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Universidade do Minho
Instituto de Educação

Educational Research and Artificial Intelligence

Dra. Antonia Cascales Martínez

Dra. María José Martínez Segura

MÉTODOS DE INVESTIGACIÓN Y DIAGNÓSTICO EN LA EDUCACIÓN

10 de marzo de 2025



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01. What is research?

02. Why is research important in education?

03. What impact does AI have on educational research?

04. AI tools for research

05. Can we trust such automated analysis?

06. Which limitation of AI in education are you most concerned about and how could it be eased?

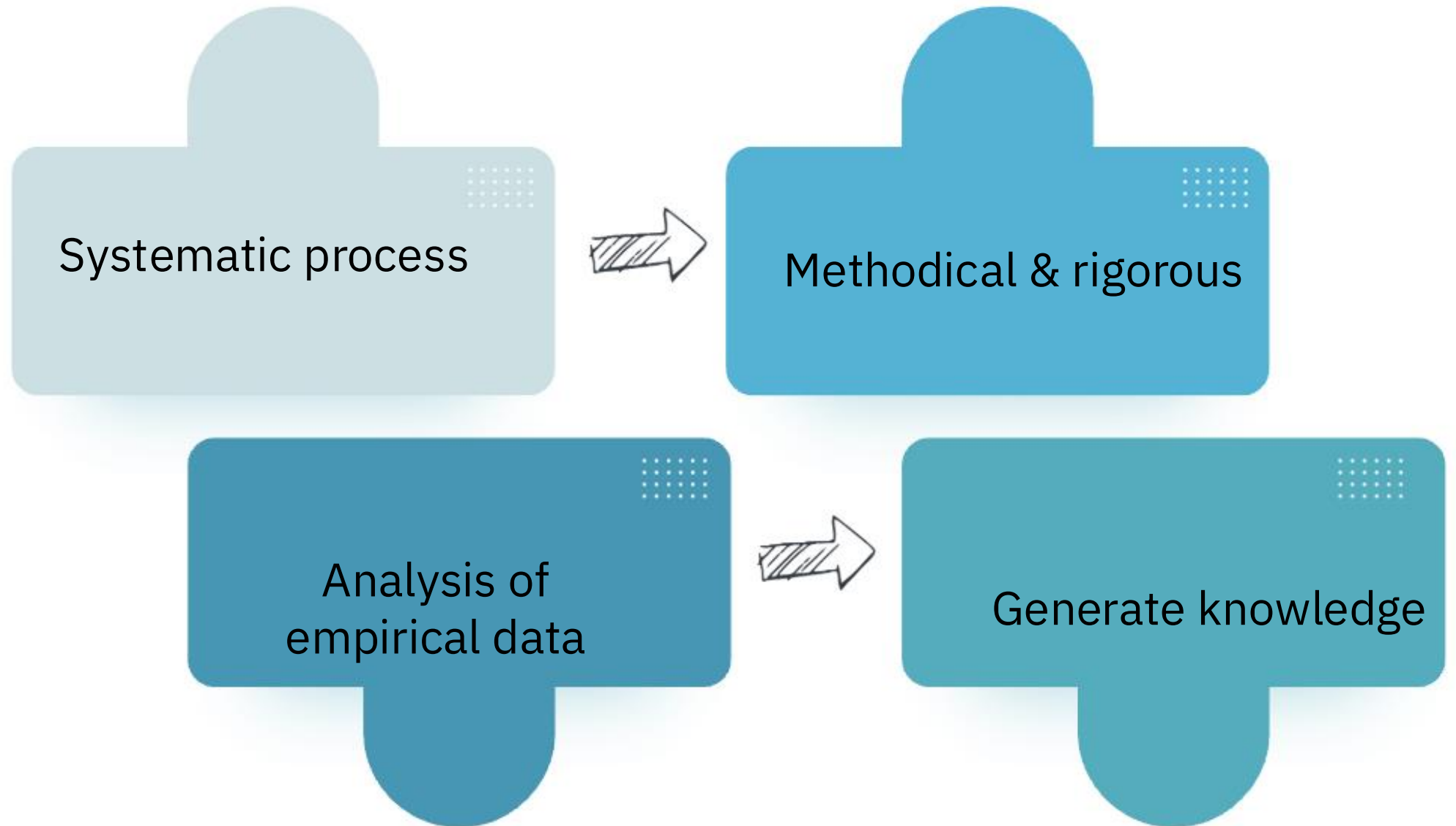
07. How do we ensure the ethical use of AI in educational research?

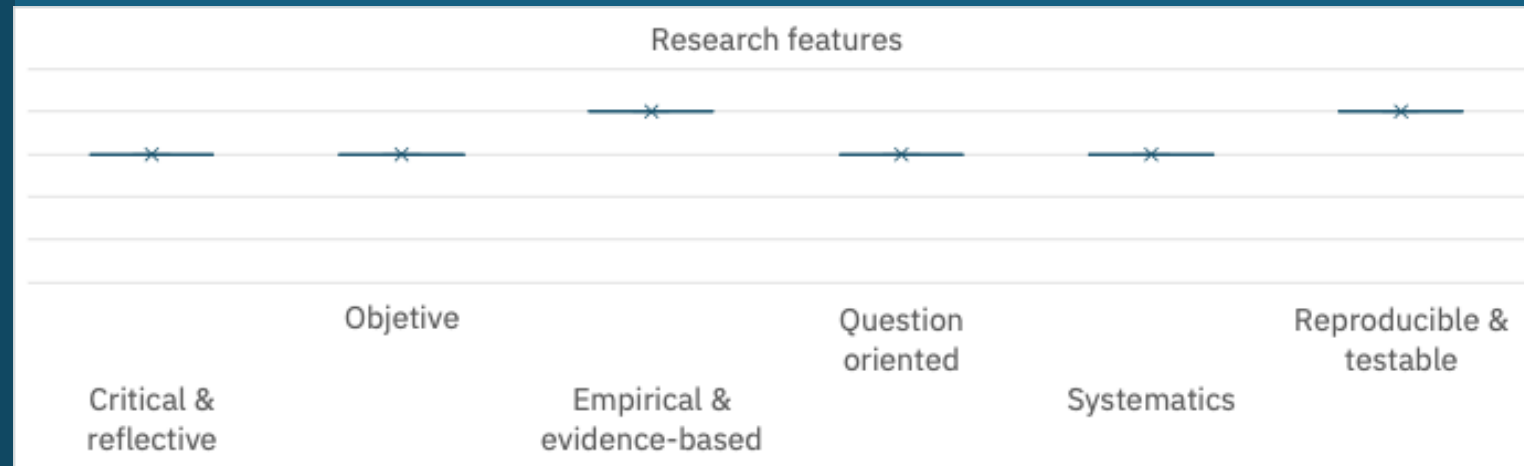
08. Will AI have transformed the way we research and teach in education?



01. **What is research?**

Research







To investigate is to search for the truth or to discover something.

Research happens everywhere, we all do research.

Research is applying that quest to better understand or improve the process.

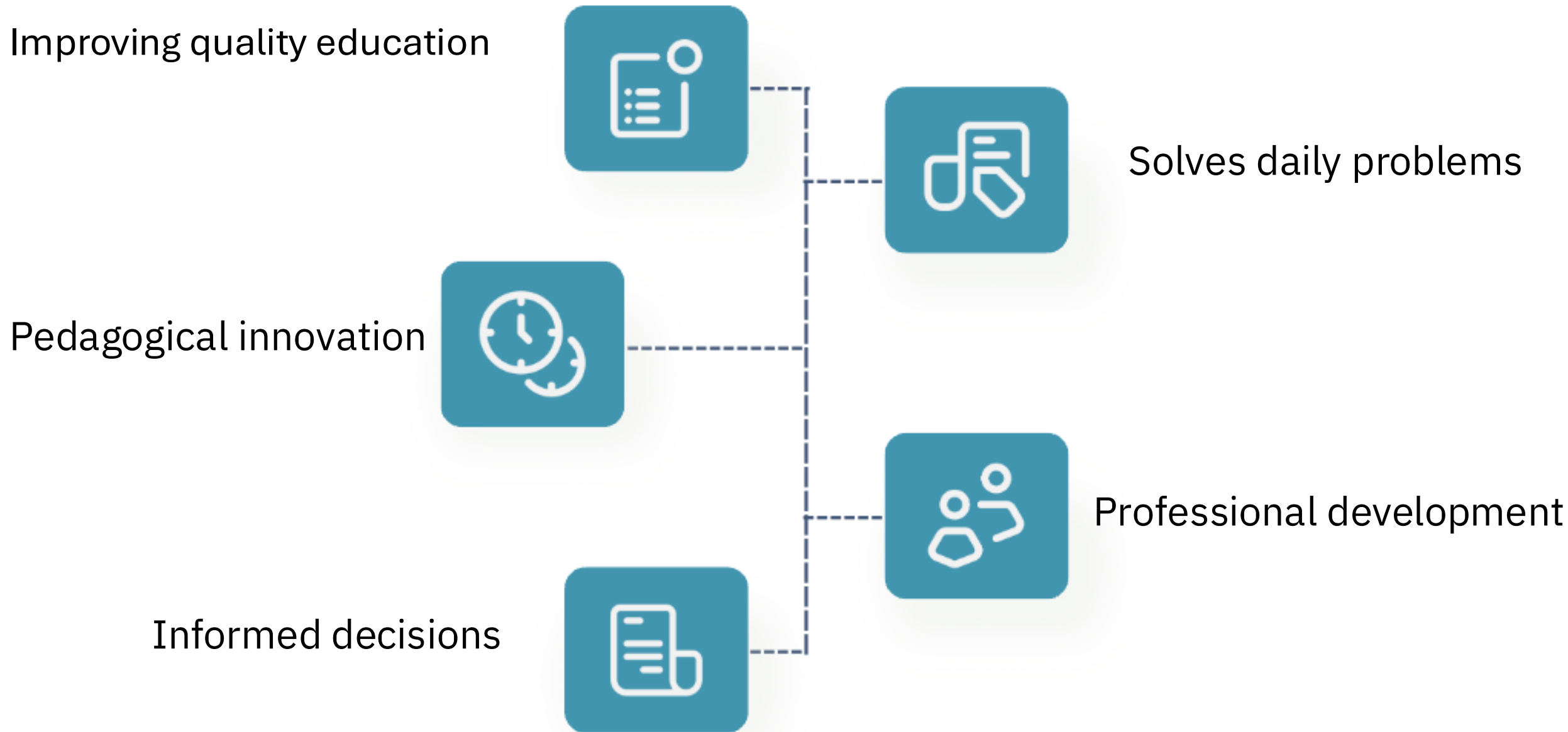
Homeshooling

02.

Why is research important in education?



[illegible]



Phases of the research

1. Question or problem



2. Literature review and establishment of the theoretical framework



3. Formulate hypotheses/ objectives



4. Method



5. Data collection



6. Data analysis



9. Writing and presentation of the research report



8. Conclusions



7. Discussion and interpretation of results



Approaches in educational research



Myths and realities of research

Research is only for geniuses in white coats in big laboratories

Any profesional with curiosity and method can do research. We are often field researchers, trying to discover what works best

Research in education is useless, theory stays in books

Research has transformed professional practices (e.g., active methodologies such as cooperative works are supported by research). Well-applied research improves real life: it guides public policy, designs effective curricula and solves everyday problems.



Myths and realities of research

It's too complicated or expensive; it takes too much time and resources

If the results are not positive, the research “failed”

There are scales. Any professional can do small investigations with minimal resources (systematic observations, simple questionnaires) and obtain valuable findings. Tools such as online surveys or analysis of daily tasks make it easy to do research without large budgets.

Not finding what we expected is also an outcome. All research provides learning. A study that disproves a hypothesis still teaches us which avenues do not work and leads us to new questions. In science, there are no failures, but knowledge that advances even by correcting mistakes.



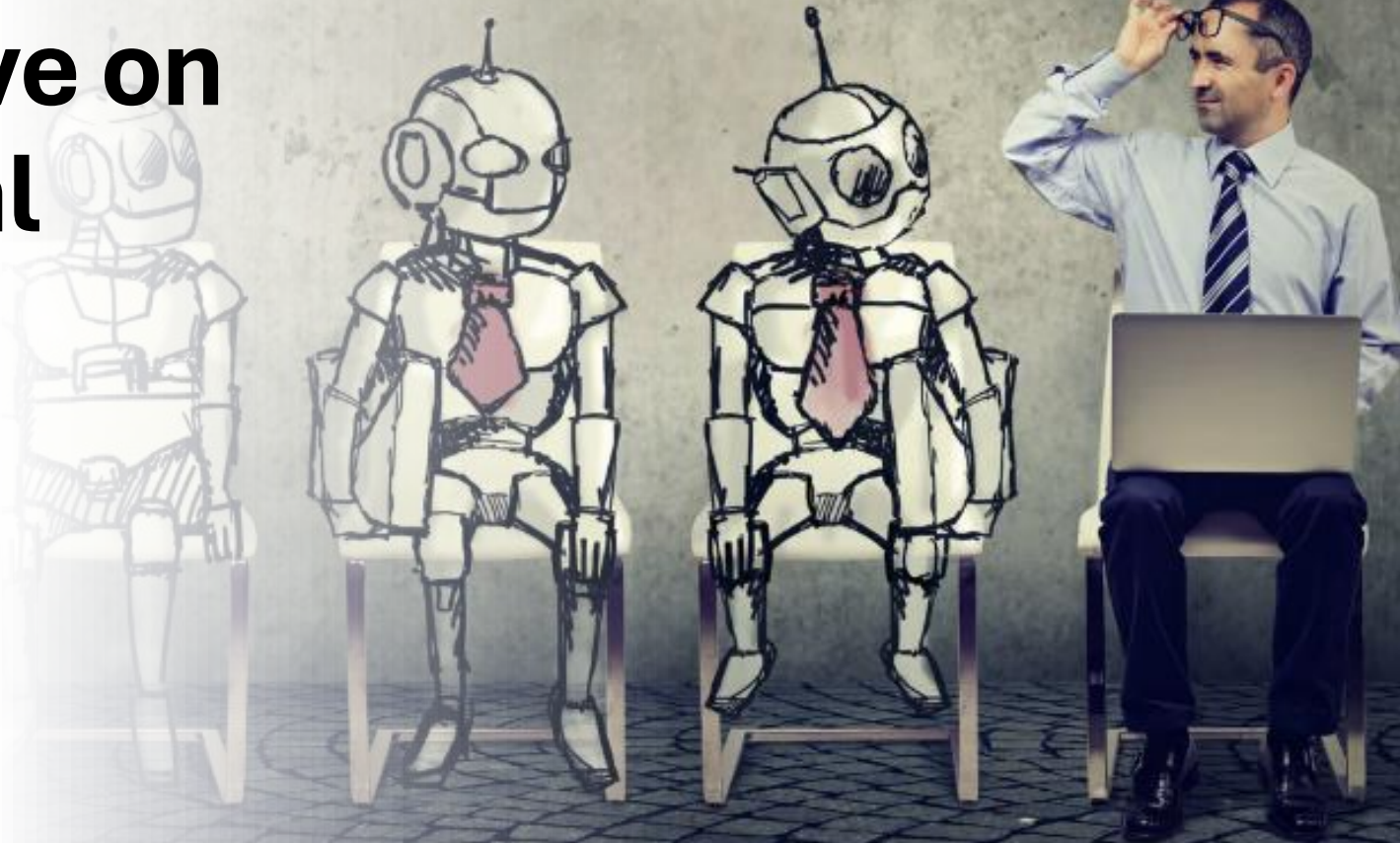


Search for knowledge

Do we prefer not to investigate problems for the sake of convenience (blue pill) or do we risk research to discover truths and improve education (red pill)?

Real research requires courage to face findings that may challenge our preconceptions.

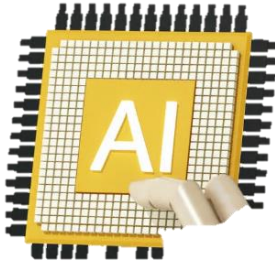
03. What impact does AI have on educational research?



AI in educational research



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A field of computing that develops machines capable of reasoning, learning and performing tasks associated with human intelligence.

Empowers the researcher, opening up opportunities to explore massive educational data, test hypotheses with simulations and discover insights that previously went unnoticed.

It is applied to personalise teaching and adapt it to each situation, identifying learning patterns, strengths and weaknesses, and providing immediate feedback.

It automates tasks, speeding up data processing.

It allows large volumes of information to be analysed in a short time, saving time and optimising resources in research projects.

[illegible]

Chat GPT magic

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04. AI tools for research





ChatGPT



Canva ▾

ChatGPT

Sora

Scholar GPT

Scholar AI

Canva

Explorar GPT

+ New Chat

My Tools

AI Chat

Image Generation

AI Search Engine

Music Generation

Chats

Type your message...



DeepSeek

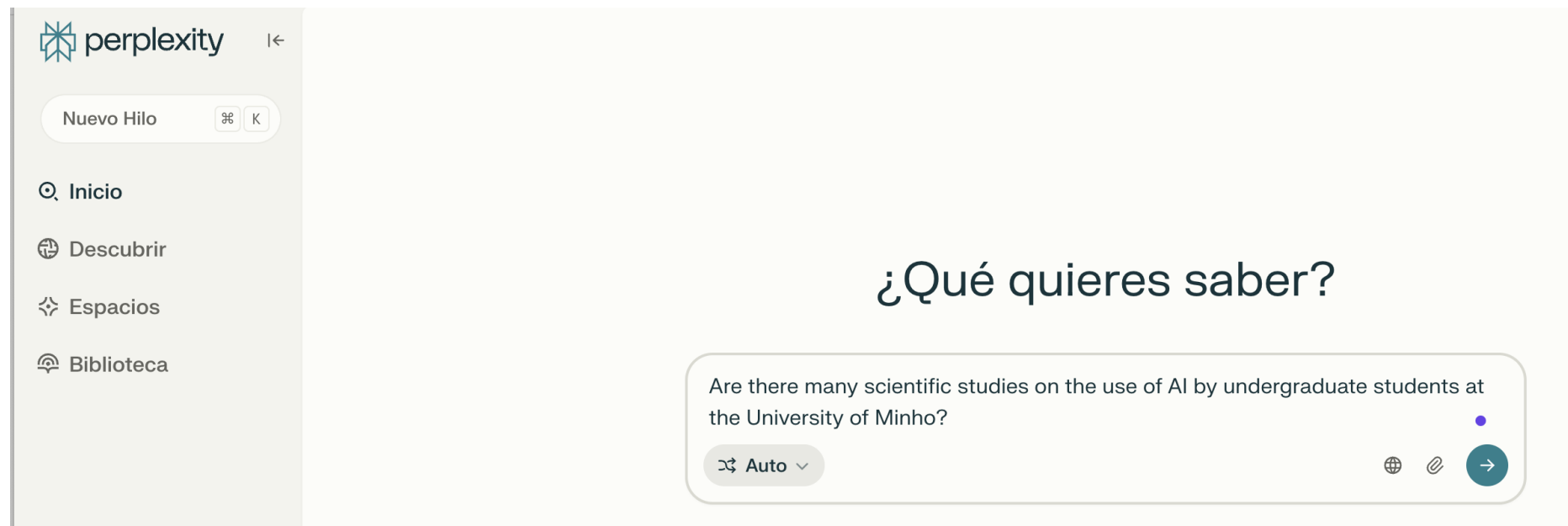
How can I help you today?



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1. Question or problem






perplexity

1. Question or problem



 perplexity |←

Nuevo Hilo

⌘ K

🏠 Inicio

🌐 Descubrir

🌟 Espacios

📖 Biblioteca

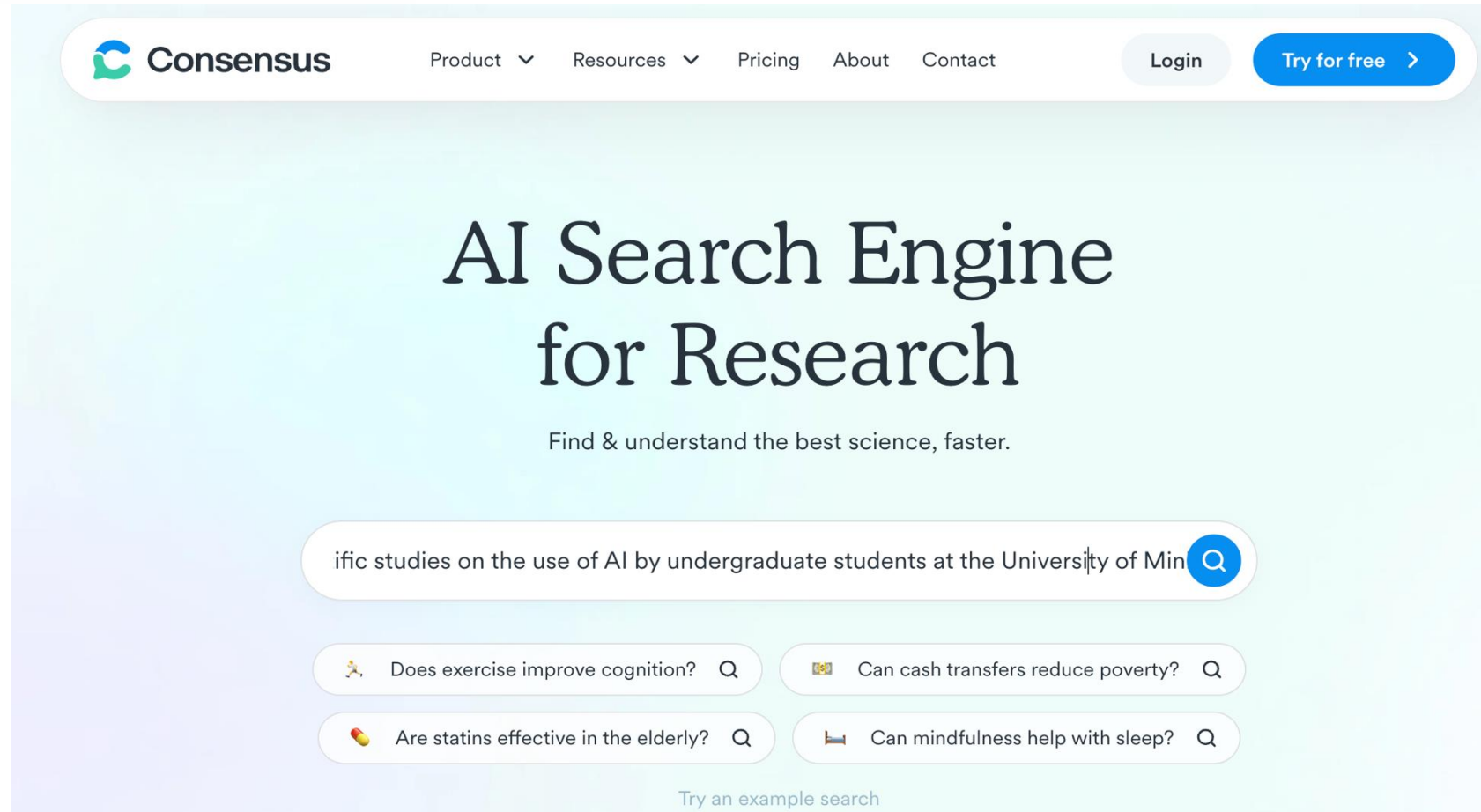
Are there many scientific studies on the use of AI by undergraduate stud...

✱ Perplexity

There appears to be limited direct evidence of scientific studies specifically focused on the use of AI by undergraduate students at the University of Minho (UMinho). However, several related points can be drawn from available information:

- Integration of AI in Education at UMinho:**
 - UMinho offers a Bachelor in Data Science, which includes courses on artificial intelligence (AI) and machine learning. This program aims to train students in predictive modeling, pattern recognition, and AI techniques, suggesting that AI is a significant part of the curriculum for some undergraduate students ¹.
 - The university is also involved in international projects to enhance AI and data science competencies, such as the Erasmus+ initiative for curriculum development in data science and AI ⁴.
- Research and Events at UMinho:**
 - The ALGORITMI Research Center at UMinho conducts R&D in fields like AI and data science, with faculty members actively engaged in projects related to intelligent agents and computational sustainability ² ⁵.
 - Conferences hosted by UMinho, such as one on AI and digital storytelling, explore the

<https://www.perplexity.ai/>



The screenshot shows the Consensus AI Search Engine for Research homepage. At the top, there is a navigation bar with the Consensus logo, links for Product, Resources, Pricing, About, and Contact, and buttons for Login and Try for free. The main heading is "AI Search Engine for Research" with the tagline "Find & understand the best science, faster." Below this is a large search bar containing the text "ific studies on the use of AI by undergraduate students at the University of Min". Below the search bar are four example search queries, each with a small icon and a magnifying glass icon: "Does exercise improve cognition?", "Can cash transfers reduce poverty?", "Are statins effective in the elderly?", and "Can mindfulness help with sleep?". At the bottom of the search bar area is a link that says "Try an example search".

<https://consensus.app/>



Pro Filter Share

Consensus Meter Beta

Requires at least 5 papers that directly answer your question. Try adjusting your query to find more papers.

✗ Is AI integration in undergraduate education widely researched?

These studies suggest that AI integration in undergraduate education can enhance learning effectiveness, boost confidence, and improve educational attainment, but must be approached with ethical considerations and flexible guidelines.

Summary of 5 papers Less relevant

Results

The integration of Artificial Intelligence (AI) into undergraduate education

AI integration in undergraduate education can enhance learning effectiveness, but ethical concerns must be addressed to prevent negative ramifications.

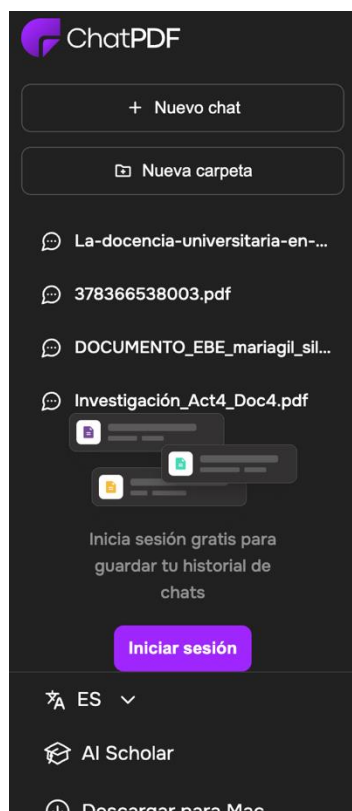
Literature Review

<https://consensus.app/>



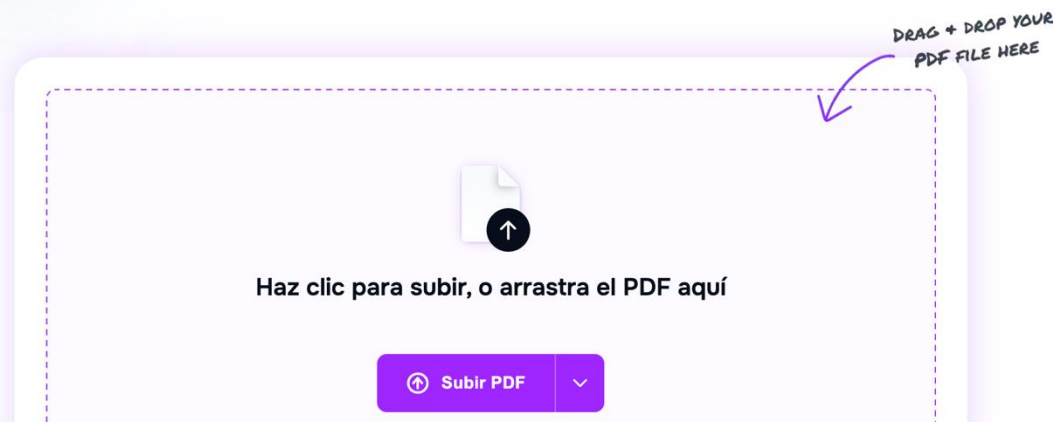
ChatPDF

2. Literature review and establishment of the theoretical framework



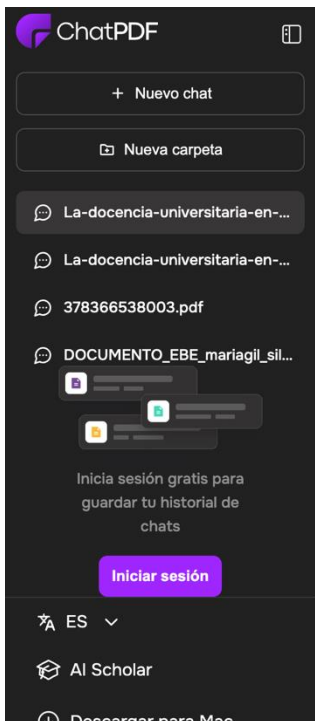
Chatea con cualquier PDF

Únete a millones de estudiantes, investigadores y profesionales para contestar preguntas y entender investigaciones al instante con IA.





ChatPDF



La-docencia-universitaria-en-tiempos... 1 / 20



<https://www.chatpdf.com/>

2. Literature review and establishment of the theoretical framework



¡Hola! Me alegra que estés aquí.

Este texto trata sobre la enseñanza universitaria en la era de la inteligencia artificial.

- Se examinan los desafíos que enfrenta la educación superior con la incorporación de la IA.
- Hay un enfoque en las experiencias de docentes y estudiantes en este nuevo contexto.
- Se plantean estrategias para mejorar la docencia en tiempos de IA.

¿Qué te gustaría explorar?

☰ Resume este texto



¿Cuáles son los principales desafíos que enfrenta la educación superior en la era de la IA?



¿Qué estrategias se sugieren para mejorar la enseñanza en este nuevo contexto tecnológico?

¿Cuáles son los principales desafíos que enfrenta la educación superior en la era de la IA?



Los principales desafíos que enfrenta la educación superior en la era de la inteligencia artificial (IA) incluyen:

1. **Adaptación del profesorado:** Muchos docentes no están



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2. Literature review and establishment of the theoretical framework



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2. Literature review and establishment of the theoretical framework



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What is the impact of magnesium on sleep and stress?



Magnesium's Role in Sleep and Stress

Research across 19 studies indicates that magnesium supplementation generally improves sleep quality and reduces stress markers, though it may vary by population and study conditions.

Abstract

This report examined 19 studies investigating magnesium supplementation's effects on sleep and stress outcomes. The included studies covered elderly individuals, adults with sleep disorders, healthy individuals with poor sleep quality, athletes, and individuals with specific health conditions. Regarding stress outcomes, studies measuring cortisol levels reported decreases following magnesium supplementation. Changes in other stress markers varied across studies, with some showing decreases in heart rate variability, melatonin levels, and inflammatory markers (IL-6 and CRP), while others showed no significant changes. Some studies reported stronger effects in specific groups, particularly elderly individuals, those with diagnosed sleep disorders, and participants with low baseline magnesium levels or higher stress levels. However, the studies varied considerably in their design, population selection, and magnesium dosing, making it difficult to draw firm conclusions about optimal dosing or treatment duration. The included studies were published between 2010 and 2024.

Analyze more evidence, more accurately

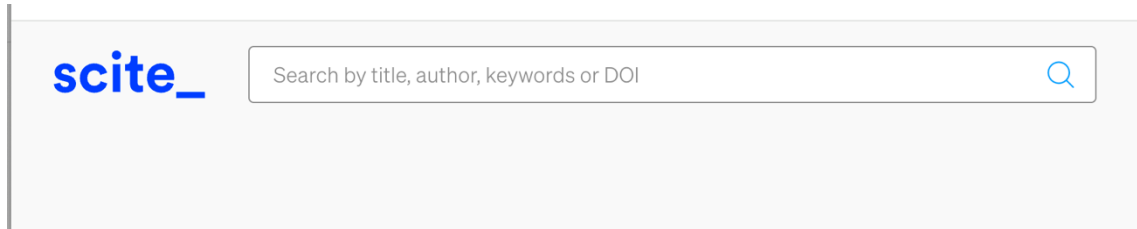
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Paper	Screening judgement ⓘ
<p>Effectiveness of Magnesium Supplementation on Sleep Quality and Mood for Adults with Poor Sleep Quality: A Randomized Double-Blind Placebo-Controlled Crossover Pilot Trial</p> <p>Michael Breus, Stephanie L Hooper, T. Lynch</p> <p>Medical Research Archives, 2024</p>	<ul style="list-style-type: none">IncludeStudy PopulationIntervention TypeStudy DesignOutcome MeasuresIntervention DurationPopulation Health Status
<p>Oral Mg(2+) supplementation reverses age-related neuroendocrine and sleep EEG changes in humans.</p>	<ul style="list-style-type: none">Include



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Diseño universal para el aprendizaje y TIC en el área de educación física: diseño y validación de una propuesta de intervención

Francisco Javier López-Ibáñez¹, Antonia Cascales Martínez², María José Martínez Segura³

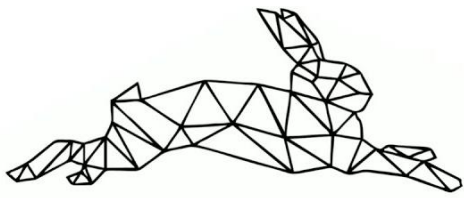
Abstract: Este trabajo se plantea con el objetivo de diseñar y validar un programa de intervención para la asignatura de Educación Física, aplicando las Tecnologías de la Información y la Comunicación y el Diseño Universal para el Aprendizaje, para favorecer la inclusión de los alumnos con diversidad funcional intelectual de cuarto curso de Educación Primaria, a través de un diseño de investigación evaluativa. Para la validación de dicho programa a través del juicio de expertos, se construye un instrumento ad hoc. En el... [Show more](#)

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Search citation statements Cited by 0 publications References 12 publications

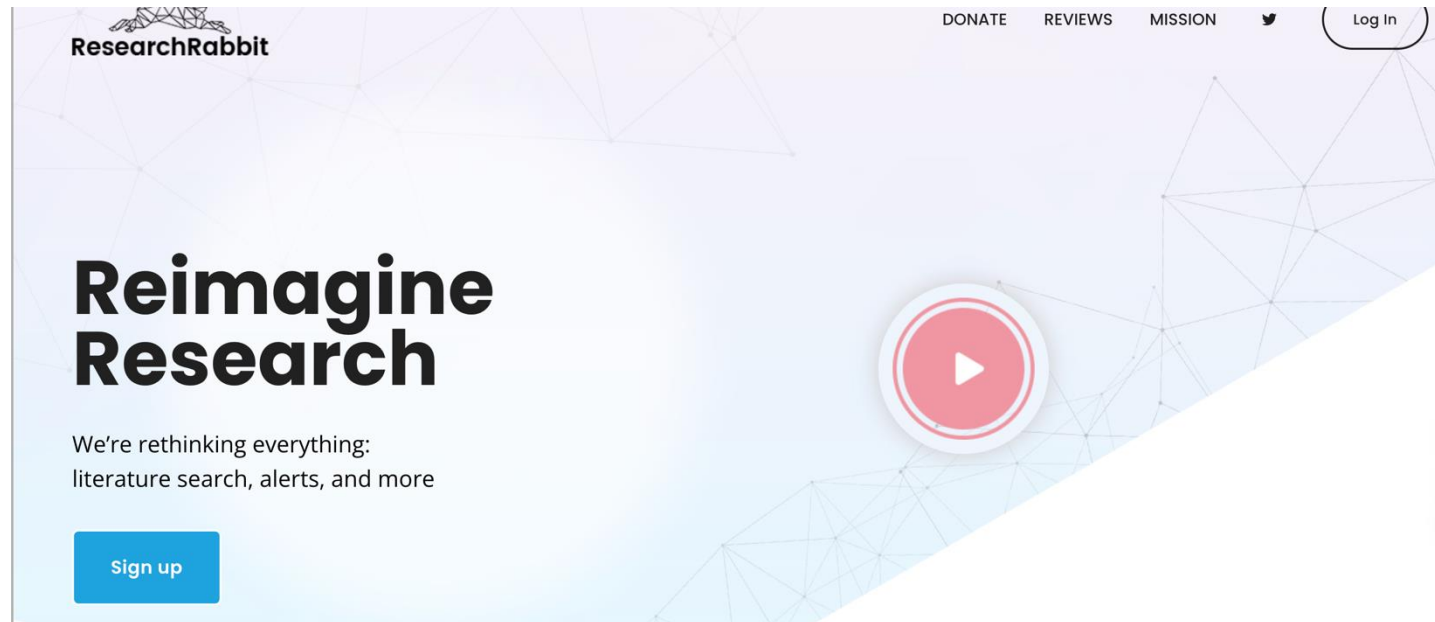
2. Literature review and establishment of the theoretical framework

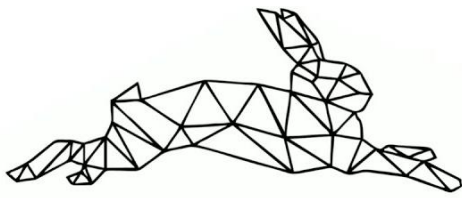




www.researchrabbit.ai

2. Literature review and establishment of the theoretical framework





2. Literature review and establishment of the theoretical framework



www.researchrabbit.ai

The screenshot displays the Research Rabbit interface, which is a tool for discovering and managing academic literature. The interface is divided into several sections:

- Left Sidebar:** Contains navigation options such as 'New Collection', 'New Category', 'Connect to Zotero', 'Uncategorized', 'Collection', 'Experiential Learning' (10 items), 'Untitled Collection' (10 items), and 'Shared with Me' (No collections).
- Filter Section:** Allows users to filter results by 'Abstracts' and 'Comments'. The current filter is 'Comments'.
- Collection List:** Displays a list of papers under the 'Experiential Learning' collection. Each entry includes a checkbox, a title, a year, and a count. For example, 'Research on Situated Learning Theory and Its New Development' (2014) has 0 comments, while 'Kurt Lewin's change model: A critical review of the role of leadership and employee involvement in organizational change' (2016) has 112 comments.
- EXPLORE PAPERS:** A section for exploring related papers, including 'Similar Work' (1878), 'Earlier Work' (34), and 'Later Work' (43).
- EXPLORE PEOPLE:** A section for exploring related authors, including 'These Authors' (34) and 'Suggested Authors' (153).
- EXPLORE OTHER CONTENT:** A section for exploring related content, including 'Linked Content' (13).
- EXPORT PAPERS:** A section for exporting papers in various formats: BibTeX, RIS, and CSV.
- Similar Work Section:** Displays a list of similar papers, including 'Situating Learning: Legitimate Peripheral Participation' (1991), 'Experiential Learning: Experience as the Source of Learning and Development' (1983), 'Kurt Lewin and the Planned Approach to Change: A Re-appraisal' (2004), 'Learning Styles and Learning Spaces: Enhancing Experiential Learning in Higher Education' (2005), 'Kurt Lewin and the planned approach to change: A re-appraisal' (2004), and 'Communities of Practice: Learning, Meaning, and Identity' (1998).
- Connections Section:** A network graph showing connections between the collection and 50 papers. The graph is titled 'Connections between your collection and 50 papers' and includes a 'Filter these items' search bar. The graph shows a complex network of nodes (papers) and edges (connections).
- EXPLORE PEOPLE:** A section for exploring related authors, including 'These Authors' (82) and 'Suggested Authors' (193).
- EXPLORE OTHER CONTENT:** A section for exploring related content, including 'Linked Content' (43).
- EXPORT PAPERS:** A section for exporting papers in various formats: BibTeX, RIS, and CSV.



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How to get started with Scopus AI?

1. From the **Scopus** homepage page, select the '**Scopus AI**' tab.

Start exploring

Documents Authors Researcher Discovery Organizations **Scopus AI *New***

Search within
Article title, Abstract, Keywords

Search documents *

+ Add search field + Add date range Advanced document search >



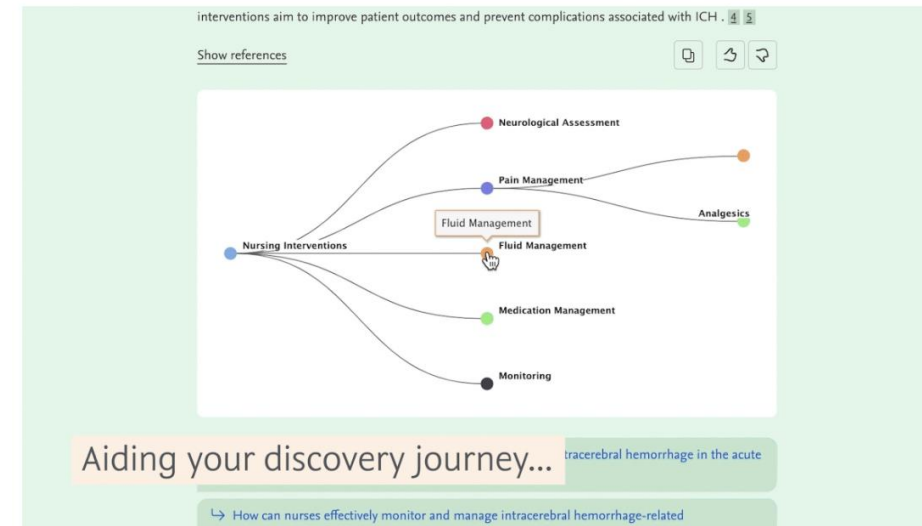
2. Enter your query in the field.

3. Press 'Enter' or select the search icon.

4. From the result page, you can:

- **View a cited document:** Select a numbered citation from the summary to open a side-panel showing the referenced document.

With Scopus AI's Concept Map, you can visualize links between research concepts, discover connections between topics and discover untapped frontiers to explore. The tool visually maps search results, offering a comprehensive overview that allows researchers to navigate complex relationships easily. The visualization takes the keywords of the abstracts and provides a bird's-eye view of the topic space. It shows how concepts fit together, and allows you to explore new vocabulary associated with a particular subject.

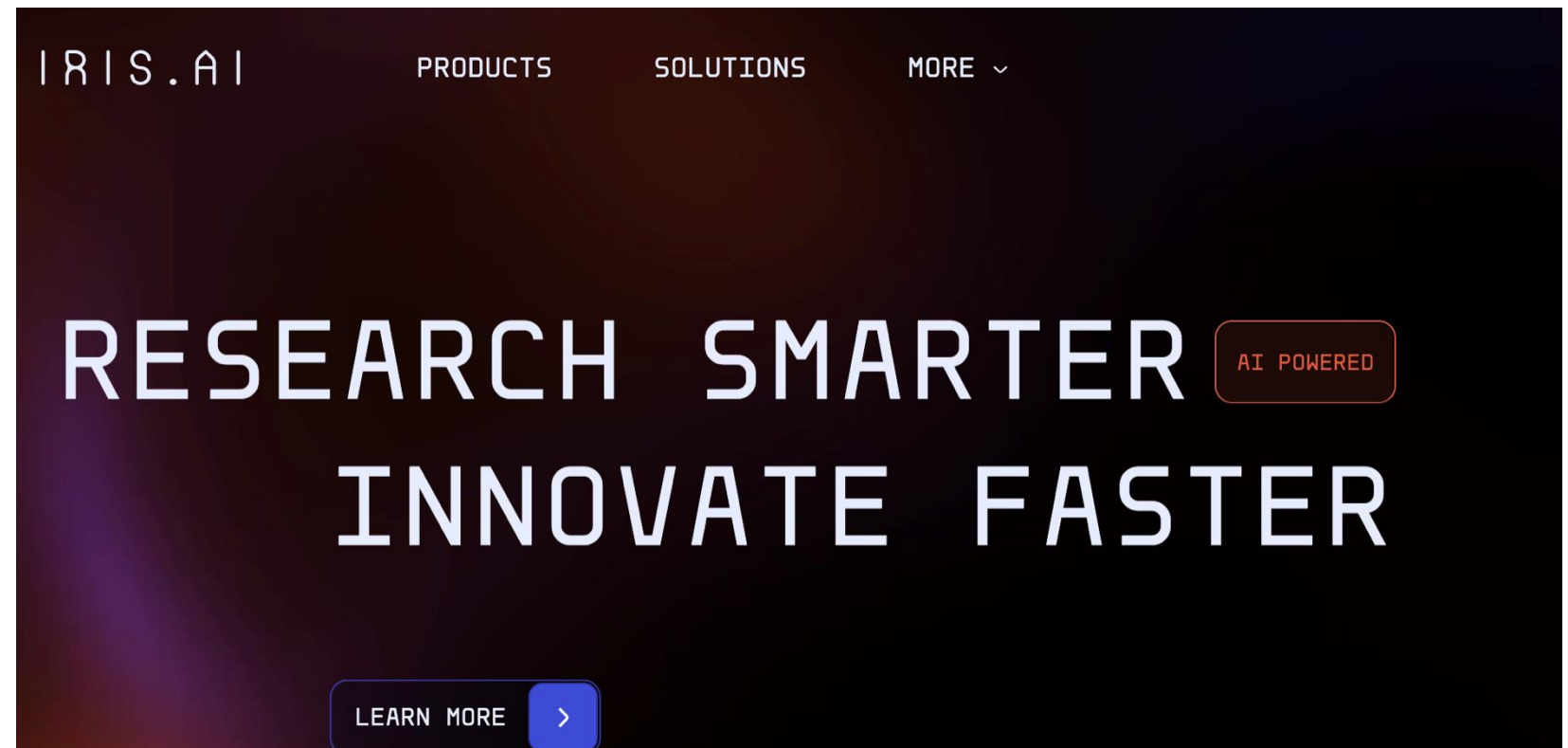


Scopus AI is an AI-driven research tool that uses the Scopus peer-reviewed research repository to help users understand and navigate unfamiliar academic content. Scopus AI generates summaries based on Scopus abstracts with references to help decipher complex content, facilitate deeper exploration, and provide academic insights



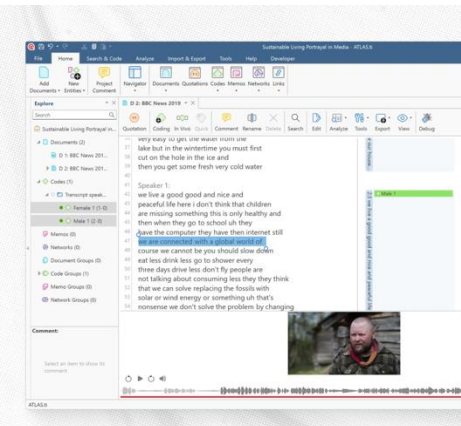
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3. Formulate
hypotheses or
objectives



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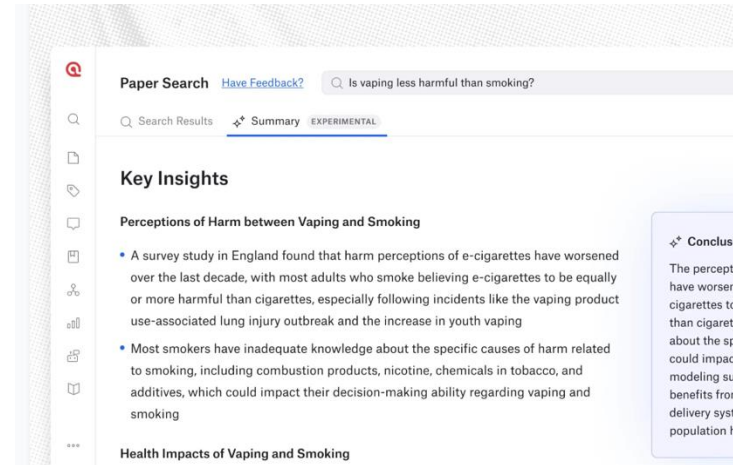


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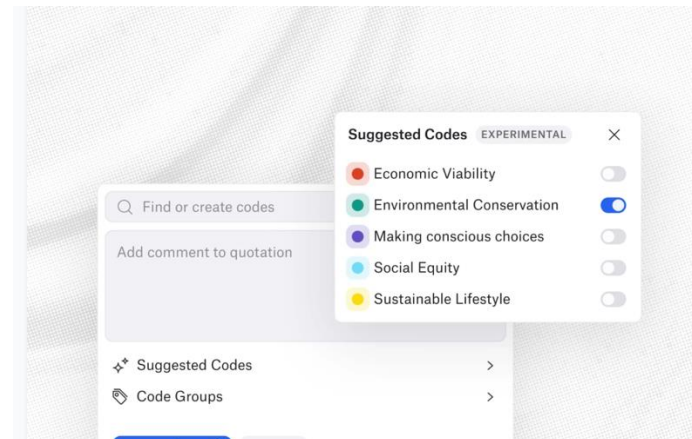
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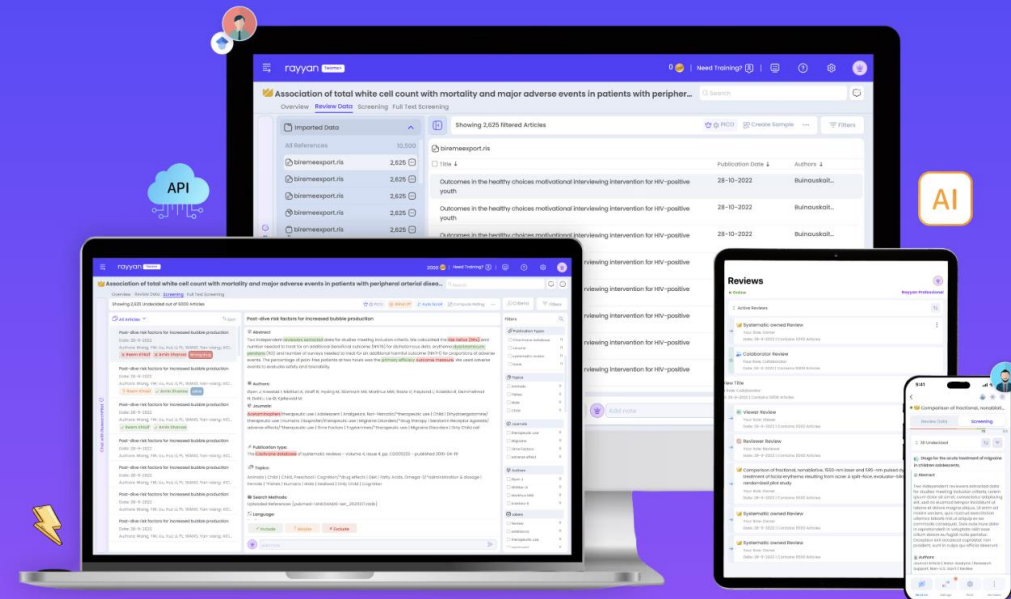
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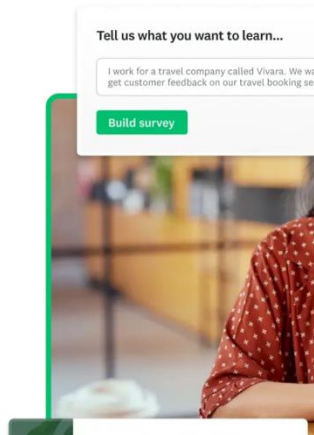
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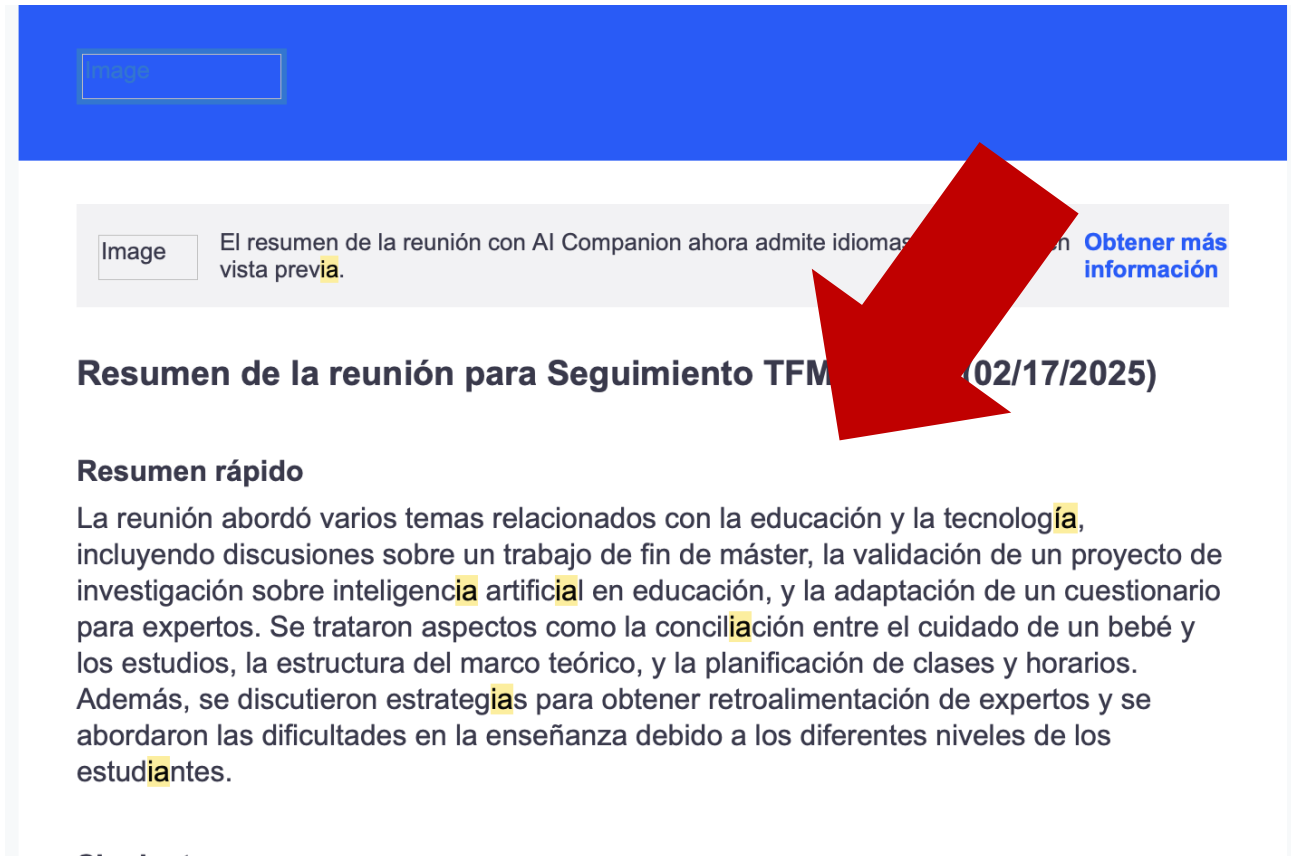


GPT para Google For...

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AI Companion Zoom offers features such as Meeting Summaries, Questions, Smart Recording, and a Whiteboard Content Generator.



Image

El resumen de la reunión con AI Companion ahora admite idiomas. [Obtener más información](#)

Resumen de la reunión para Seguimiento TFM (02/17/2025)

Resumen rápido

La reunión abordó varios temas relacionados con la educación y la tecnología, incluyendo discusiones sobre un trabajo de fin de máster, la validación de un proyecto de investigación sobre inteligencia artificial en educación, y la adaptación de un cuestionario para expertos. Se trataron aspectos como la conciliación entre el cuidado de un bebé y los estudios, la estructura del marco teórico, y la planificación de clases y horarios. Además, se discutieron estrategias para obtener retroalimentación de expertos y se abordaron las dificultades en la enseñanza debido a los diferentes niveles de los estudiantes.



6. Data analysis



Análisis de Datos y Reportes IA + ▾



ChatGPT



Sora



Scholar GPT



Scholar AI



1 más ▾



Explorar GPT



Análisis de Datos y Reportes IA +

Por Rodolfo Arce 👤

Análisis de Datos IA le proporciona asistencia experta en el análisis de datos, incluyendo el manejo de datos, estadísticas descriptivas, análisis inferenciales y técnicas de análisis exploratorio



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9. Writing and presentation of the research report

Text



DeepL



grammarly



ChatGPT Jasper



Paperpal

Gemini





DALL·E



beautiful.ai



Pitch

Algorithms can analyse thousands of pieces of data, but ...

05.
**Can we trust such
automated
analysis?**



Antonia Cascales Martínez
María José Martínez Segura



AI uses advanced neural networks to produce coherent and engaging texts (Cascales, 2025). By refining data from various domains, I continuously improve my results to adapt them to the changing needs of readers. This approach highlights the growing synergy between technology and creativity.

Reference

Cascales, A. (2025). *Reimagining authorship through artificial intelligence*. Fictitious Press.

06.

**Which limitation
of AI in education
are you most
concerned about
and how could it
be eased?**



Benefits

New findings

Efficiency and time saving

Customisation and improvement

Large-scale analysis

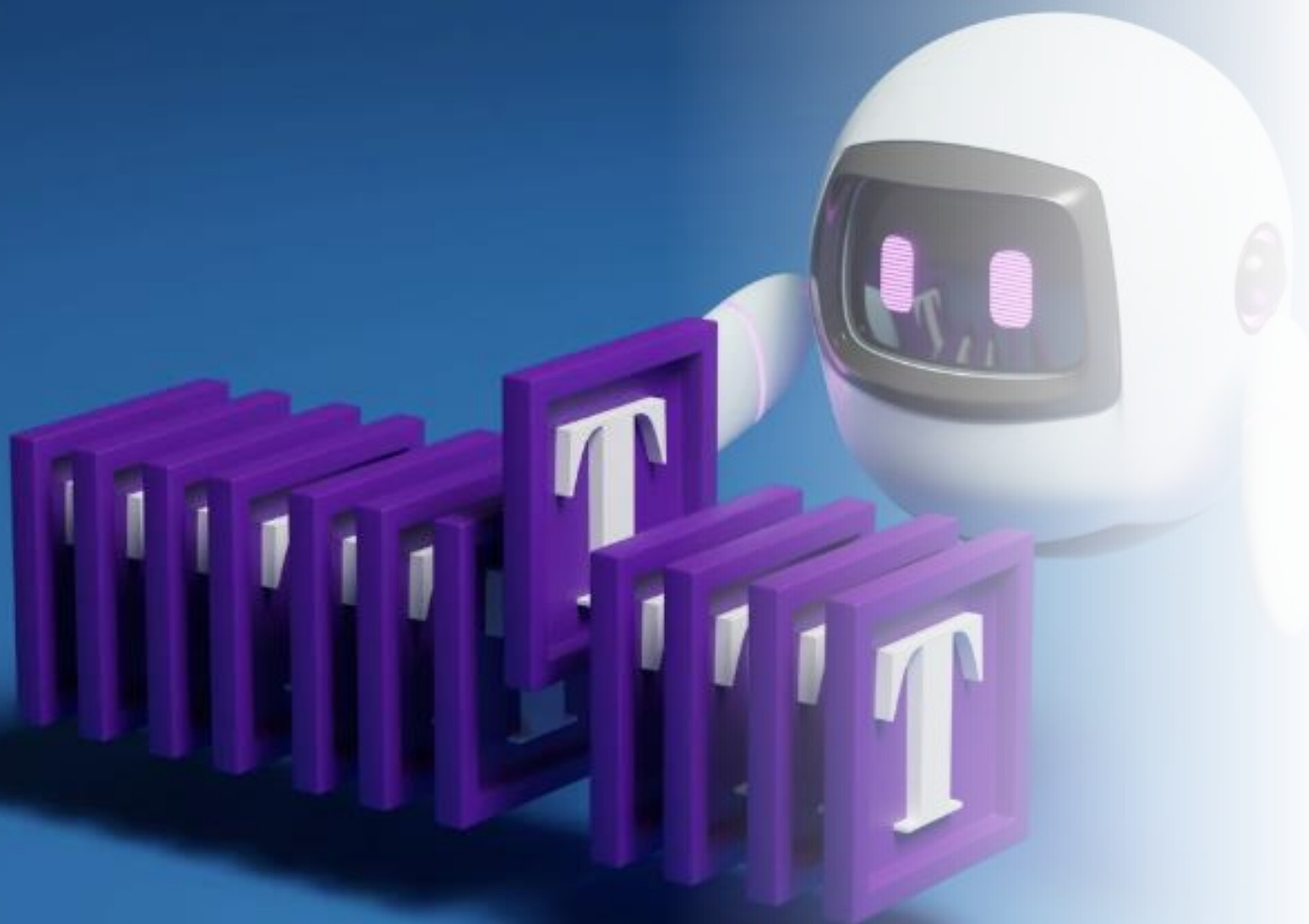
Limitations

Privacy and security

Lack of context and empathy

Data dependence





07. How do we ensure the ethical use of AI in educational research?



**Proportionality
and safety**

Security

**Privacy &
data
protection**

**Responsibility
&
accountability**

**Transparency
&
explainability**

**Human
oversight &
decision-
making**

Sustainability

**Awareness-
raising**

**Equity & non-
discrimination**

Ethics and Considerations in the use of AI

And in educational research

Responsible design

Algorithmic clarity

Data protection

Human oversight

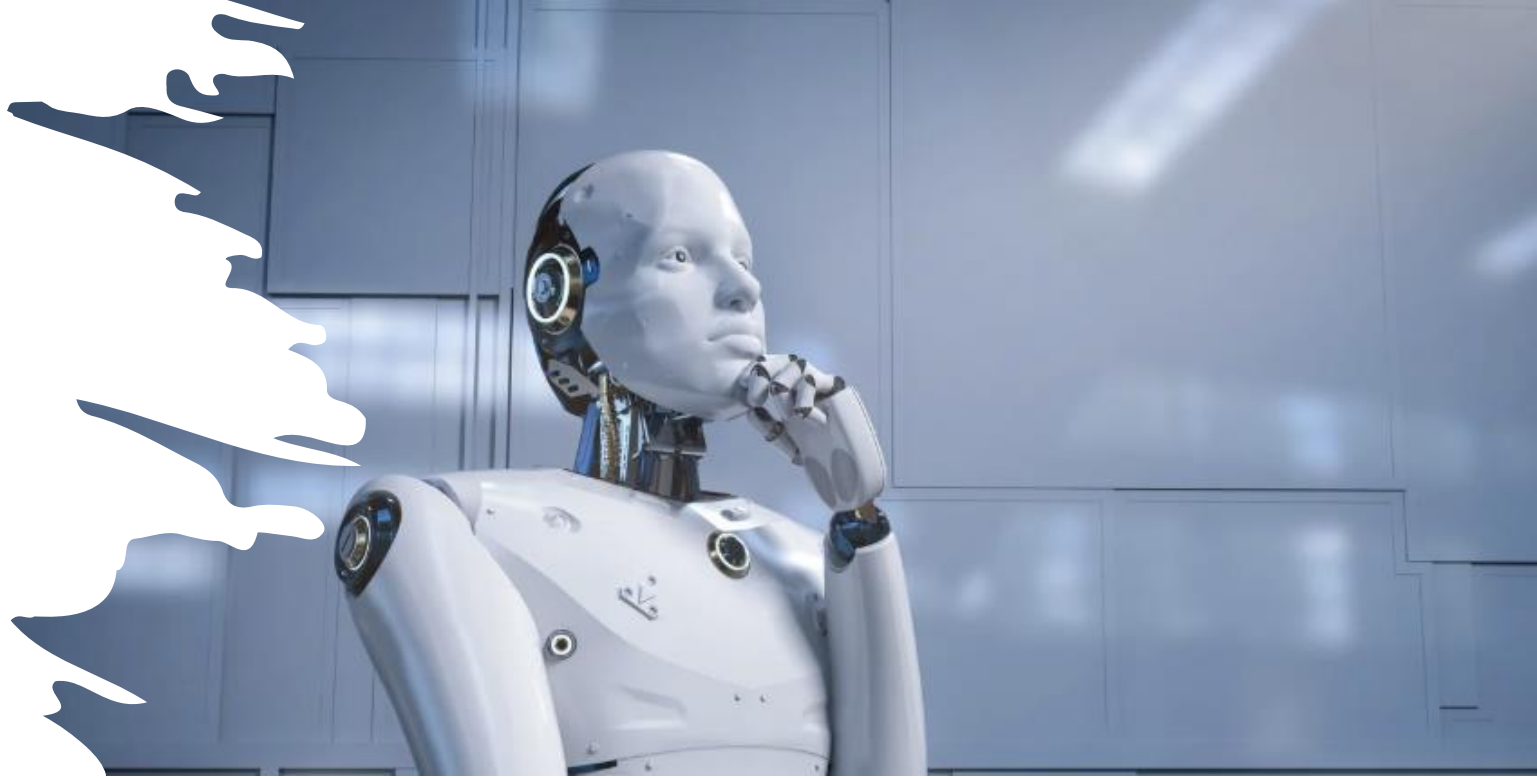
Ethical training



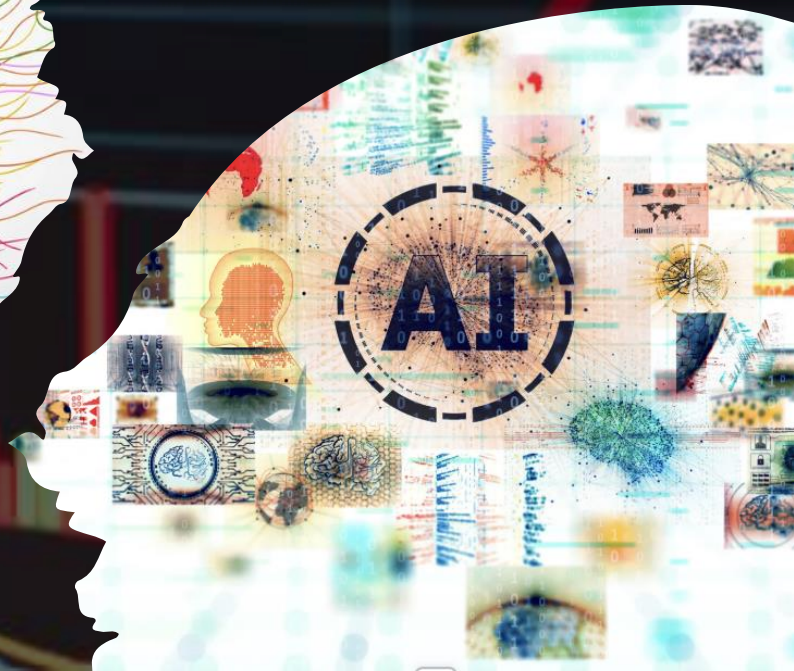
Let's imagine the year 2035...

08.

Will AI have transformed the way we research and teach in education?



- ❖ AI will personalise teaching through big data analysis and machine learning algorithms.
- ❖ Natural language processing will extract precise insights from qualitative data.
- ❖ Mixed methods will be adopted to gain a comprehensive view of educational processes.
- ❖ Integration with neuroscience and educational psychology will enhance the formulation of effective educational policies.
- ❖ Rigorous ethical protocols will ensure robust data oversight and protection, thereby guaranteeing equity and integrity.



Referencias

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The images in this presentation are from Canva, and it was designed using Microsoft PowerPoint.



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Educational research and Artificial Intelligence

Thank you

Dra. Antonia Cascales Martínez

Dra. María José Martínez Segura

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10 de marzo de 2025



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