Preparing students for the AI era: integrating fundamental AI tools and skills into academic education curricula.

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AI in Education Map

real | idea

Teacher Practice Support

- Lesson generation
- Instruction coaching — after class coach, real-time coach, align with teaching framework
- Teaching advisor
- Classroom management simulator
- Competency-based teaching
- Tracking student project work (PBL)
- Analysis of student data
- Background knowledge refresh — anticipate questions
- Admin support to free teacher time
- Incorporating researched-based practice
- Family connections *(new)*
- Team teach with AI *(new)*
- Para practitioners *(new)*

Classroom Material

- Activity-specific content — role play, debates, flip, etc.
- Explanations — at student reading level, interest-based, student-made eg. TikTok
- video / animation
- poem /song /story
- Student questions generation — interest-specific, classroom response, from video
- ESL student content *(new)*
- Active learning embeds
- Focus on big ideas
- Focus on transfer
- Worked examples
- Flashcard generation
- Culturally responsive content *(new)*
- Vocabulary / glossary
- Quiz questions
- Graphic organizers
- Just-in-time skill builder
- Extended learning
- Connecting new content to old
- Less-cheatable questions

Evaluation + Feedback

- Holistic assessment (based on longitudinal student work)
- Feedback on student work — self explanation, peer and self, math thinking, iterate, writing
- Identification of student thinking
- Competency-based feedback (eg, collab, critical thinking)
- Tracking student progress — send teacher report
- Rubric generation with model answers

Social Tools

- Small group facilitation
- Discourse support tool for student groups
- Facilitated student discussion board
- Facilitating whole class discussion
- Interest-based networks *(new)*

Student Support

- 24/7 Tutor — step by step, testprep, immersion, language, writing, math, coding
- Early reading coach *(new)*
- Curiosity coach *(new)*
- Teachable agents — socratic questioner, games
- Support for students with special needs — question a document
- Mental health support
- College / career advisor
- Smart student portfolio *(new)*
- Meta-cognitive support *(new)*

Demystification of AI

What is AI?
AI stands for Artificial Intelligence. It involves **creating systems capable of performing tasks that typically require human intelligence. - so the question is who design them, how and why?**

Types of Intelligence:
Natural Intelligence: Human and animal cognition.
Artificial Intelligence: Machine-based reasoning and problem-solving. *(Human is still perfect semantic machine, Floridi)*

No AI without Data:
Data is the foundation of AI. AI systems learn from vast amounts of data to make predictions and decisions. - **so the question is in data and how we cuddle with them**

Interdisciplinary Nature of AI:
Computer Science: Develops the algorithms and code.
Statistics: Provides the methods for data analysis.
Mathematics: Underpins the theoretical foundation.

Herbert Simon, a pioneer in AI, wanted to call it "mathematical reasoning."

Small problems vs Wicked Problems

Small Problem (Plant Genetics): AI identifies drought-resistant genes in crops.

- Well-defined with clear, specific solutions.
- **Plant Genetics**: Using machine learning algorithms to identify genetic markers for crop improvement. , AI helps analyze large datasets efficiently to enhance breeding programs and increase crop yields.
- **AI's Strength: -** AI excels at repetitive, data-intensive tasks, providing precise and reliable results.

Wicked Problem (Farmers' Protests): AI provides data on crop yields and economic impact, but policy decisions require human consensus and negotiation.

- Complex, multifaceted, and often lacking a clear solution.
- **Farmers' Protests around the EU**: Issues like agricultural policies, economic disparities, and environmental concerns. , These involve multiple stakeholders with conflicting interests, making it difficult to find a single, satisfactory solution.
- **AI's Limitations: A**I can assist in analyzing data and providing insights, but it cannot resolve the underlying socio-political and economic complexities., Requires human judgment, negotiation, and policy-making.

Tools, Technology and Solutions

AI Tools: *Useful but often limited by their generic design. Vs* **Effective Solutions:** *Require adaptable, transparent, and integrated AI technologies.*

Custom Development: Essential for aligning AI capabilities with specific needs and ensuring comprehensive problem-solving

AI Tools vs. Solutions:

AI Tools: Commercially available AI tools are components, not complete answers.

Solutions: Solutions address complex, dynamic problems and are designed using a combination of technologies.

Complexity and Dynamics: Solutions need to adapt to evolving challenges.

Integration of Technologies: Effective solutions leverage multiple tools and technologies to address various aspects of the problem.

Challenges with Commercial AI Tools:

Lack of Transparency: *Commercial AI tools often function as "black boxes."*

Customization Limits: *These tools may not be easily adaptable to specific needs or integrated with existing systems.*

Where science and technology and business meet

Holistic Education: Combining science, technology, and business to prepare students for the AI era.

Practical Experience: Real-world problem-solving skills.

Ethical Awareness: Responsible AI development.

Innovation Focus: Entrepreneurial mindset.

Continuous Growth: Lifelong learning and adaptability.

Biodigital Convergence: Bridging Life Sciences, Biotechnology, and Information Sciences