



Tomorrow's Doctors, Tomorrow's Cures®

Learn

Serve

Lead

AI in Medical Education

Using the Missions of Medical Education as a Guide

January 23, 2024

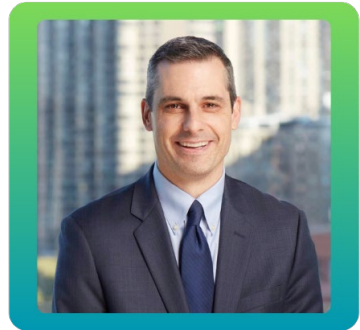


Association of
American Medical Colleges

Speakers



Alison Whelan, MD
Chief Academic Officer, AAMC



Marc Triola, MD
Associate Dean for Educational Informatics
Director, Institute for Innovations in Medical Education
Professor, Department of Medicine
NYU Langone Health



Stephanie Mann, MD, MS HPEd
Senior Associate Dean for Academic Affairs, Methodist
University/Cape Fear Valley Health School of Medicine

Upcoming AAMC AI Webinars

***Building Trust & Transparency in the Age of AI:
Behind the Data Curtain – February 2024***

***Artificial Intelligence and Healthcare Delivery:
Navigating the Clinical Reality – March 2024***



**Register for the
monthly series!**

AAMC AI Resources

[AAMC AI Webinar Series](#)

[AAMC AI Resource Bundle](#)

AAMC Center for Health Justice

- [Foundations for Responsible NLP Use for Maternal Health Equity](#)
- [Polling Snapshot: Artificial Intelligence - August 2023](#)

[International Advisory Committee for Artificial Intelligence](#)

Links may be found in the chat.

Artificial Intelligence in Medical Education

Marc M. Triola, MD

Associate Dean, Educational Informatics

Director, Institute for Innovations in Medical Education



Disclosures

- Employee of NYU Grossman School of Medicine, NYU Langone Health
- Board Member, AAMC
- Institute's research funded by AMA Accelerating Change in Medical Education, the Stemmler Fund
- Textbook author, Pearson

NYU Langone Education Landscape

NYU Grossman School of Medicine

530 Medical Students

1,700 Residents

Educator Community ~700 faculty

NYU Long Island School of Medicine

80 Medical Students

NYU Vilcek - Biomedical Sciences

300 PhD and Post-Docs

- Single person is both Dean and CEO, integrated missions and data
- Both medical schools are three-year curricula
- All students get full tuition scholarships
- Sophisticated education technology and analytics

The Institute for Innovations in Medical Education (IIME)

- Founded in 2013 as a key component of NYU Grossman School of Medicine
- The Institute's mission is to transform medical education through innovative approaches and new technologies
- We develop cutting-edge teaching methods, such as technology-based learning, artificial intelligence, and learning analytics
- We are working towards a program of precision medical education to deliver a custom experience tailored for every student



AI in Clinical Care

- Passes USMLE with flying colors
- Excellent, often better, at diagnosing complex clinical cases
- AI text is indistinguishable, appears creative and empathic
- AI-tools are rapidly being integrated into the EHR to communicate with patients, summarize clinical course, and perform new types of clinical decision support
- AI may soon be able to automatically write a draft note from the audio of the doctor-patient conversation

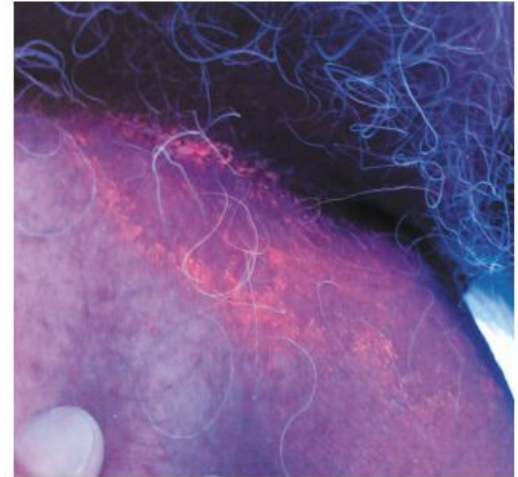
Accuracy of a Vision-Language Model on Challenging Medical Cases

Thomas Buckley¹, James A. Diao, B.S.¹, Adam Rodman, M.D.², and Arjun K. Manrai, Ph.D.^{1*}

¹ Department of Biomedical Informatics, Harvard Medical School, Boston, MA

² Department of Medicine, Beth Israel Deaconess Medical Center, Boston, MA

- **Also used NEJM Challenge Cases and CPCs and GPT-4V (includes the ability to understand images and text)**
- **GPT-4V achieved an overall accuracy of 61% compared to 49% for humans.**
- **GPT-4V outperformed humans at all levels of difficulty and disagreement, skin tones, and image types;**
- **The exception was radiographic images, where performance was equivalent between GPT-4V and human respondents.**



“The image shows a rash that fluoresces coral red under ultraviolet light, which is characteristic of Erythrasma caused by the bacteria *Corynebacterium minutissimum*.”

Medical Students and Residents are using AI to...

- Generate differential diagnoses and plans for PBL cases
- Be a virtual simulated patient by giving the AI OSCE cases; generating new patient cases
- Create USMLE questions and flashcards
- Draft clinical write ups, summarize the literature
- Inform clinical reasoning on challenging cases and CPCs
- Assisting with Research Papers/Abstracts

Anki

AnkiGPT - Turn Text Into Anki Flashcards Automatically Using Our New AI Model [Free To Use!]

5 Essential AI (ChatGPT) Prompts Every Medical Student and Doctor Should be Using to 10x their Productivity 🙋🚀👨



Esh Tatla · Follow

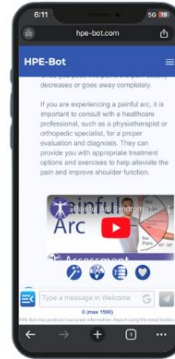
15 min read · May 24



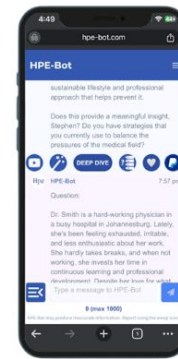
Introduction to AI-Powered Health Professions Tutors

An AI-powered health professions tutor is a virtual tutor that uses artificial intelligence to provide personalized support and guidance to students in their health professions studies. With an AI tutor, students can gain a deeper understanding of health professions concepts and achieve academic and career success.

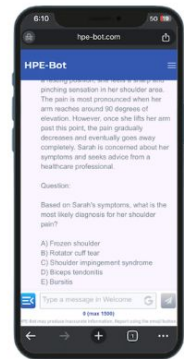
AI-curated videos



Chat



Test yourself



NYU Langone and AI

Harnessing the Power of AI and ChatGPT

NYU Langone's trifold mission to serve, teach, and discover is achieved daily through an integrated academic culture devoted to excellence in patient care, education, and research.

We view generative AI and Large Language Models as a key driver of our success and are transforming our organization around their potential.

Our vision is that the majority of all text written (both clinical and operational) at or for NYU Langone will one day pass through an equitable and ethical language model to improve quality, efficiency, and safety of all of our missions.

Several research groups at NYU Langone are working on AI solutions and LLM Development, led by the MCIT Department of Clinical Informatics Predictive Analytics Unit. This is a cross-mission effort with shared resources, expertise, and innovation.

AI for Precision Medical Education Across the UME Spectrum

Admissions	<ul style="list-style-type: none">• Selection process that uses AI and predictive analytics to support a holistic review
Self-Directed Learning and Assessment	<ul style="list-style-type: none">• Suggested resources and adaptive assessments linked to demonstrated knowledge
Clinical Learning Environment	<ul style="list-style-type: none">• Clinical learning resources, guidelines, and literature suggestions driven by cases seen and not seen• Personalized workplace-based assessment and OSCEs based on demonstrated competence and intended specialty
Career Exploration and Specialty Selection	<ul style="list-style-type: none">• Suggested educational pathways using predictive analytics• Case mix and patient assignments informed by specialty and prior experiences
Transition to GME	<ul style="list-style-type: none">• Tailoring terminal aspects of medical school to smooth transition to GME• Specialty-specific transition to residency linked UME-GME coaching
Coaching and Planning	<ul style="list-style-type: none">• Data-driven coaching• Aspirational goal-setting with personal learning plans

AI innovation at NYU Langone

- Established a policy of GAI use that applied to all
- Formed GenAI Advisory Workgroup
- Established 1st Academic Medical Center HIPAA/PHI GPT environment
- Elicited 100+ ideas for initial use cases; Launched 10+ pilots in clinical, research and education
- Hosted world's 1st healthcare "Prompt-a-thon"
- Built NYUTron our own GenAI model trained on NYU Langone EHR data
- Launching a new Masters program in Health Care AI for students, residents, and faculty



Example Use at NYU Langone: Curriculum Mapping

Lecture Description

In this lecture, you will learn about the mechanisms of liver injury and how that manifests in a variety of hepatic diseases. In addition to learning about the ways liver injury manifest, you will learn about the liver's amazing regenerative response and fibrosis that occurs with chronic injury. You will hear about the diseases that result in acute and chronic types of hepatocellular and cholestatic injury and learn the means to distinguish them. Perhaps most importantly, you will learn about drug-induced liver disease, which is quite common and potentially deadly. In all, this lecture will provide you an amazing framework for characterization of all manner of liver disease. Goal: Be able to describe the major histology of common types of hepatitis, identify the salient histological features of the etiology-specific hepatitis, and associate the histology with the clinical outcome.

+

ChatGPT Prompt

"Map this lecture to USMLE Content Area keywords and to MeSH terms:"

=

Result

USMLE Content Area Keywords:

- Liver injury mechanisms
- Hepatic diseases
- Liver regeneration
- Fibrosis
- Acute hepatocellular injury
- Chronic hepatocellular injury...

MeSH terms:

- Liver injuries
- Liver diseases
- Liver regeneration
- Liver cirrhosis
- Hepatitis...

Curricular Tools: My Day

The screenshot shows a user interface with a navigation bar at the top containing 'Inbox', 'Calendar', 'MyData' (with a 'New!' badge), and 'QOD'. Below the navigation bar, the main content area is titled 'Today's Events Nov 3, 2023'. A green notification box contains the following text:

MyDay - AI
The lectures covered various topics related to cardiovascular health. Here are the key themes that emerged:

- Arrhythmia, specifically in regards to the cellular response and treatment options for this condition.
- Ischemia, stress testing, and anti-anginals, including the importance of pre-test probability and differential diagnosis in determining post-test probability.
- Clinical myocardial infarction, though information on the lecture is not provided.
- Peripheral vascular disease, focusing on the epidemiology, diagnosis, and pathogenesis of this condition.
- Personal protected time, which may refer to scheduled breaks or time off for healthcare professionals to address their own health and wellness.

Get ready to learn and grow! 🧠

Seminar: syncope (Arrhythmia)
9:00 am (1 hour 30 mins)
Organ Systems 1: Cardio, Pulmonary, & Kidney
(2023-2024)

Ischemia, stress testing and anti-anginals (Skolnick)
SLH E
10:30 am (1 hour)
Organ Systems 1: Cardio, Pulmonary, & Kidney
(2023-2024)

This will be a combination of lecture and application exercises.
Assigned advanced reading: Lilly chapter on Ischemic Heart Disease
Learning objectives: To understand the cellular response to ischemia and the steps in the ischemic cascade To understand the difference between anatomic and physiologic testing of coronary artery disease To understand the importance of pre-test probabilit...

AI Integration in Medical Education - NYU Student Goals

Suggested ways to accomplish this goal:

1. Join NYU Grossman School of Medicine's academic clubs, interest groups or student chapters of professional associations related to psychiatry. This will provide opportunities to expand your knowledge, participate in organized discussions, and attend seminars or conferences.
2. Set up a weekly schedule to review journal articles related to psychiatry. Utilize resources such as the American Journal of Physical Medicine & Rehabilitation and Archives of Physical Medicine and Rehabilitation. Staying up-to-date on recent research findings will enhance your understanding of the field.
3. Read and analyze the Cuccurullo textbook, "Physical Medicine and Rehabilitation Board Review." Cover one chapter or section each week, taking notes and discussing key points with classmates or mentors to ensure a thorough understanding of the material.
4. Participate in clinical rotations or observe psychiatrists at Family Health Centers affiliated with NYU Langone Hospital – Brooklyn or other NYU-sponsored clinics. This hands-on experience will give you insight into the practice of psychiatry while expanding your knowledge.
5. Attend psychiatry-related webinars, conferences, and workshops offered by NYU Grossman School of Medicine, other medical schools, or professional associations. These opportunities will provide updates on the latest advances in the field, as well as the chance to network with professionals and fellow students with similar interests.

ChatGPT may produce inaccurate information about people, places, or facts

Save these suggestions as a note

Generate different suggestions

Rate this suggestion:  

Create a
and adva
-Weekly
-Become
-Read C

mentals

the this goal

An AI summary of these abstracts: The first abstract presents a systematic review on the clinical presentation and outcomes of patients suffering from hypercalcemia of malignancy presenting with acute pancreatitis (AP). Hypercalcemia of malignancy is found to be a relatively rare but serious condition with a mortality rate of 32.4%. Intravenous hydration and bisphosphonates or calcitonin/calcitonin analogues are common treatments, and the degree of hypercalcemia doesn't appear to influence mortality. The second abstract emphasizes the role of antibiotic stewardship (AMS) in the context of medical antibiotic prophylaxis (AP). It identifies several areas where AMS interventions could be beneficial, such as reducing unnecessary AP usage, controlling spectrum and duration of AP usage, and focusing on antibiotic-sparing strategies. The review also highlights the need for further research on suitable indications or antibiotic regimens for medical prophylaxis.

Key points:

- Hypercalcemia of malignancy presenting with acute pancreatitis is rare, with the most common malignancies being parathyroid carcinoma and multiple myeloma.
- Mortality rate in such cases is high, at 32.4%, though the degree of hypercalcemia does not appear to influence this figure.
- The role of AMS in medical antibiotic prophylaxis is currently under-recognized and holds potential for significant improvements.
- AMS interventions could target areas such as reduction of unnecessary and over-expansive AP usage, and implementation of antibiotic-sparing strategies.
- There exists a need to address research gaps on the appropriate indications or antibiotic regimens for medical prophylaxis.

Identified gaps in scientific knowledge include a lack of a defined correlation between the degree of hypercalcemia and mortality rate in malignancy cases, and the need for additional research on appropriate indications and antibiotic regimens for medical prophylaxis.

ChatGPT may produce inaccurate information about people, places, or facts. Do not rely on the responses from this system without doing your own independent research.

Rate this AI-generated summary:  

DxMentor uses Epic Data to tailor suggested educational nudges for our medical students

- Students and cases determined by authorship of H&P or Progress notes
- Students emailed each morning at 8:30 with AI-generated nudges for their new cases
- Students have access to all prior cases and recommendations (patient log).
- DxMentor has a reading list, history of viewed resources, and an overview of diagnoses seen
- Lots of interest but adoption remains low

Summarizing Evaluation Comments

Select "UME", "GME", or "COMBINED" to see an AI-Generated Summary



UME	GME	COMBINED
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These summaries are AI generated and may contain errors. Please review carefully with the context of the raw comments below and edit appropriately

AI Generated Summary based on 30 comments

[Export to Excel \(select 'Summary'\)](#)

Overall, Dr. [redacted] emerges as a highly valued educator and physician, known for his use of a Socratic teaching style, engagement of trainees in discussions, and fostering an environment for in-depth learning. His strengths lie in his effective method of bedside teaching, ability to strike a balance between presentations and physical exams, and his approach toward patient care. Reports from trainees imply that Dr. [redacted] allows autonomy whilst guiding and supervising, a method that promotes active learning. The application of evidence-based medicine is also lauded, with trainees benefiting from Dr. [redacted] sending articles related to their patient cases. Furthermore, he is appreciated for establishing a thoughtful and non-intimidating learning culture that enhances clinical reasoning and practical skills.

In addition to his teaching strengths, Dr. [redacted] inspires trainees through his infectious deep curiosity about internal medicine. He creates an environment where trainees feel safe to grow and learn and feel valued as team members. Feedback from trainees indicates he is accessible and easy to work with, proficient at bedside rounds, and swiftly gives real-time feedback, leading to improved learning outcomes. Ultimately, his teaching model has profound impacts on the trainees' learning experience, engagement, and medical career growth.

Key Strengths:

1. Effective use of the Socratic method during teaching sessions.
2. Fosters a conducive and low-stress learning environment, allowing the trainees to make independent decisions whilst providing guided supervision.
3. Highly efficient in integrating patient care, bedside teaching, and relevant discussions into learning sessions.
4. Encourages and facilitates the use of evidence-based medicine by sharing relevant readings/articles related to patient cases.
5. Provides constructive real-time feedback and helps trainees enhance their physical examination and clinical reasoning skills.

Given the positive comments, there was no specific mention of areas needing improvement for Dr. [redacted] teaching performance.

Unique Challenges of GenAI in Medicine and Med Ed

- **The need for a human in the loop.** The increasing need to verify whether generated content is based on fact or inference elevates the need for a new level of quality control.
- **Explainability.** A lack of transparency into the origins of generated content and traceability of root data could make it difficult to update models and scan them for potential errors and biases.
- **Training for the future.** We need to teach our students, residents, and graduate students now so they are prepared for the changed future awaiting them.
- **Evidence of effectiveness:** Few studies or RCTs to date of these technologies
- **Scale:** Generative AI services are costly and difficult to scale, though this is improving rapidly

Healthcare is an optimal place for AI transformation

- AI can tackle the data overload facing physicians, students, and trainees
- AI can help us with many free-text tasks, will be a new member of the health care team - part scribe, part co-pilot
- AI will enable precision in everything medicine: clinical care, education, and research
- Scalable and relatively affordable
- Ultimately, AI will free up physicians for more patient interaction and higher order activities



Thank you

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NYU Langone Health



Mission driven approach to use of artificial intelligence in medical education



Stephanie Mann MD, MS HPEd

Senior Associate Dean for Academic Affairs

Methodist University Cape Fear Valley Health School of Medicine

Disclosure

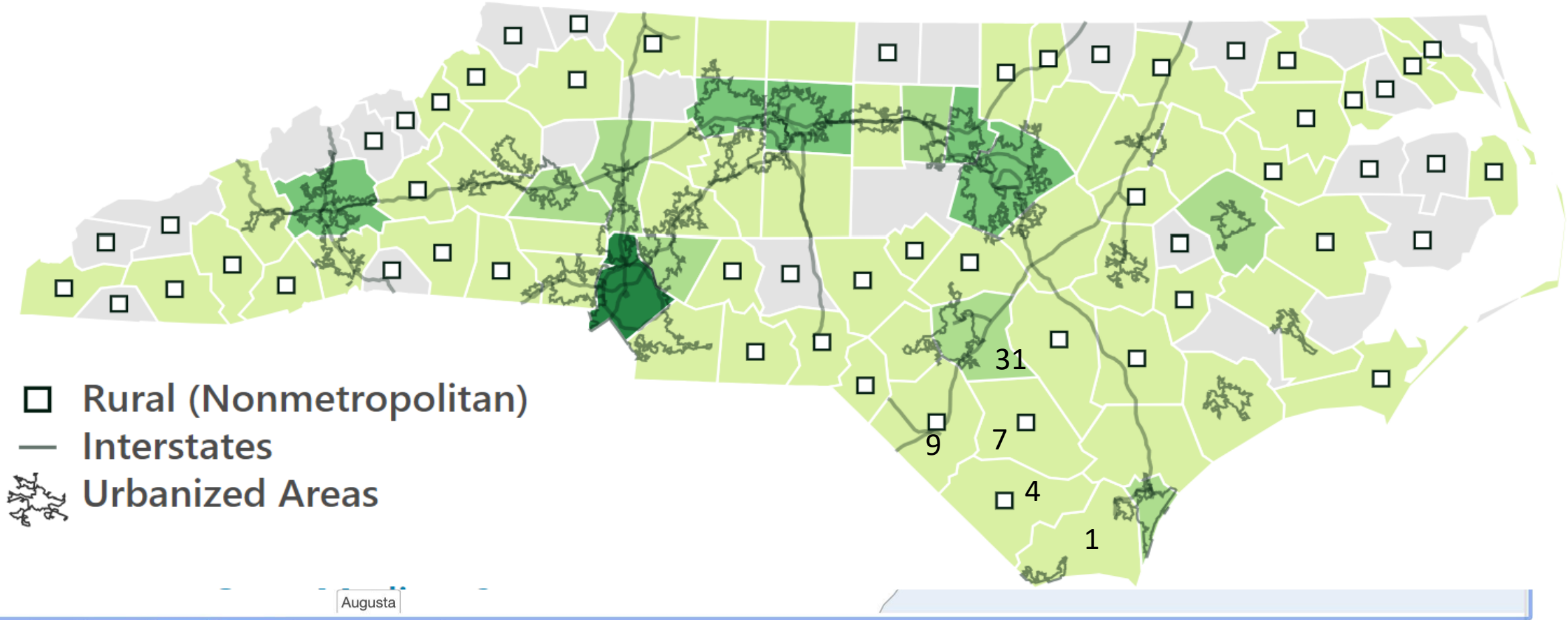
- AI will enhance our students' capacity not only for knowledge acquisition, curation, and application but also for maintaining and enhancing their humanity...

Methodist University Cape Fear Valley Health School of Medicine



- Mission based on social accountability.
- Development of our UME program is based on ensuring our education, research, service activities address the priority health concerns of our community.

Total Number of Physicians with a Primary Area of Practice of Obstetrics & Gynecology, General by County, North Carolina, 2022

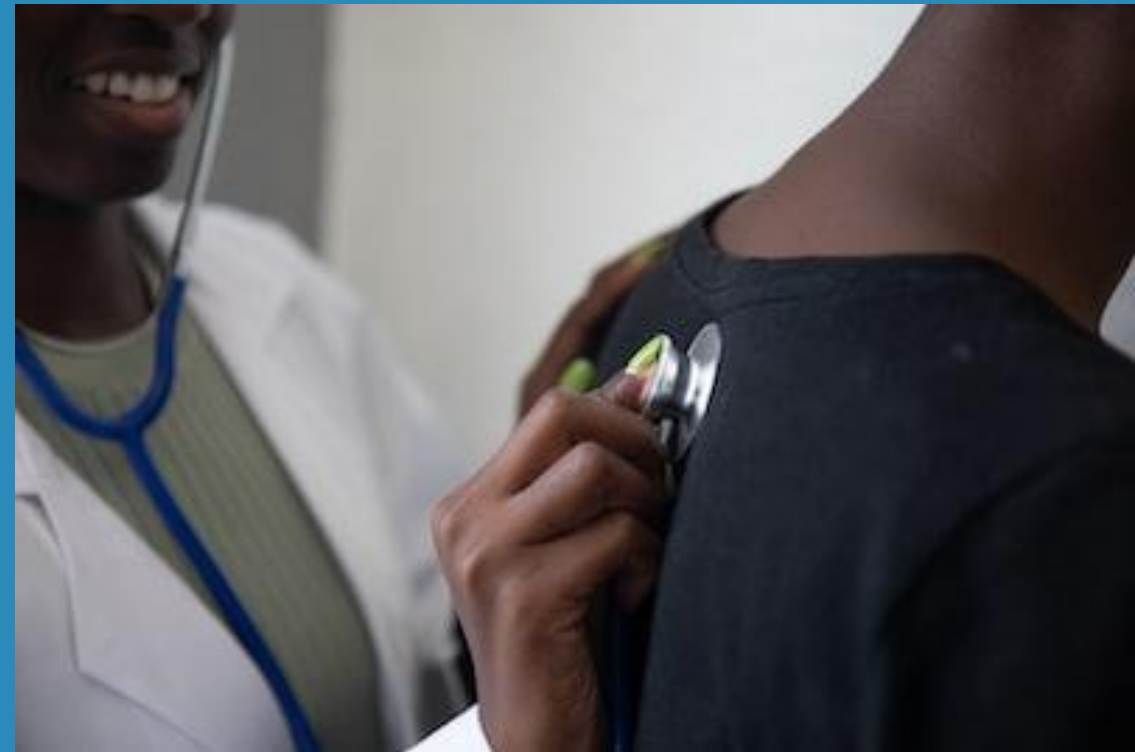


RANK 1 - 25 26 - 50 51 - 75 76 - 100 NOT RANKED (NR)

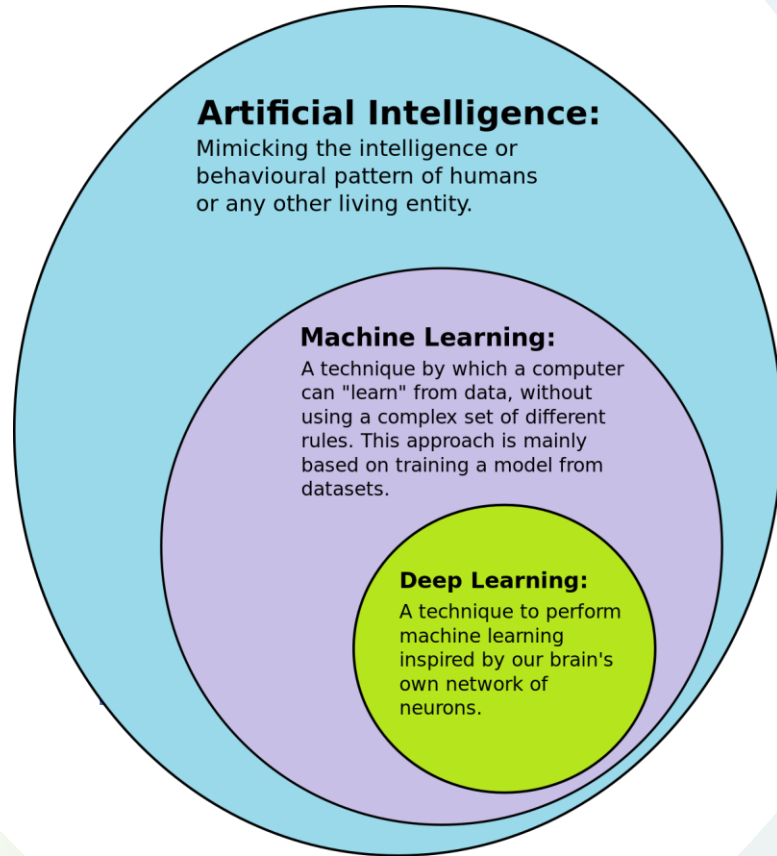
Mission-Aligned Medical Education

Prepare our graduates to be ***socially accountable, community-engaged, evidence-based, compassionate, equity-focused physician leaders*** who will contribute to mitigating health disparities and improving health outcomes in southeastern NC or wherever they may practice.

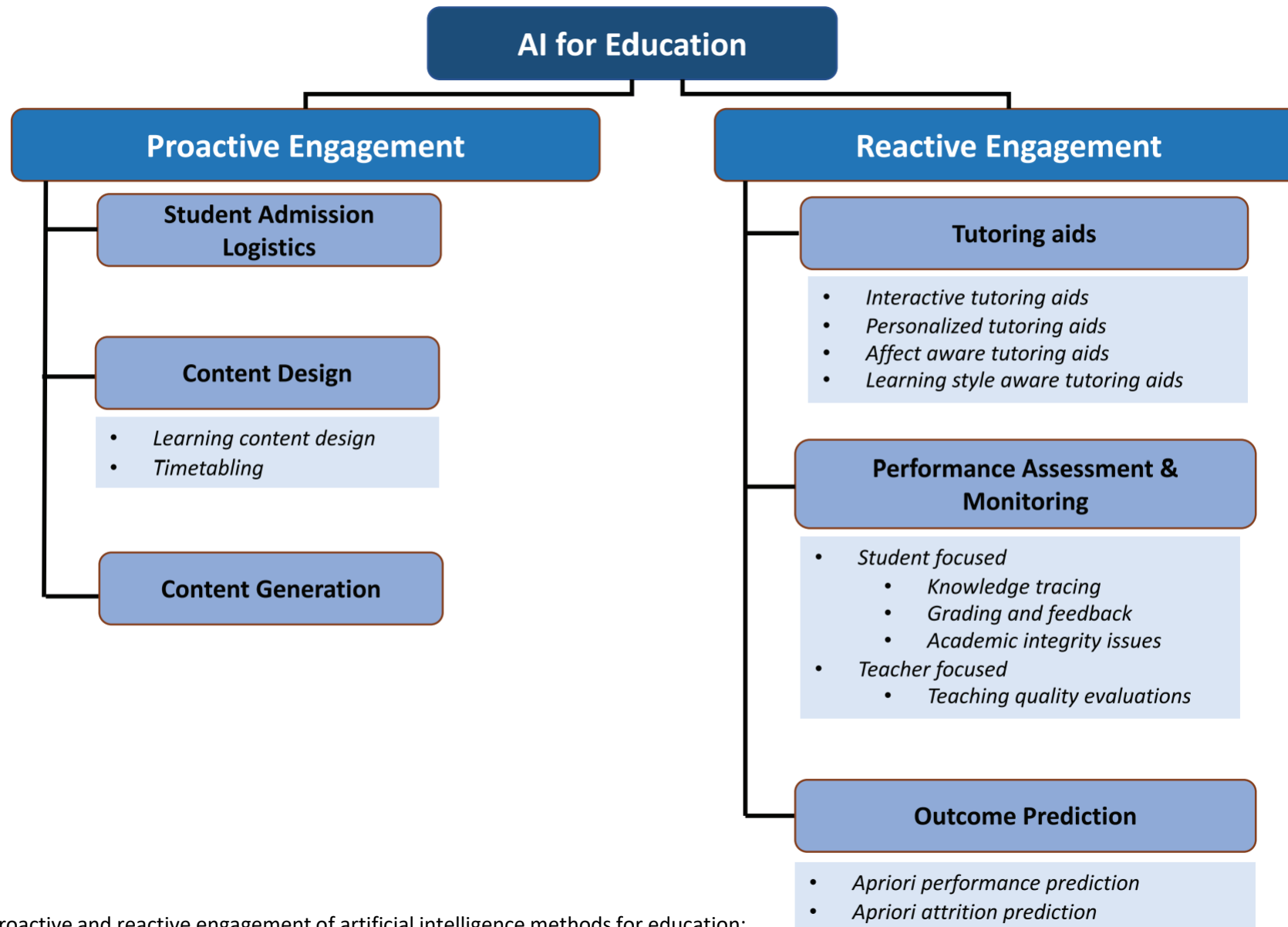
- **Mission Statement Integration**: Embed the core values of social accountability, community engagement, evidence-based practice, compassion, and equity into every aspect of the UME program, ensuring graduates are prepared to mitigate health disparities.
- **Admissions with a Purpose**: Select candidates who demonstrate a commitment to the mission's core values, ensuring a student body capable of advancing health outcomes in southeastern NC and beyond.
- **Curriculum That Matters**: Design curriculum content and assessments that reflect the mission's emphasis on social accountability and equity, providing the knowledge and skills to practice compassionate, evidence-based medicine.



Planning considerations



- Determine needed human and financial resources.
- AI is a resource to support the work of humans.
- Institutional policies
- Understand ethical concerns, bias
- Plan forward – our first class graduates in 2030
- What aspects of our mission will AI support?
- Constituent buy-in to include a “digital citizenship” thread in our curriculum.
- Acknowledge limitations



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Can AI help identify students whose background aligns with a UME mission?

From: [Designing and evaluating a big data analytics approach for predicting students' success factors](#)

Early prediction of undergraduate Student's academic performance in completely online learning: a 5-year study [15]	Proposed a collection of AI models to predict student academic progress from LMS interaction data and student academic data like GPA and enrolment test data. The data consists of LMS log files, demographics, and academic achievement. No research methodology is identified
Predicting Students' Academic Performance Through Supervised Machine Learning [61]	Developed an AI based system to predict student performance from their demographical and LMS interaction data. The dataset comprises of demographical characteristics and LMS interaction data including gender, country, birthplace, view of the LMS content, quiz attempts, and assessment submissions. The nature of the dataset does not allow early prediction. The research methodology is not clear
Predicting Students' Academic Procrastination in Blended Learning Course Using Homework Submission Data [62]	Develop an algorithm to enhance students' academic progress by detecting struggling students through their homework submission behaviours e.g., no submission or late submission. The nature of the dataset does not allow enough time to offer timely interventions and support to enhance student academic performance. No research methodology is identified to construct the predictive model e.g., DSR or DBR
An Efficient Approach for Multiclass Student Performance Prediction based upon Machine Learning [52]	Predicted the students' performance by using four classification algorithms The same dataset is used in other studies as well but with different ML classifiers [63, 64]. The study used secondary school students, not HE and did not use of LMS data Used socio-economic attributes of students which do not allow timely identification of the at-risk student. The research approach is not based on the similarities of DSR and DBR principles
Design, development, and evaluation of a mobile learning application for computing education [65]	Applied DSR approach to developing mobile learning application for HE for better student learning. The research approach is only based on the DSR approach and not on DBR principles or similarities between DSR and DBR. No AI (DL or ML) models are used to predict student academic performance
Predicting Student Performance in Higher Educational Institutions Using Video Learning Analytics and Data Mining Techniques [66]	Created a model to predict student overall performance at the end of the semester by analysing student academic information and video interactions data. The model is trained and tested using was tested with eight classification algorithms. The research approach used is quantitative prediction methodology which is not based on the similarities of DSR and DBR principles. The study mentioned early stages, but it does not state a definitive timeframe within the semester to show whether there is enough time to offer support to enhance student performance

AI and curriculum development



Reactive

Tools that respond to specific inputs or situations without learning from past experiences (e.g. Alexa, Roomba, chess-playing computer).



Predictive

Tools that analyze historical data and experiences to predict future events or behaviors (e.g. Netflix, credit-scoring systems).

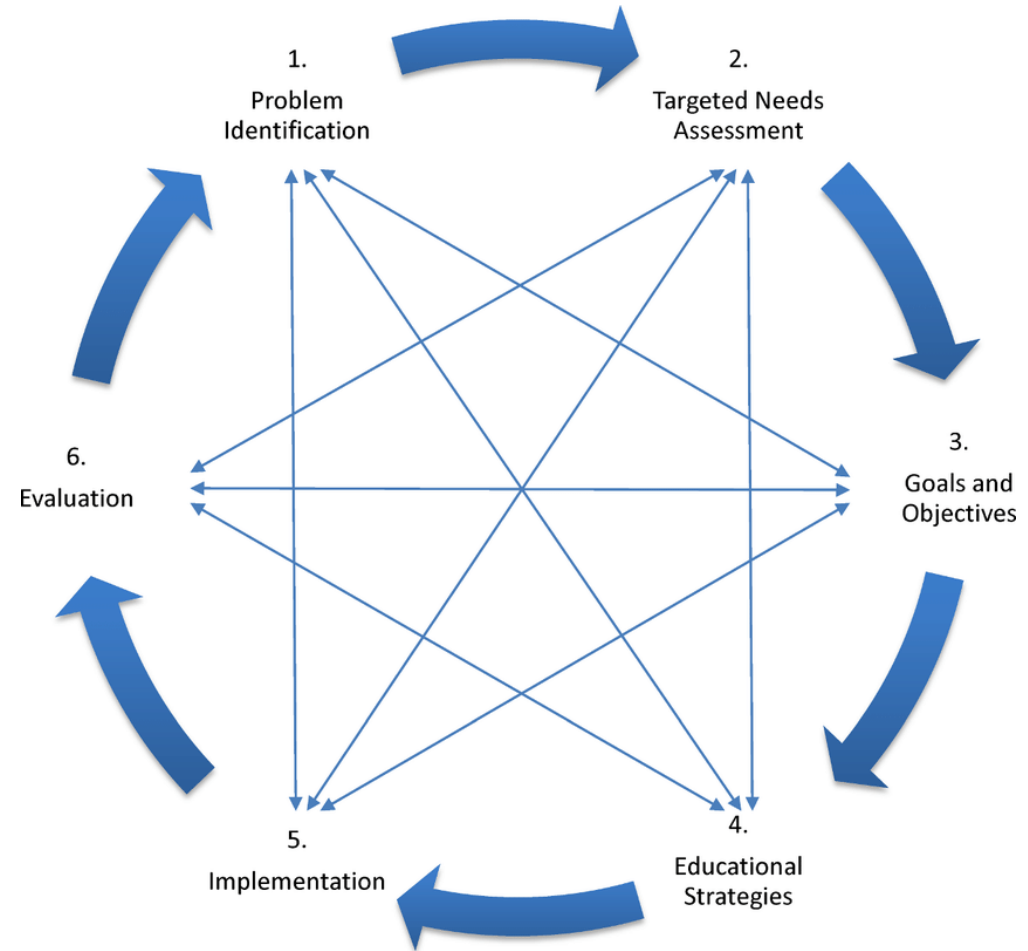
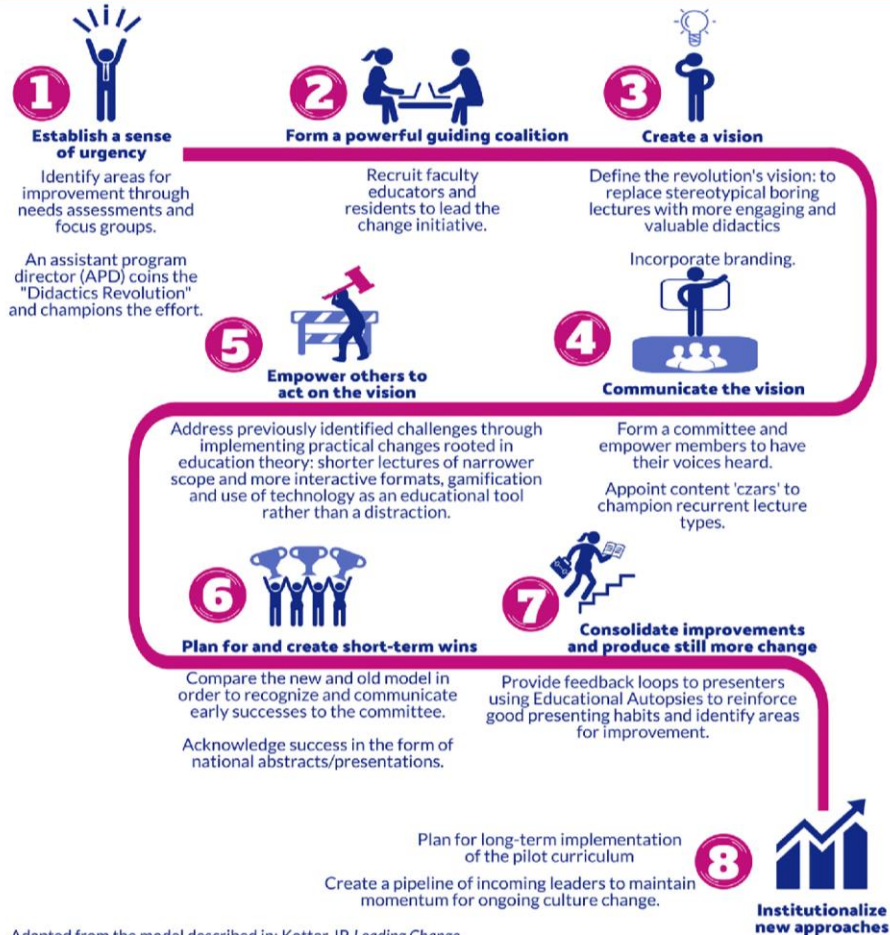


Generative

Tools that generate new content or outputs, often creating something novel from learned patterns (e.g. ChatGPT, Stable Diffusion).

First step: Kotter and Kern

The Kotter 8-step change management model was originally designed to help leaders execute change in the corporate world. This innovation improved residency didactics by applying Kotter's model to curricular change.



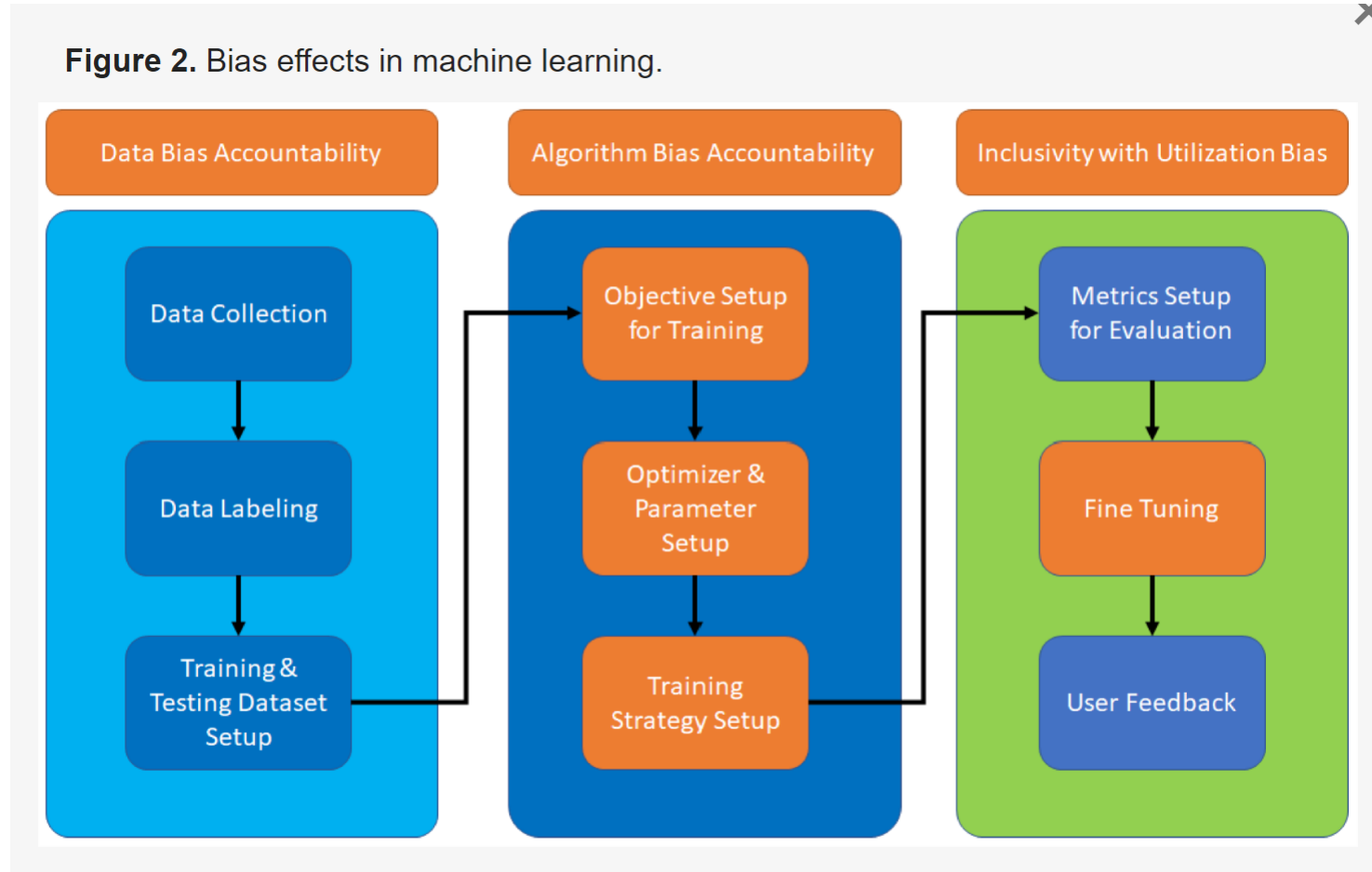
Adapted from the model described in: Kotter JP. *Leading Change*. Boston, MA: Harvard Business Review Press, 1996

Considerations for curriculum development

Early introduction and integration

AI curriculum objectives	Studies	Subthemes
Working with and managing AI systems	8-11,17-24,26-34	Foundational statistical concepts critical to understanding AI tools <ul style="list-style-type: none"> Foster students understanding of foundational statistical and medical informatic concepts—data aggregation, analysis, and personalization.^{9,10,19,23,24,26,28,31,34}
		Foundational statistical concepts critical to understanding AI tools <ul style="list-style-type: none"> Foster students understanding of foundational statistical and medical informatic concepts—data aggregation, analysis, and personalization.^{9,10,19,23,24,26,28,31,34}
		AI fundamentals needed to understand and use AI tools <ul style="list-style-type: none"> Foster students' understanding of AI fundamentals^{11,19,23,32-34} including machine learning; natural language processing; and basic pipeline of data acquisition, cleaning, analysis, and visualization. Familiarize students with varied AI approaches to data, e.g., understanding the distinction between prediction and causal inference approaches.²⁷ Foster students' ability to understand and use AI predictive and diagnostic algorithms, modeling techniques, and relational-time pattern analysis.^{18-21,33} Familiarize students with future AI tools and approaches^{17,19,22} such as AI robotics (for surgery); precision medicine; and evidence-based, AI-generated therapeutic algorithms.
		AI applications, benefits, and risks needed to use AI appropriately <ul style="list-style-type: none"> Familiarize students with clinical applications of AI in clinical practice.^{9,10,18,19,22,23,27-29} Familiarize students with factors that affect AI accuracy, e.g., sources of error and bias, the impact of data selection, the "garbage in-garbage out" phenomenon.^{18,21,27,30,34} Foster students' understanding of the strengths and weaknesses of different AI systems. Help students appreciate when, what, how, why, and to what extent AI tools should be used in clinical practice.^{8,11}
		Operating AI systems <ul style="list-style-type: none"> Help students learn how to inform and communicate with AI to receive meaningful results^{19,22,27,33} and to engage in appropriate handoffs with AI tools,²⁰ e.g., how to use data mining tools, how to engage in verbal and written communication with AI, the role of voice input.
		Impact of AI on clinical reasoning <ul style="list-style-type: none"> Familiarize students with the impact of AI on disease prediction, risk stratification, and management.^{11,20} Foster students' ability to understand, interpret, and apply results of AI tools in clinical practice.²⁷ Help students integrate AI decision support tools in clinical reasoning.²¹ Foster student's ability to engage in data-driven decision making by cultivating student's understanding of 4 Vs of big data: volume, variety, velocity, and veracity.^{10,22,24}
Ethical and legal implications of AI systems	11,18,19,23,27,28,30,31,33,34	Communicating AI results to patients <ul style="list-style-type: none"> Foster student's ability to meaningfully communicate AI results (often probabilities).^{8,9,28,29,34} Cultivate students' understanding of patients' decision-making process, including psychology of choice and heuristics.^{8,9}
		Ethical and legal implications of AI tools in clinical practice <ul style="list-style-type: none"> Consider applying medical informatic ethics to medical AI ethics as guiding principles.¹⁹ Provide frameworks to approach AI ethics at clinical and systems levels.^{27,28} Familiarize students with clinically relevant AI ethical and legal issues such as liability, data privacy, and control.^{11,18,19,23,27,28,30,31,33,34}

Our goal: equity focused approach to assessment



Our goal: equity focused approach to assessment

- AI can process large data sets – quantitative and qualitative.
- Identify patterns in answers – detect bias.
- Can AI assist in the development of measuring tools and equity focused assessments?
 - Generate high quality test items?
 - Chat GPT can give formative feedback.
 - Identify at risk students without bias?
 - Generative AI can help detect assessment bias.
 - Challenges remain with respect to the data used to train the LLMs.
- Program evaluation
 - Minimize attrition, optimize student success
 - Mission focused outcomes, e.g., specialty choice

Ethical issues “checklist”

Ethical Issue	Question Example	√
Privacy	Does the use of the technology raise concerns that people's privacy might be at risk or endangered?	
Personal Data	Does the technology or its use presume a particular group or person “own” the data? If so, who?	
Security	Does the technology use personally-identifying data? If so, is this data stored and treated securely?	
Loss of employment	Does the use of the technology put people's jobs at risk, either directly or indirectly?	
Autonomy/agency	Does the use of the technology impact in any way on people's freedom to choose how to live their lives?	
Discrimination	Can/does the technology or its use lead to discriminating behaviour in any way? Does the technology draw on data sets that are representative of those stakeholders affected by the technology?	
Trust	Does the technology impact people's trust in organisations, other people, or the technology itself?	
Power asymmetries	Can or does the technology exacerbate existing power asymmetries by, for instance, giving a large amount of power to those already holding power over other people?	
Inequality	Can or does the technology reduce inequalities in society or exacerbate them?	
Fairness	Is the technology fair in the way in which it treats those affected by it? Are there unfair practices which arise in relation to the technology?	
Justice	Does the technology or its use raise a feeling of injustice on the part of one or more groups affected?	
Freedom	Does the technology or its use raise questions regarding freedom of speech, censorship, or freedom of assembly?	
Sustainability	Is the technology or its use sustainable, or does it draw on limited natural resources in some way?	

Digital citizenship – foundation for AI competencies?



Join the #DigCitCommit movement



Digital citizenship is critical for today's students and tomorrow's leaders. That's why a coalition of like-minded organizations are redefining digital citizenship and shifting the conversation from don'ts to do's.

As we redefine digital citizenship, we're highlighting five key competencies:



Inclusive: Open to hearing and respectfully recognizing multiple viewpoints, and engaging with others online with respect and empathy.



Informed: Evaluate the accuracy, perspective and validity of digital media and social posts.



Engaged: Use technology and digital channels for civic engagement, to solve problems and be a force for good in both physical and virtual communities.



Balanced: Make informed decisions about how to prioritize time and activities online and off.



Alert: Aware of online actions, and know how to be safe and create safe spaces for others online.

Join the movement today! Make your commitment at digcitcommit.org and help share the five DigCitCommit competencies with educators, students and parents.

Get involved in these ways:

- Register for the DigCitCommit Virtual Congress, Feb. 11-12, 2020, where you can engage with educators and students who are successfully modeling the competencies and hear how their experiences are empowering learners to lead in the digital world! Learn more at digcitcommit.org/events
- Share and use the resources that are aligned with the five competencies in your classroom or school. Find them at digcitcommit.org/resources
- Find tools and inspiration from peers - Follow @digcitcommit on Twitter and engage using #digcitcommit
- Learn more about who's involved in this initiative at digcitcommit.org/partners



Cautious optimism – mindful AI mission based implementation*

- AI will transform medical education, offering customized and engaging learning through AI tutors and mentors.
- AI will provide varied educational content and assessments, accessible across devices but needs to be developed with a mindful approach to bias and unintended consequences.
- AI will aid in curriculum development and tracking student progress.
- Despite making education more inclusive, disparities in AI access and associated costs will persist.
- Concerns will exist about AI standardizing education at the expense of critical thinking, creativity, and social skills.

*Identify barriers, address legal, ethical, regulatory issues, mitigate/eliminate bias