

Medical History:
- Hypothyroidism diagnosed 5 years ago, managed with levothyroxine.
- Seasonal allergies, usually managed with over-the-counter antihistamines.
- History of occasional migraines, usually triggered by stress or lack of sleep.
- No surgeries or hospitalizations.
- No history of chronic illnesses in the family.

Current Issue:
Sarah has been experiencing persistent fatigue and difficulty concentrating for the past few months. She feels like she's been in a mental fog, which is affecting her work performance and personal life. Despite getting enough sleep, she wakes up feeling exhausted. She's also been feeling unusually cold lately, even when others around her feel comfortable. She suspects it might be related to her thyroid condition. She wants to explore other possibilities as well. She's concerned about her overall health and wants to regain her energy and focus.
Benefits for Career Development

- Help students explore different specialties
- Identify potential research areas of interest and mentors
- Map out goals and requirements to become a competitive applicant
- Connect students with other resources to learn further

*Copilot*

As a medical student interested in radiology, there are several valuable resources and steps you can take to enhance your knowledge in this field. Here are some recommendations:

1. **Online Radiology Courses and Websites:**
   - **LearningRadiology:** This award-winning teaching site offers lectures, quizzes, hand-out notes, and interactive material focused on chest, GI, cardiac, and musculoskeletal diseases. It's an excellent resource for medical students starting out in radiology.
   - **Radiology Basics:** A free e-learning resource covering CT, MRI, and ultrasound, including anatomy, pathology, and quizzes.
   - **Coursera:** Hosts online radiology courses from reputable institutions. Some popular options include "Visualizing the Living Body: Diagnostic Imaging" from Yale University and "MRI Fundamentals" from the Korea Advanced Institute of Science and Technology (KAIST).
   - **Radiology Cafe:** Another useful website with tutorials and resources for junior doctors and medical students.
   - **Radiology Master Class:** While not mentioned in the search results, this website is also highly regarded for radiology learning.

2. **Textbooks and Books:**

3. **Clinical Experience and Electives:**

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*4-Year Medical School Plan for Diagnostic Radiology Residency*

This plan outlines steps you can take throughout medical school to become a competitive applicant for diagnostic radiology residency programs.

**Year 1:**
- **Academics:** Focus on building a strong foundation in core medical sciences like anatomy, physiology, and pathology. These are crucial for understanding the diseases radiologists diagnose.
- **Research:** Explore research opportunities in radiology departments. Look for faculty with research interests aligning with yours. Early research involvement demonstrates initiative and interest in the field.
- **Extracurricular Activities:** Join radiology interest groups or student-run radiology societies. Attend national radiology conferences (e.g., ACRAS) to network with professionals and learn about the latest advancements.

**Year 2:**

*Note: Copilot is a virtual assistant that creates personalized content for educational purposes.*

*aamsa*
AI: A tool or a trap?

Students are bombarded with resources and ‘how to learn’

- No training on how to critically appraise output
  - Still learning how to sift through curricular content itself
- Easier for preclinical medical students to pick up, more difficult for clinical medical students
  - Do not substitute AI for clinical decision making
So what do we need?

- **Incorporation** into current resources (First Aid, Sketchy, UWorld, etc.)
- **Integration** with institution-based and standardized test content
- **Guidance** on how to effectively use and critically appraise AI output
- **Support** on preparing students to use AI in clinical practice
So what do we need?

- **Guidance** on how to effectively use and critically appraise AI output
- **Support** on preparing students to use AI in clinical practice

<table>
<thead>
<tr>
<th>Responsibility</th>
<th>Innovation project team</th>
<th>Educational administration (deans, curric cmte.)</th>
<th>Educator</th>
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<tbody>
<tr>
<td><strong>PLANNING AND DEVELOPMENT</strong></td>
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<tr>
<td>Ensure the AI system addresses a meaningful educational goal</td>
<td>✓</td>
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<tr>
<td>Ensure the AI system works as intended</td>
<td>✓</td>
<td></td>
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<tr>
<td>Explore and resolve legal implications of the AI system¹ prior to implementation and agree upon appropriate safe, effective and equitable use of and access to education AI</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Develop a clear protocol to identify and correct for potential bias</td>
<td>✓</td>
<td></td>
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<tr>
<td>Ensure appropriate learner safeguards are in place for direct-to-consumer tools that lack educator oversight</td>
<td>✓</td>
<td></td>
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<tr>
<td><strong>IMPLEMENTATION AND MONITORING</strong></td>
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<tr>
<td>Make educational decisions such as advancement and remediation</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Have the authority and ability to override the AI system</td>
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<tr>
<td>Ensure meaningful oversight is in place for ongoing monitoring</td>
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<td>✓</td>
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</tr>
<tr>
<td>Ensure the AI system continues to perform as intended through performance monitoring and maintenance</td>
<td>✓</td>
<td></td>
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</tr>
<tr>
<td>Ensure ethical issues identified at the time of purchase and during use have been addressed²</td>
<td>✓</td>
<td></td>
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</tr>
<tr>
<td>Ensure clear protocols exist for enforcement and accountability, including a clear protocol to ensure equitable implementation</td>
<td>✓</td>
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Enhancing the learner’s experience

Reducing cost

Improving learning outcomes

Improving work life of health professions educators

Improving equity in educational processes

Footer: amsa
Precision Education and Precision Medicine

- **Guidance** on how to effectively use and critically appraise AI output
- **Support** on preparing students to use AI in clinical practice

What is Precision Medical Education?

- Data and Outcomes from UME/GME Education Apps Clinical EHR Data
- EHR/MyChart-like Education Portal
- Data-driven coaching
- Nudges and Alerts
- Action and Learning Plans
- Research and Feedback Loop

Education Data Warehouse

Personalization Engine + AI

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Takeaways

● Students are **aware and interested in utilizing AI** in medical education
● There is a **wariness of how to use this** as a tool effectively (trust is still key for students)
● **Guidance is needed** on how to incorporate AI into medical student training both on the educator side and on the student side
● **Precision education** is an exciting glimpse into what the future of medical education could look like
Thank you!
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  – May 22, 2024

Past AAMC AI Webinar

• AI & Healthcare Delivery: Navigating the Clinical Reality and Expectations – March 2024
• Building Trust & Transparency in the Age of AI: Behind the Data Curtain – February 2024
  • Video recording
  • Presentation slides
  • Q&A section summary

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