Impact of Artificial Intelligence in Higher Education

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UNIVERSIDAD DE GRANADA

Contents

1. Artificial Intelligence and Education: Initial positioning: academic panic

- "*Artificial intelligence (AI) panic is spreading across the education sector*". This new wave may be one of the biggest and fastest transformations ever to affect the academic world

- There have been other big changes (web, Wikipedia, intelligent search engines, ...) but they have not been appreciated as quickly. **AI "democratization"**

PEOPLE

Prof Mike Sharples

Emeritus Professor

Email me

iet
Institute of Educational Technology

"Students will use AI to write their essays/practice works. Teachers will use it to correct/assess them" → **Nobody learns, nobody wins...** →

Need to rethink assessment

DIGITAL LEARNING

Why All Our Classes Suddenly Became AI Classes

Strategies for Teaching and Learning in a ChatGPT World

by Ethan Mollick and Lilach Mollick

February 9, 2023

Harvard Business Publishing Education

Mairéad Pratschke, PhD

Professor and Chair in Digital Education

Manchester, England, United Kingdom

"*After COVID, many lecturers want to take a step back ("back to normal") but the disruption of AI will not allow it*"

Artificial Intelligence and the Academy's Loss of Purpose

Picciano, Anthony G.

Online Learning, v23 n3 p270-284 Sep 2019

Online Learning
OLJ • THE OFFICIAL JOURNAL OF OLC

This article speculates on the future of higher education as online technology, specifically adaptive learning and analytics as infused by artificial intelligence software, develops and matures. Online and adaptive learning have already advanced within the academy, but the most significant changes are yet to come. These evolving technologies have the potential to change the traditional roles in our colleges and universities to the point that many educators will reconsider their purposes as teachers, researchers and administrators.

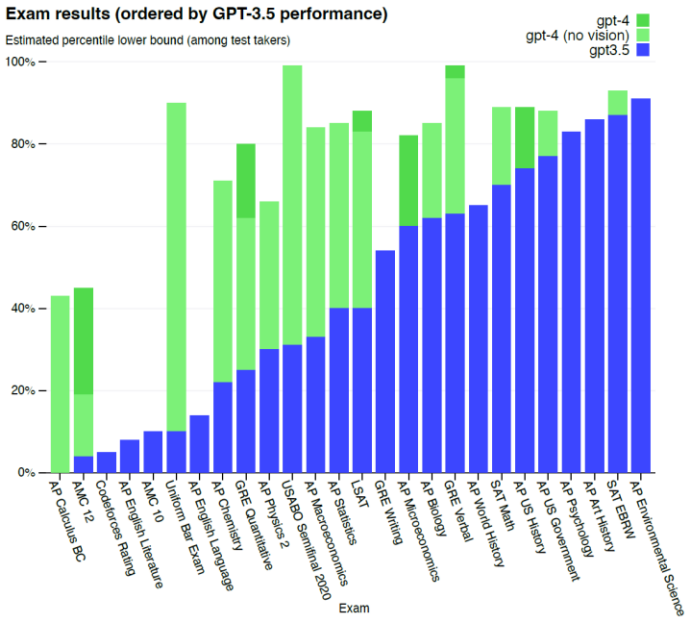
1. Artificial Intelligence and Education: Initial positioning: GPT boom

- **It is not all ChatGPT**. AI has been applied to education for decades, usually from a machine learning (learning analytics) perspective.
- **Two years ago**: Either it's COVID or it's something else → Either it's ChatGPT or it's something else
- **Very rapid recognition** among students and **teachers**: ***Tik Tok effect***
- GPT-4 was released on 14/03/2023 with greatly improved capabilities over GPT-3.5
- Academics claimed to be able to distinguish between real work and plagiarism, now they can't...

Peter Norvig (He/Him) · 2nd
Education Fellow at Stanford / Researcher at Google

"Are LLMs safe for students? No, can't expose directly!! (Jan 2023) → Yes, we can use LLMs (March 2023)"

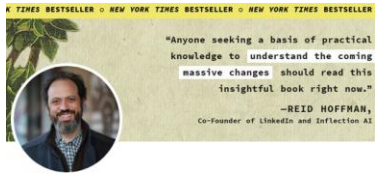
- Huge improvement in the grades obtained in the standard exams to enter Business Schools, MBAs, etc. in the USA



https://openai.com/research/gpt-4
https://arxiv.org/abs/2303.08774

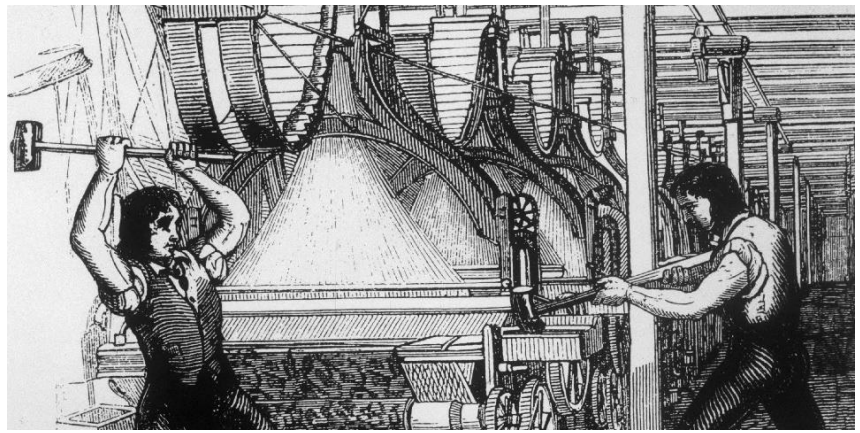
1. Artificial Intelligence and Education: Resistance to innovation vs. innovation

The reaction against generative AI (to prosecute and prohibit its use) is the same as it was with the first industrial revolution: breaking the production machine ("the hammers")



Ethan Mollick · 2nd
Associate Professor at The Wharton School. Author of Co-Intelligence

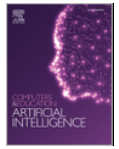
"***AI detection in school is a losing game***": AI detectors have a high false positive rate and teachers' intuition seems to work even worse → frustration and legal issues



On a late January night in 1812, a mob hell-bent on violence stormed through the door of George Ball's textile workshop on the outskirts of Nottingham, England. With handkerchiefs tied around their faces, the men slammed their targets with sledgehammers and fled, leaving behind five shattered knitting machines.

Computers and Education: Artificial Intelligence

Volume 6, June 2024, 100209



Do teachers spot AI? Evaluating the detectability of AI-generated texts among student essays

Johanna Fleckenstein [a,b,*], Jennifer Meyer [b], Thorben Jansen [b], Stefan D. Keller [c], Olaf Köller [b], Jens Möller [d]

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[b] Leibniz Institute for Science and Mathematics Education, Kiel, Germany
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ARTICLE INFO

Keywords:
Generative AI
Writing assessment
Teachers
Essay writing
ChatGPT

ABSTRACT

The potential application of generative artificial intelligence (AI) in schools and universities poses great challenges, especially for the assessment of students' texts. Previous research has shown that people generally have difficulty distinguishing AI-generated from human-written texts; however, the ability of teachers to identify an AI-generated text among student essays has not yet been investigated. Here we show in two experimental studies that novice ($N = 89$) and experienced teachers ($N = 200$) could not identify texts generated by ChatGPT among student-written texts. However, there are some indications that more experienced teachers made more differentiated and more accurate judgments. Furthermore, both groups were overconfident in their judgments. Effects of real and assumed source on quality assessment were heterogeneous. Our findings demonstrate that with relatively little prompting, current AI can generate texts that are not detectable for teachers, which poses a challenge to schools and universities in grading student essays. Our study provides empirical evidence for the current debate regarding exam strategies in schools and universities in light of the latest technological developments.

https://www.sciencedirect.com/science/article/pii/S2666920X24000109

Possibilities of innovation with AI in the area:

1. **New solutions for old problems in education**
2. Time reduction in more routine tasks (minor corrections, test preparation, ...) to devote more time to the student, create new knowledge, face more complex pedagogical tasks
3. *BYOM: Bring your own motivation*. *Peter Norvig, Stanford*: Increasing student motivation for learning

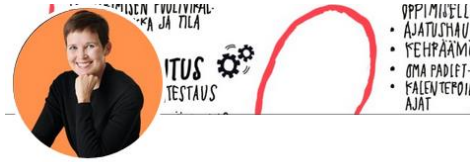
1. Artificial Intelligence and Education: Opportunities and risks

- **New opportunity to solve old and new challenges in Education (Education 4.0)**. **Personalized learning** models based on AI:
  - **Active learning**: More active role of the student by knowing her evolution and optimizing learning
  - Identification of students requiring more support (AI systems for **monitoring**)
  - Assessment and identification of high proficiency (**predictive AI models**)
  - Treatment of students with functional diversity (**learning analytics**, **adaptive AI-based systems**)
  - New **tutoring** models (**intelligent tutoring systems**, **chatbots/virtual assistants**)
  - **Recommendation** and feedback systems
  - Prediction of early failure and detection of anomalous students (**machine learning systems** and **competency assessment**)

RISKS: Digital competencies of teachers. Ethical treatment of data

2. AI Applications in Higher Education: What can AI really be used for in Higher Education?

Merja Alanko-Turunen (Haaga-Helia UAS, Finland), Ulysseus European University:



Merja Alanko-Turunen · 3rd
Change Midwife | Learning Designer | Graphic Facilitator| Principal Lecturer
Helsinki, Uusimaa, Finland · Contact info

Segmentation of AI applications in education in 4 areas:

1. Profiling and predictions (e.g. admissions, course planning, dropout, ...)
2. Intelligent tutoring systems (e.g. teaching course content, curating learning materials, evaluation of student understanding, ...)
3. Assessment and evaluation (e.g. automatic grading, feedback, evaluation of student understanding, ...)
4. Adaptive systems and personalization (e.g. teaching course content, supporting teachers and learning design, ...)

https://ulysseus.eu/es/events/webinar-ai-in-education/

Systematic review of research on artificial intelligence applications in higher education – where are the educators?

Olaf Zawacki-Richter, Victoria I. Marín, Melissa Bond and Franziska Gouverneur

International Journal of Educational Technology in Higher Education

Zawacki-Richter *et al. International Journal of Educational Technology in Higher Education* (2019) 16:39
https://doi.org/10.1186/s41239-019-0171-0

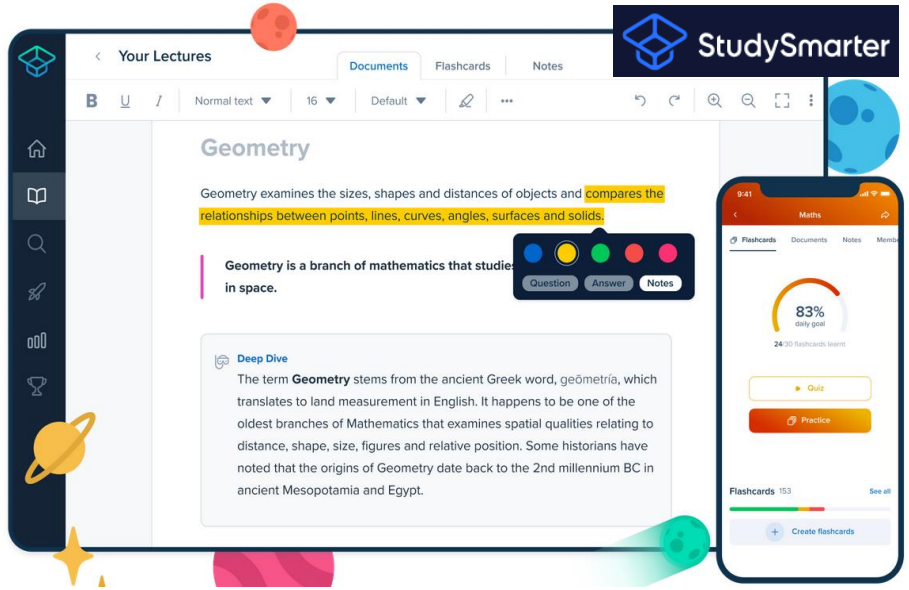
2. AI Applications in Higher Education: Different AI tools for education (1)

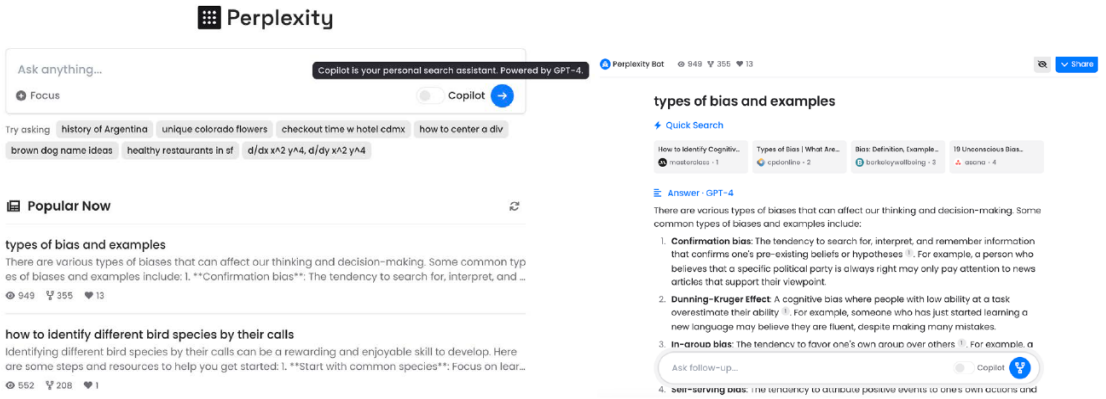
- *Everything up*: There are many things you can do with GPT4 and many extensions. The message is not to look for plagiarism detectors, but for opportunities: ***Copilot***

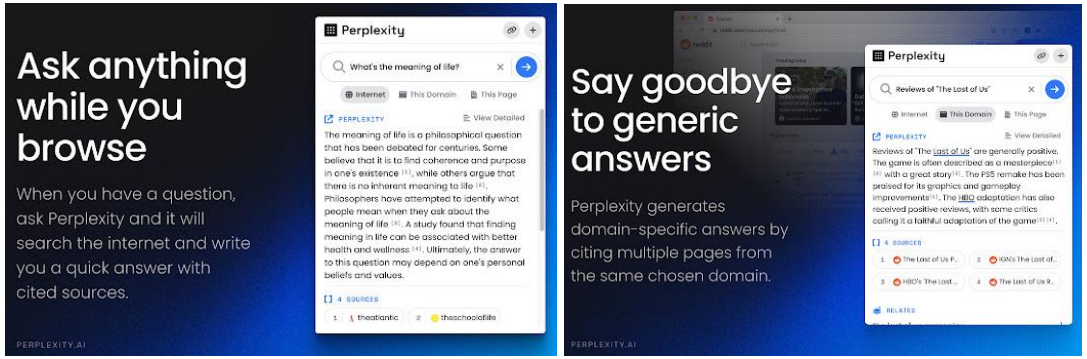
- GPT-4 can create code, is multimodal (like *Gemini*), can check its facts, visual results, more than 40 languages, etc.

- *Perplexity*: "Ask anything while you browse": chatbot with web connection = real citations

- *Studysmarter*: Personalized study tools. They are not perfect, but they will get better







2. AI Applications in Higher Education: Different AI tools for education (2)

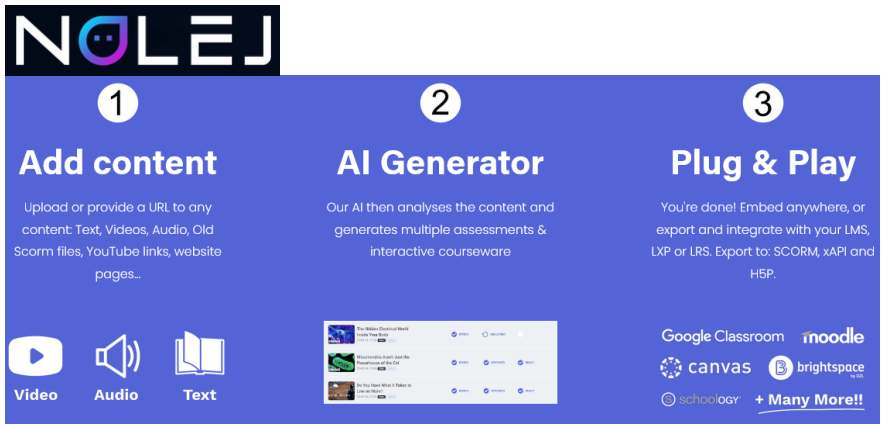
- *Nolej AI*: Content generation modules for online learning

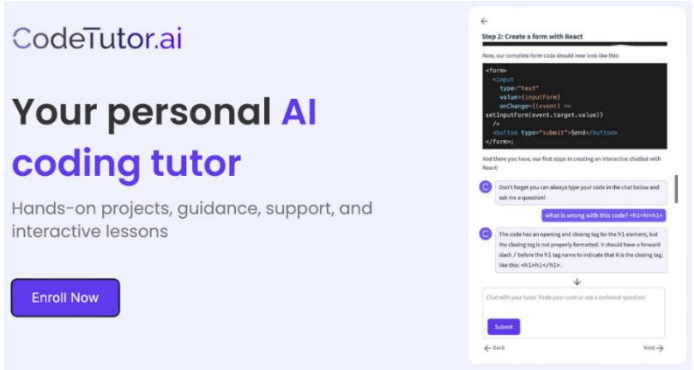
  Problem: the educational design is not considered, the learning pathway should be defined

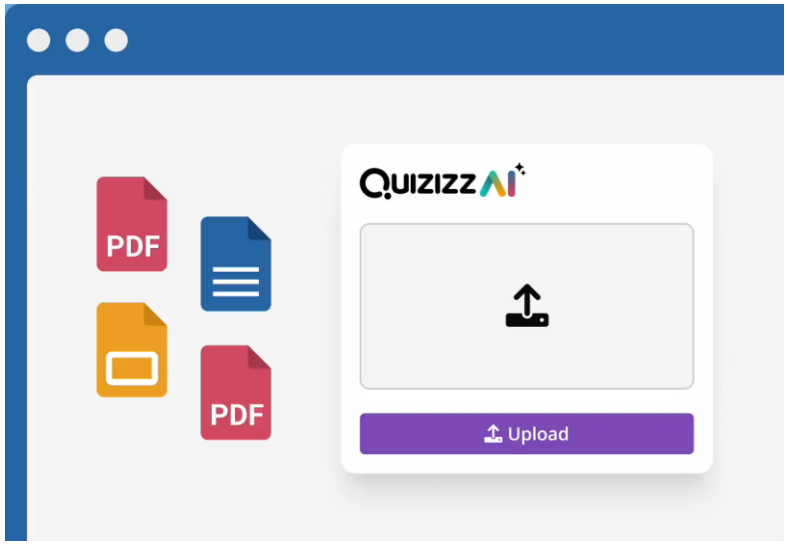
- *Quizziz*: Advanced tools for creating evaluation questionnaires from videos, documents or text generated by an LLM

- AI tutors: *Khanmigo*, *Duolingo*, *CodeTutor*, …

  A plausible future: *AI examiner*, a chatbot that is taking the exam with us







2. AI Applications in Higher Education: Virtual assistants: Khanmigo (1)

https://openai.com/customer-stories/khan-academy

Sal Khan
Education innovator

Sal Khan is the founder and CEO of Khan Academy

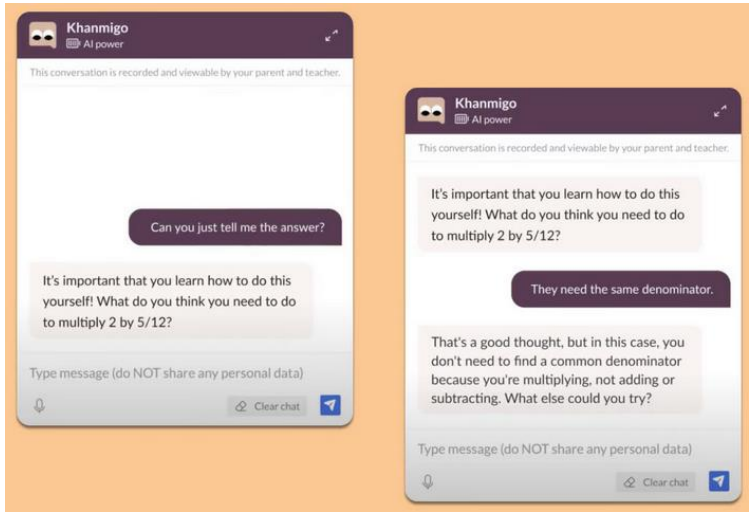
- *Khan Academy is a non-profit with a mission to provide a free, world-class education for anyone, anywhere. The organization offers thousands of lessons in math, science and the humanities for students of all ages* → **online learning**

- **Personalized learning pilot: *Khanmigo***, based on GPT-4, to assist both **students as a virtual tutor** and **lecturers as a classroom assistant**

- Ask individualized questions to each student to promote more advanced learning

- Motivational aspect: "Why do I have to learn this?" → Personalized answers, interactive dialogue with the student: "I am interested in such and such a specific topic" and GPT-4 can provide the specific motivation

- Lecturer support: preparation of teaching materials and class follow-up, easily monitoring the level of each student



Sal Khan: How AI could save (not destroy) education. Ted Talk:
https://www.ted.com/talks/sal_khan_how_ai_could_save_not_destroy_education

2. AI Applications in Higher Education: Virtual assistants: Khanmigo (2)

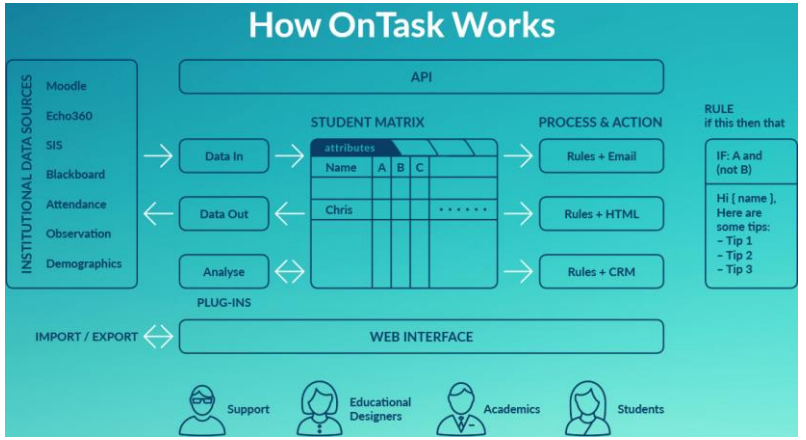
https://www.youtube.com/watch?v=_nSmkyDNulk

2. AI Applications in Higher Education: Some cases of use (1)

- University of South Australia: *OnTaskLearning*: Data insights and AI to drive the provision of personalized feedback:

  Open source tool that provides support for instructors to create customized feedback comments based on student data

  Uses rules to segment students and performs actions: sending general and specific campaigns to students, personalized feedback, ...



- Sacred Heart University's Welch College of Business & Technology: *PitchVantage* y *VirtualSpeech*: Improving Persuasive Oral Communication Skills:

  Joint use of an AI-based platform (*PitchVantage*) and a virtual reality platform (*VirtualSpeech*) in introductory marketing courses to improve students' oral communication skills when presenting compelling points of view on analyzing real-world business cases

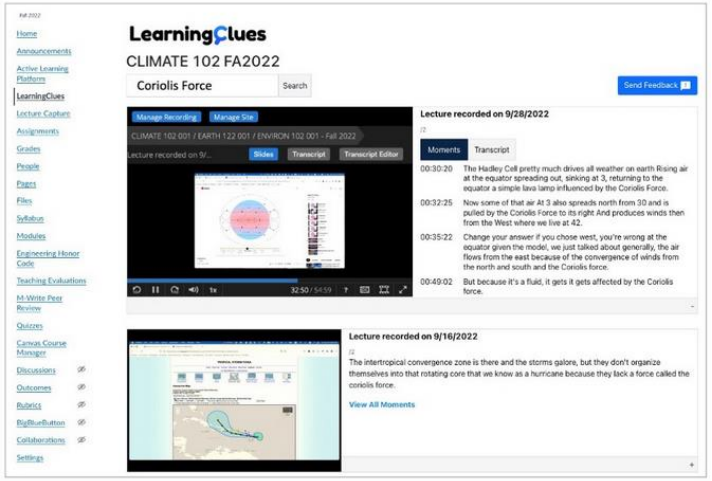
https://library.educause.edu/resources/2023/5/2023-educause-horizon-report-teaching-and-learning-edition

2. AI Applications in Higher Education: Some cases of use (2)

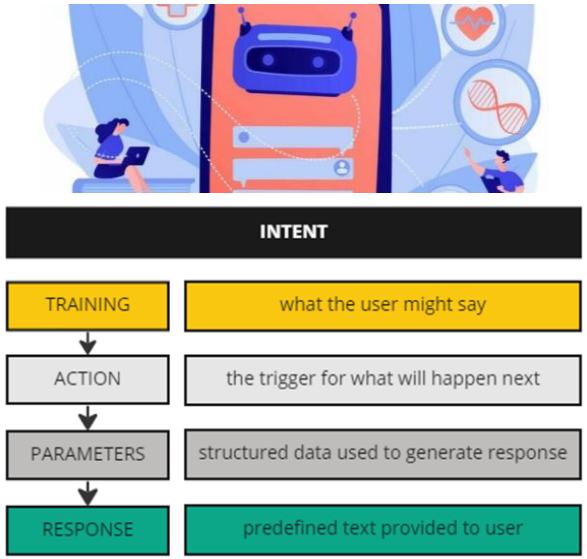
- University of Michigan: *LearningClues*: Personalizing Student Help-Seeking through AI–Powered Video Analysis:

  It mines what was said or visually presented during class sessions and automatically create links to pertinent resources in other educational platforms in a student's learning ecosystem

  Based on class discussion, students are provided links to relevant pages in their textbook, documents in their LMS, and other resources the instructor has made available



Example illustrating a search for when "Coriolis force" was discussed in class videos. LearningClues shows in which lectures the term was discussed and at what specific moments in those lectures.



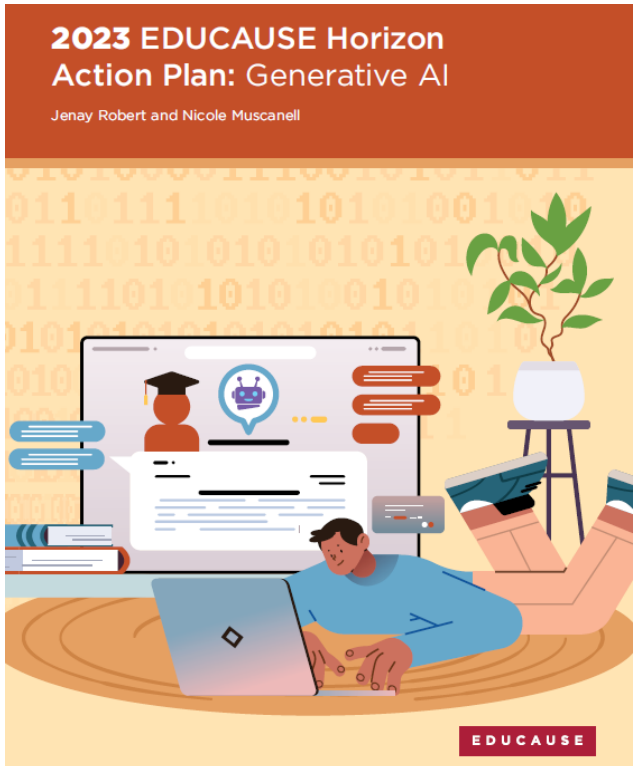
- Western University: *Empathy Chatbot*: Mimic a patient–provider dialogue using the five skills of an empathetic conversation:

  Training for the Objective Structured Clinical Examination (OSCE) exam in the Medicine degree

  The chatbot (preloaded with patient case scenarios) plays the role of the patient, while students can practice being the medical provider

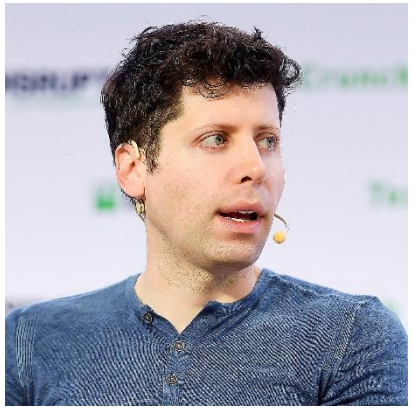
3. Effective Implementation in the Spanish Higher Education System: Context and recommendations

- **Only works if managed from the highest level**: Rector/ Government Team/Vice Rector
- **Strategic planning** in the institution at several levels: individual, unit/department, institution, collaboration
- Obsession with quality of service (experience) of the student
- **Pilots vs. services**: Bottom-up vs. Top-down. Scalability, specialized staff, resistance to change, etc.
- GPT applications more feasible as a service, although the economic cost and the intensive dependence on an external solution (advantage: multiple providers) will have to be considered
- Solution could one day cease to function or even disappear



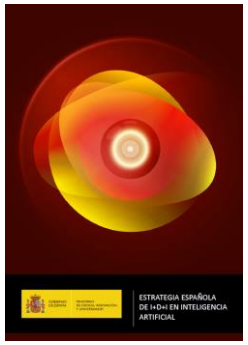
3. Effective Implementation in the Spanish Higher Education System: General training for everyone

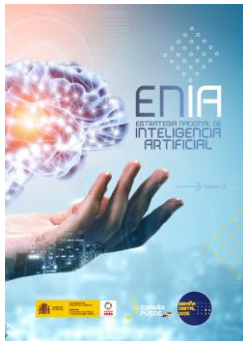
- **AI Literacy**: educators, students and the general public
- Two different dimensions: 1) Teaching with AI; 2) Learning AI through creative pedagogical use
- Acceptance of AI-based solutions by students and teachers: Training → Trust → Acceptance



Sam Altman
Open AI

- Open AI CEO Sam Altman's response to the question of how we can prepare for a future with AI: "*With resilience, adaptability, the ability to learn new things quickly and creativity (although there will be assisted creativity)*"
- Lack of flexibility in university curricula in Spain. Use of MOOCs



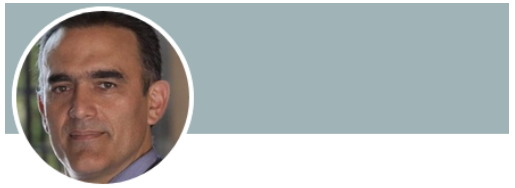


3. Effective Implementation in the Spanish Higher Education System: Interdisciplinary work teams

Margarida Romero (She/Her) · 2nd
Full professor at Université Côte d'Azur

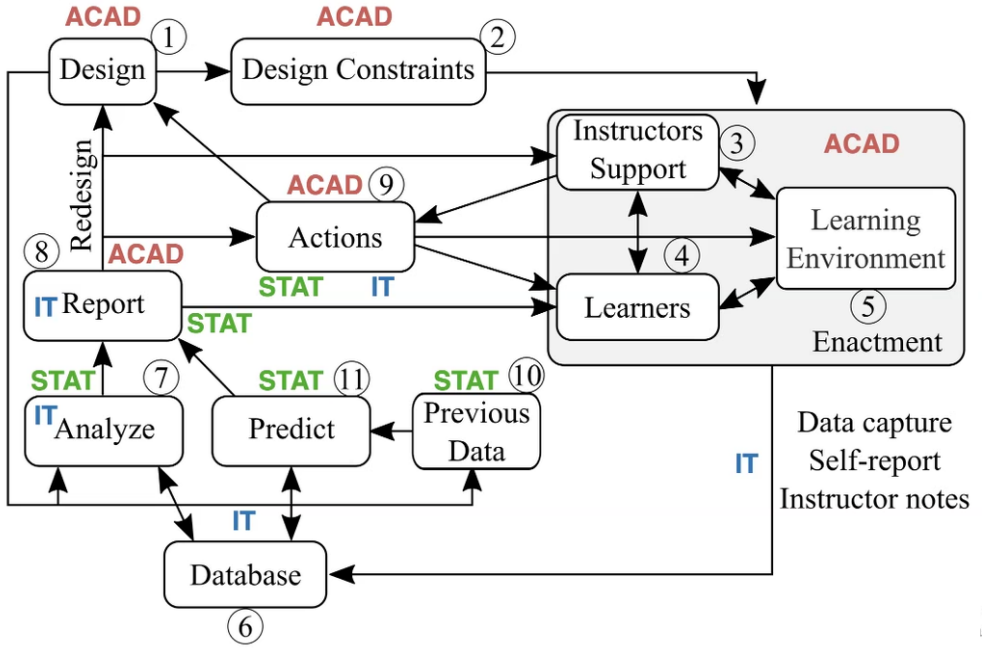
Experts in:

- learning (pedagogues, educational technologists),
- AI,
- user interface design (UX),
- information scientists



Abelardo Pardo (He/Him) · 2nd
Head of School of Computer and Mathematical Sciences, The University of Adelaide, Australia

- learning designers (ACAD),
- statistics (STAT),
- IT experts (IT)



BOOK CHAPTER

A model for learning analytics to support personalization in higher education

Abelardo Pardo (UniSA STEM, University of South Australia) ; Negin Mirriahi (UniSA College and Edu

2022

Handbook of Digital Higher Education ch. 3, pp. 26-37

- **Learning Analytics structural model**

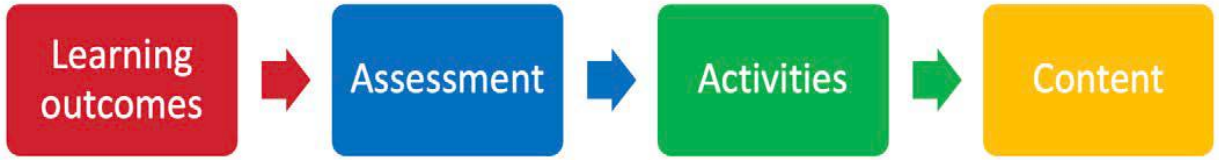
3. Effective Implementation in the Spanish Higher Education System:
Changing the learning and assessment model and the role of the lecturer

- The key is **learning design**, taking advantage of the available tools:

  Science of learning (how people learn) +

  Educational and knowledge technologies (to support that learning)

- We have 25 years of experience in e-learning that can be put to good use
- There are many models:



- *Merja Alanko-Turunen, Haaga-Helia UAS, Finland*: **Entangled AI pedagogy**: Towards entangled, sustainable Higher Education AI solutions

- Need for change in the role of the teacher and the assessment model
- *Abelardo Pardo, University of Adelaide, Australia*: Two roles of the teacher: role of judge vs. role of coach in separating learning and assessment

3. Effective Implementation in the Spanish Higher Education System: Assessment

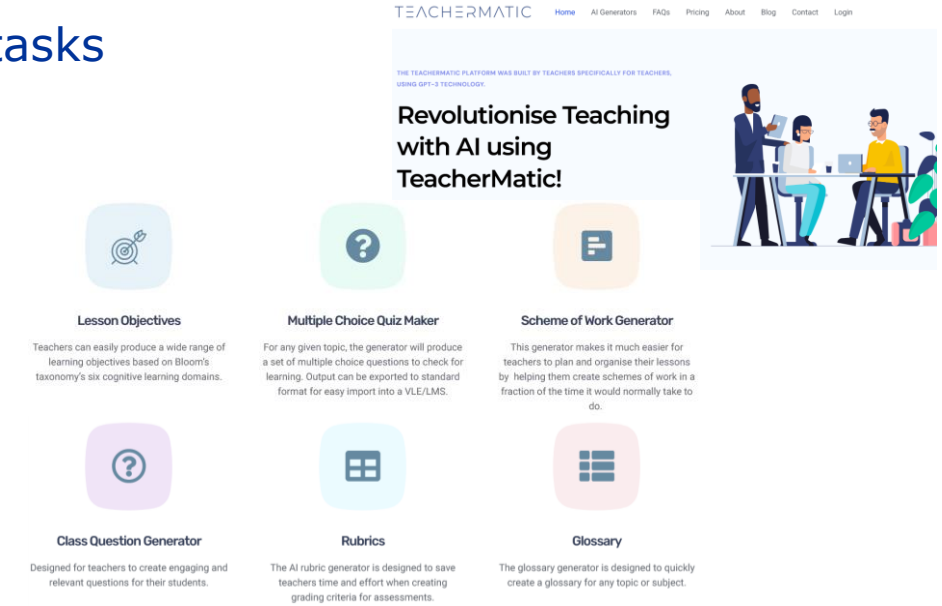
https://www.freepik.es/
CC4.0 licence

Rethink evaluation: Evaluate the process, not (just) the outcome

- Incorporate online learning models into our face-to-face classes
- Include collaborative group activities
- Use multiple assessment points, to balance the load and allow for feedback
- Connect learning outcomes with assessment activities to motivate students to always participate
- Use peer instruction and peer assessment for formative tasks

Previous design, supported by AI tools

- Course planning and module generators based on GPT (**human-AI design and content co-creation**, collaborative teacher-AI tool model): *Teachermatic*



3. Effective Implementation in the Spanish Higher Education System: Definition of AI usage policies for courses

Some institutions want to ban the use of AI tools, specifically GPT...
It is like trying to stem the tide!!

Need for a course-level policy, **which could be defined globally by the university itself and customized for each course**:

TECHNOLOGY

How To Write an AI Policy for Schools: Examples and Resources

Make it clear what is acceptable ... and what is not.

https://www.weareteachers.com/ai-policy-for-schools/

What should an AI policy for schools include?

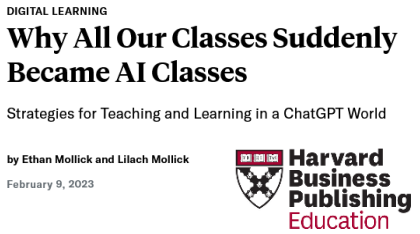
A comprehensive AI policy requires much more than just telling students "Don't use AI to cheat." Schools should be specific in their guidelines, helping everyone understand what is and isn't appropriate. These are some possible sections to include in your policy:

- *Appropriate use: DOs and DON'Ts*
- *Responsible AI use*
- *Reporting and consequences*
- *Education and Awareness*

3. Effective Implementation in the Spanish Higher Education System: Definition of AI usage policies for courses

Some tips:

https://hbsp.harvard.edu/inspiring-minds/why-all-our-classes-suddenly-became-ai-classes


DIGITAL LEARNING

Why All Our Classes Suddenly Became AI Classes

Strategies for Teaching and Learning in a ChatGPT World

by Ethan Mollick and Lilach Mollick

February 9, 2023

Harvard Business Publishing Education

1. Developing an AI policy for your class

2. Using AI to raise expectations and level the playing field (*leverage*): our students have great skills, but not everyone is good at writing → let's teach them "*prompt engineering*"

3. Improving student learning with AI:

   "*Approaching AI in this way pushes students to think critically about the content and articulate their thoughts for improvement clearly and concisely*"

   In addition, it can help deepen their understanding of complex topics. Asking students to identify what AI does well and what it does poorly can trigger deeper thinking

4. Motivating students for learning through AI: *Peter Norvig*: *BYOM: Bring your own motivation*

Mollick, Ethan R. and Mollick, Lilach, New Modes of Learning Enabled by AI Chatbots: Three Methods and Assignments (December 13, 2022). Available at SSRN: https://ssrn.com/abstract=4300783 or http://dx.doi.org/10.2139/ssrn.4300783

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4300783

Abstract

Chatbots are able to produce high-quality, sophisticated text in natural language. The authors of this paper believe that AI can be used to overcome three barriers to learning in the classroom: improving transfer, breaking the illusion of explanatory depth, and training students to critically evaluate explanations. The paper provides background information and techniques on how AI can be used to overcome these barriers and includes prompts and assignments that teachers can incorporate into their teaching. The goal is to help teachers use the capabilities and drawbacks of AI to improve learning

Keywords: AI, education, chatbot, transfer, learning

4. Legal and Ethical Impact of AI in Education

- **Education is a "high risk" in the EU AI Act**. *Leave nothing to chance*.
  Control procedures are still unclear: check-list vs. audits

- **Data use, ethics, European AI Act**: several rights could be violated by the solution: equality and non-discrimination, dignity, the right to privacy and data protection, intellectual property rights, right to honor, etc.

- **Ethics in AI for Education**: Authorship recognition, data anonymization, students must understand that they are talking to a chatbot and not to a person, ...

- **Copyright aspects of generative AI**: Europe vs. other countries. Japan: AI model training is not copyrighted

- **Beware of myths and fears**: "A misleading open letter about sci-fi AI dangers ignores the real risks"
  https://www.aisnakeoil.com/p/a-misleading-open-letter-about-sci

	Speculative risks	Real risks
Misinformation	Malicious disinformation	Overreliance on inaccurate tools
Labor impact	LLMs will replace all jobs	Centralized power, labor exploitation
Safety	Long-term existential risks	Near-term security risks

4. Legal and Ethical Impact of AI in Education: Impact on the job market

- 2024: Texas Education Agency (TEA) to hire 4,000 fewer scorers to grade student tests in and replace them with AI-based automated grading
- The State of Texas Assessments of Academic Readiness (STAAR) exam measures the level of each college/high school by assessing knowledge in writing, reading, science and social studies
- **The exam now includes fewer multiple choice questions and more open-ended questions**. The state of Texas claims a savings of 15-20M USD. Only 25% will be reviewed by human examiners
- **No one knows what correction criteria the AI system applies…**
  AI is not used as an assistant/co-pilot but as a substitute…

Students in Texas taking their state-mandated exams this week are being used as guinea pigs for a new artificial intelligence-powered scoring system set to replace a majority of human graders in the region.

https://www.theverge.com/2024/4/10/24126206/texas-staar-exam-graders-ai-automated-scoring-engine

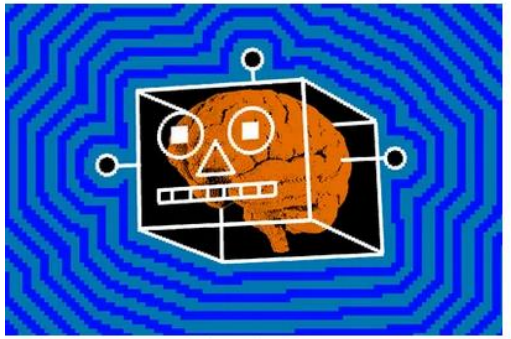
https://www.texastribune.org/2024/04/09/staar-artificial-intelligence-computer-grading-texas/

The Texas Tribune reports an "automated scoring engine" that utilizes natural language processing — the technology that enables chatbots like OpenAI's ChatGPT to understand and communicate with users — is being rolled out by the Texas Education Agency (TEA) to grade open-ended questions on the State of Texas Assessments of Academic Readiness (STAAR) exams. The agency is expecting the system to save $15–20 million per year by reducing the need for temporary human scorers, with plans to hire under 2,000 graders this year compared to the 6,000 required in 2023.

The Verge / Tech

ARTIFICIAL INTELLIGENCE / TECH

Texas is replacing thousands of human exam graders with AI



The TEA expects to save between $15 and $20 million per year by using its new "automated scoring engine." Image: The Verge

/ Don't call the 'automated scoring engine' AI, though. They don't like that.

By Jess Weatherbed, a news writer focused on creative industries, computing, and internet culture. Jess started her career at TechRadar, covering news and hardware reviews.

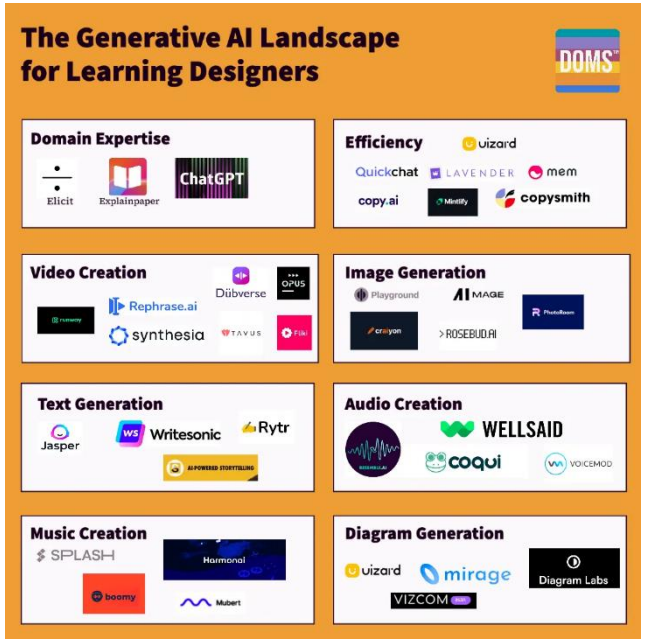
Apr 10, 2024, 5:47 PM GMT+2

21 Comments (21 New)

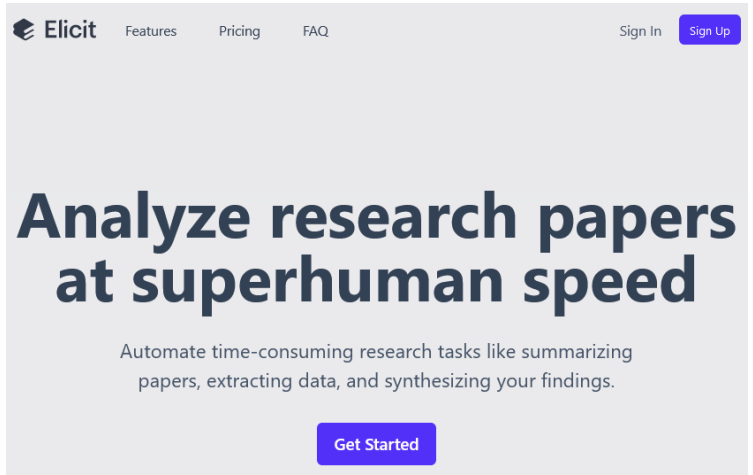
5. Conclusions:
The new hybrid: human + computer

Evolution to a new hybrid: human + computer (AI):

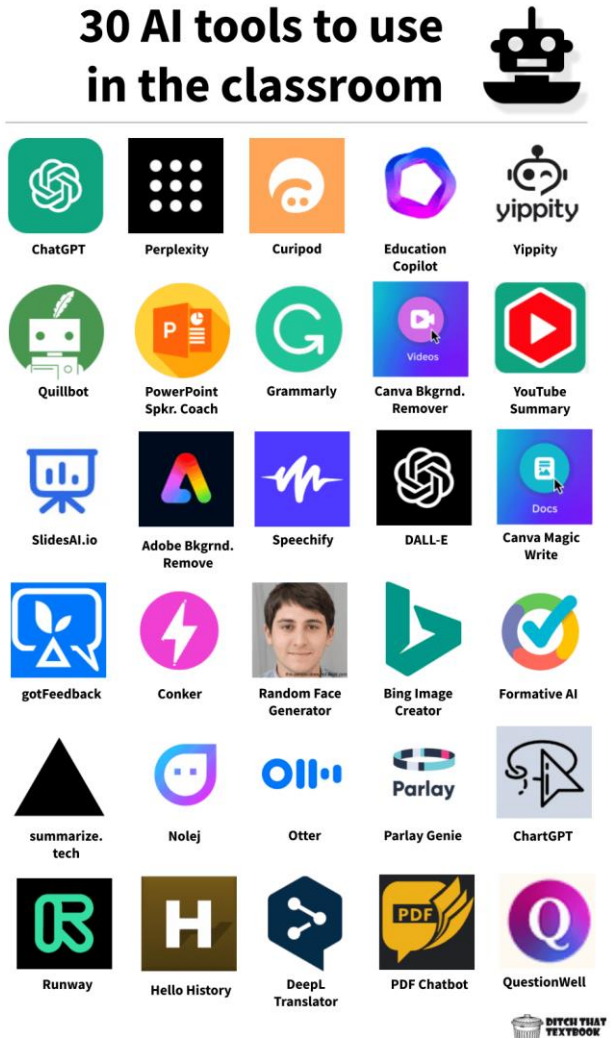
- Human being: critical thinking, creativity, collaboration, leadership
- Computer: literacy, risk, safety, security, accountability
- Teaching with AI: learning design with AI tools
- Assessment with AI: based on learning activities themselves



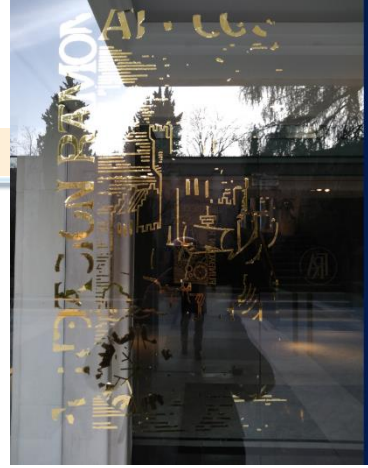
https://drphilippahardman.substack.com/p/the-generative-ai-landscape-for-learning



https://elicit.com/



https://ditchthattextbook.com/ai-tools/



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SOCIAL IMPACT OF AI

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Impact of Artificial Intelligence in Higher Education

Oscar Cordón

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