

Trends in AI in Education and Implications for Teacher Education

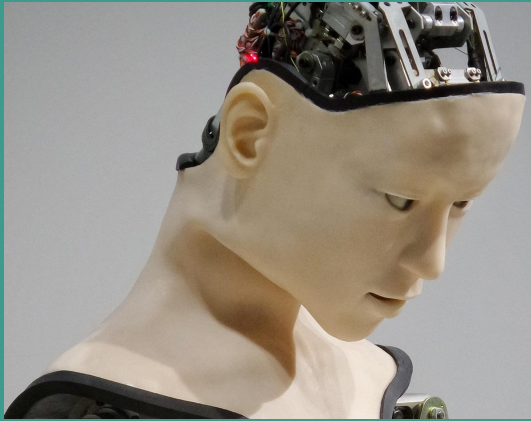
Professor Rose Luckin



What is Artificial Intelligence (AI)?



EC High-Level Expert Group on Artificial Intelligence definition within the European Commission's Communication on AI



https://ec.europa.eu/futurium/en/system/files/ged/ai_hleg_definition_of_ai_18_december_1.pdf

“Artificial intelligence (AI) refers to systems that display intelligent behaviour by analysing their environment and taking actions – with some degree of autonomy – to achieve specific goals.”

AI-based systems can be purely software-based, acting in the virtual world (e.g. voice assistants, image analysis software, search engines, speech and face recognition systems) or AI can be embedded in hardware devices (e.g. advanced robots, autonomous cars, drones or Internet of Things applications).”

AI is not new



AI Timeline - Good Old Fashioned AI (GOFAI). AI that cannot Learn

- 1950: The Turing test “Can Machines Think” and the Turing Test
- 1956: Dartmouth College meeting and statement - the birth of modern AI
- 1957: In 1957 Rosenblatt’s perceptron - the first neural network
- 1960s: The first chatbot called Eliza
- 1970s: Expert systems
- GOFAI rule-based systems and statistical methods culminating in ...
- 1997: IBM’s Deep Blue wins world chess championship
- AI Winter - we realised we had not cracked intelligence - vision is much harder than chess!

AI Timeline – The Rise of Machine Learning AI that can Learn

- Early 2000s: increased interest in machine learning using neural networks and statistical methods.
- 2011: Apple integrates Siri to the iPhone
- 2012: Alex Krizhevsky, creates the first CNN, AlexNet based on Fei Fei's model
- 2014: A chatbot called Eugene passes the Turing test
- 2014: Amazon launches Alexa
- 2017: Google's AlphaGo beats world champion at board game Go
 - Deep Neural Networks become the trend
- 2018: First LLMs created
- 2022: ChatGPT released and commercial LLMs proliferate

AI in Education is not New





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Recommendations

1. Resilience & Adaptability

- Online course: Literature and Mental Health: Reading for Wellbeing (4 days)
- Podcast: How you can become more resilient (5 minutes)
- Podcast: How To Be Confident (8 minutes)

2. Personal Development

- Article: How to Overcome Addiction and Make Permanent Changes in Your Life
- Article: Why is everyone so busy?
- Article: Thin Slices of Anxiety: Illustrated Meditation What It's Like...

Chat

The learning assets are arranged in horizontal trays of skills. The #1 skill for you is **Resilience & Adaptability** and placed at the top of this list.

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SimSensei uses backchannel behavior to indicate listening.

AI can sense behaviours based on multiple sources of data then advise/recommend

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Health Social Impact

Virtual humans inspire patients to open up, USC study suggests

The research holds promise for people with mental health issues, says social psychologist



Tanya Abrams • JULY 9, 2014



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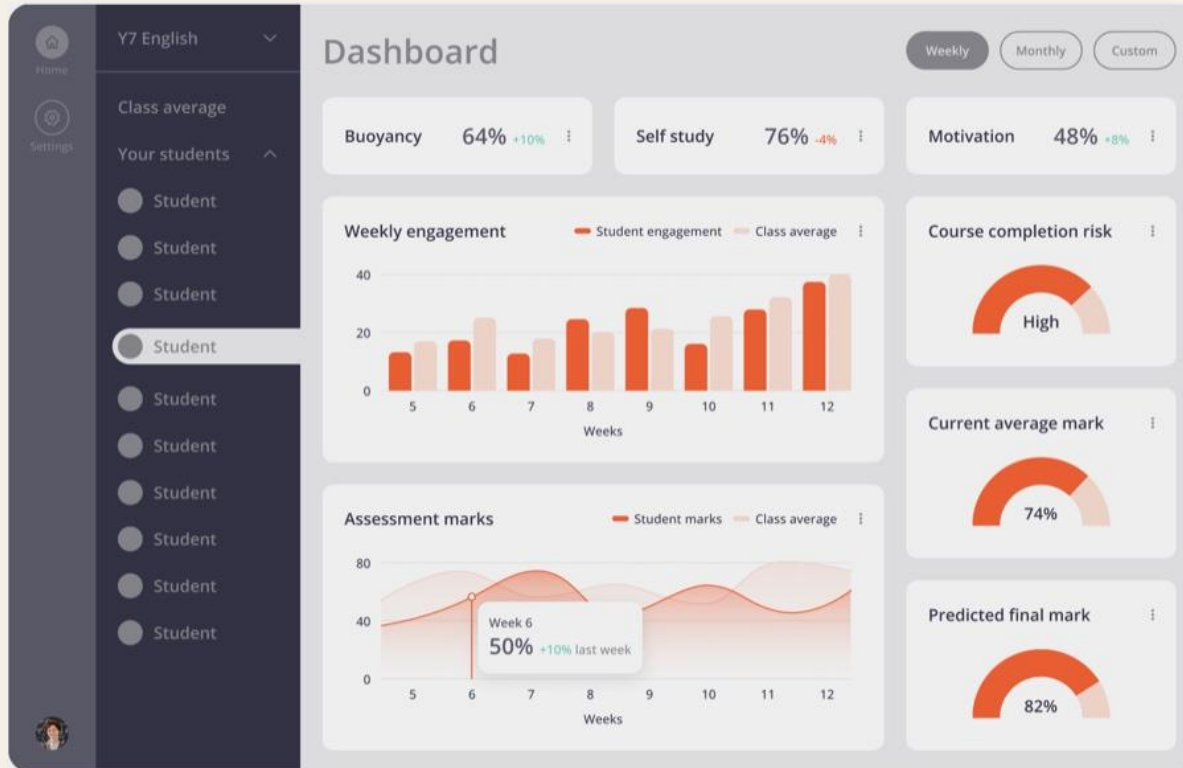
ICT Virtual Humans Change the Face of Training

Army chief of staff visits ICT

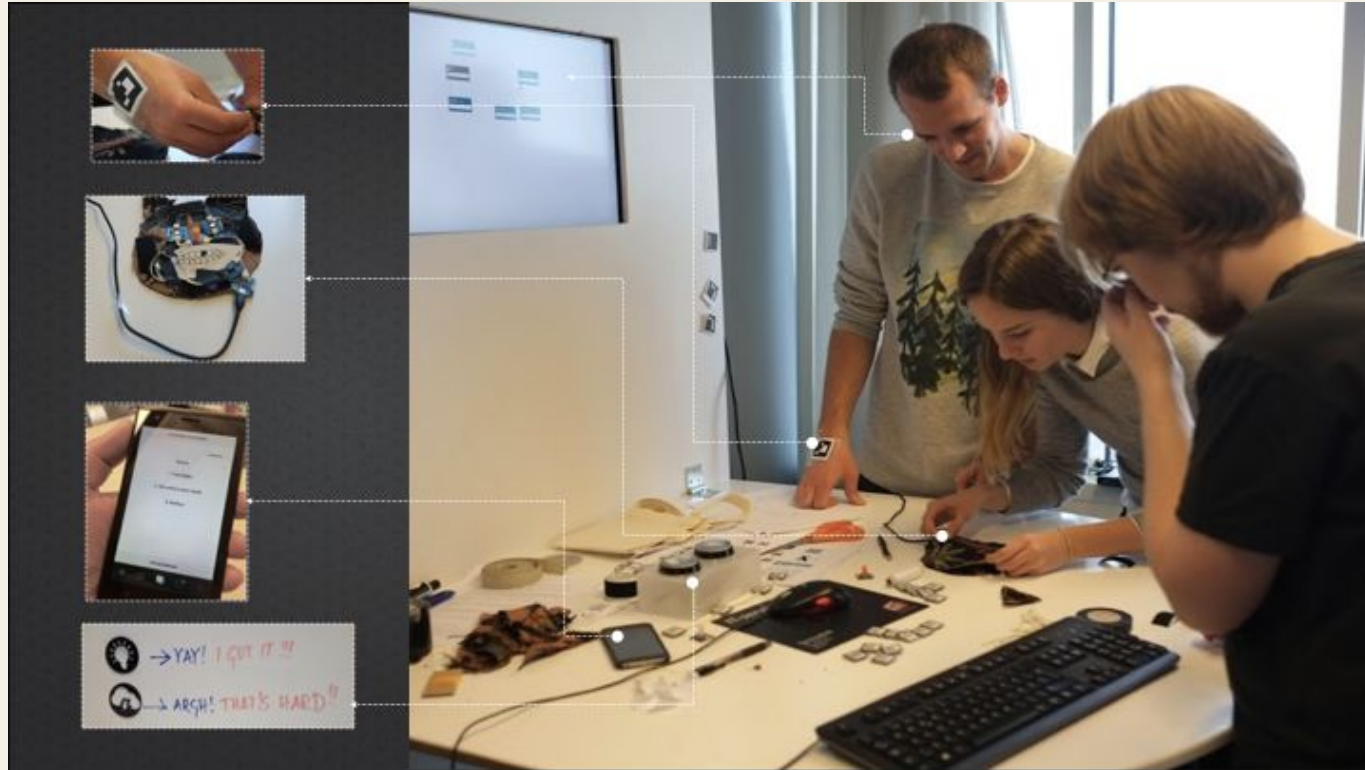
Which PTSD Symptoms Do the Most Damage?

AI can also provide enhanced analytics that can show the learning process as it happens

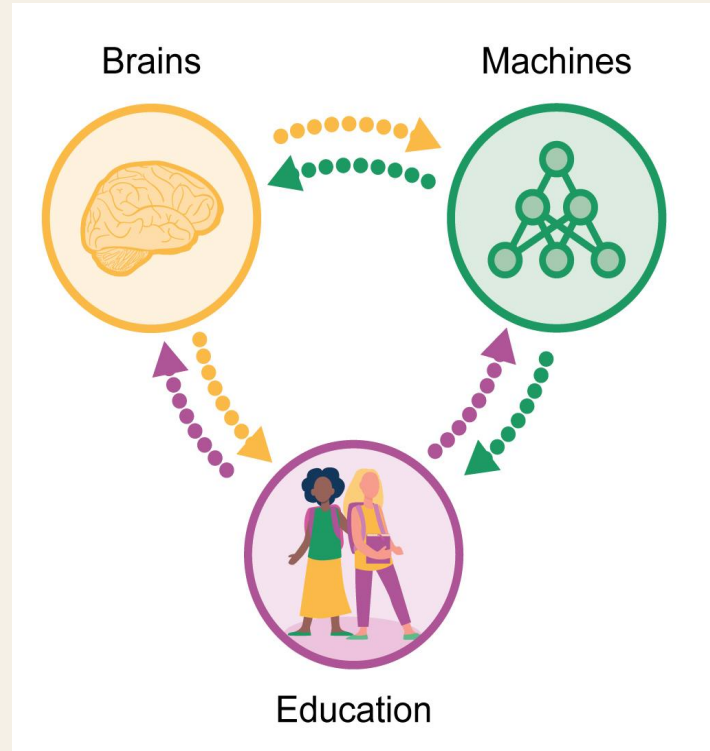
Dashboards



Multi-modal data



And increasingly brain data will be available



But freely
available AI is
new





ERNIE Bot: Baidu's Knowledge-Enhanced Large Language Model Built on Full AI Stack Technology

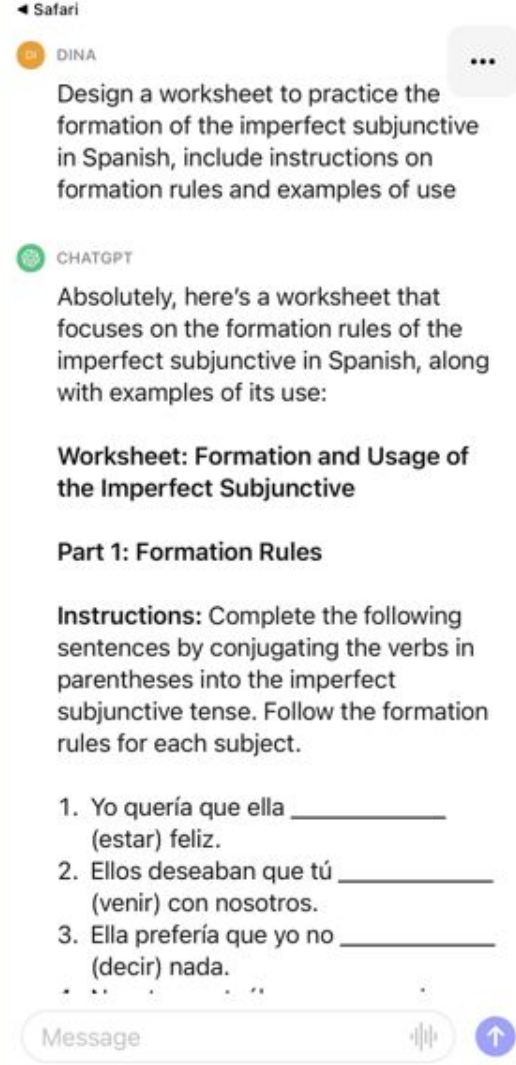
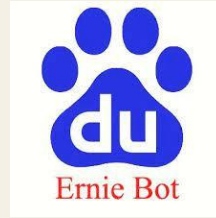
🕒 2023-03-24

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Baidu introduced [ERNIE Bot](#), its latest generative AI product and knowledge-enhanced large language model (LLM), on March 16, 2023. This advanced technology can comprehend human intentions and deliver accurate, logical, and fluent responses approaching human level. During a press conference at Baidu's headquarters in Beijing, Baidu Co-founder, Chairman, and CEO, Robin Li showcased the comprehensive abilities of ERNIE Bot, in five scenarios: literary creation, business writing, mathematical calculation, Chinese language understanding, and multi-modal generation.

ERNIE Bot is a culmination of years of research and industry practices by Baidu, said Haifeng Wang, CTO of Baidu. Below is a deep dive into the technology behind ERNIE Bot.

But scaled
technology that is
freely available,
such as ChatGPT,
is new.





← → ↻ bing.com/search?q=Design.+worksheet+to+practice+the+formation+of+the+imperfect+subjunctive

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Sure, I can help you with that! Here is a worksheet to practice the formation of the imperfect subjunctive in Spanish:

Instructions	Examples
Use the third person plural (ellos/ellas) form of the preterite tense.	Hablar: hablaron → hablaran
Drop the -ron ending.	Hablaran → habla-
Add the appropriate imperfect subjunctive endings.	Habla- + -ra, -ras, -ra, -ramos, -rais, -ran

Now that you know the formation rules, here are some examples of how to use the imperfect subjunctive:

1. Esperaba que **vinieras** a mi fiesta. (I hoped you would come to my party.)
2. Era importante que **estudiáramos** para el examen. (It was important that we studied for the exam.)
3. Deseaba que **fuera** más fácil. (I wished it were easier.)

I hope this helps! Let me know if you have any other questions.

Learn more: [1. spanishboat.com](https://1.spanishboat.com) [2. teacherspayteachers.com](https://2.teacherspayteachers.com) +2 more

1 of 4 ●





STABLE DIFFUSION XL

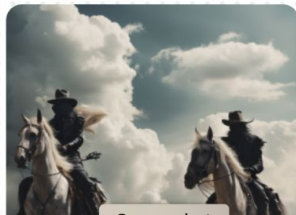
SDXL 1.0: A Leap Forward in AI Image Generation

Enter your prompt



Generate

TRY AN EXAMPLE



What has changed?

- Access to huge datasets
- Improvements in processing power of computers
- AI systems have become very impressive and are now used in many disciplines
- Easily available to use
- Human like behaviour making interactions very accessible

The landscape is changing very quickly...

- Policy, frameworks and guidelines are developing
- Products are rapidly adapting

What are the implications of AI for Education?



1

AI tools:

Using AI in Education to tackle some of the big educational challenges

2

Skills focus:

Changing Education so that we focus on human intelligence and prepare people for an AI world

3

Learning about AI:

Educating People about AI so that they can use it safely and effectively

Artificial intelligence in Education

AI tools

Using AI in Education to tackle some of the big educational challenges





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Recommendations

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Horizontal Gaze, Vertical Gaze, Head Eye Offset of Left Eye Offset, Head Angle, Smiling Level, Speaking Fraction, Mouth Open (3)

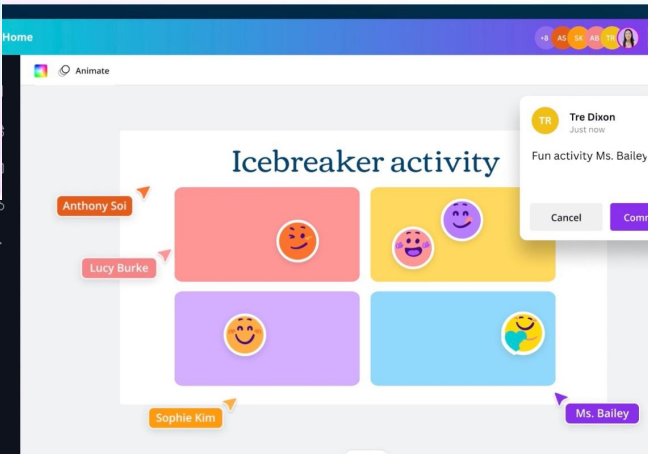
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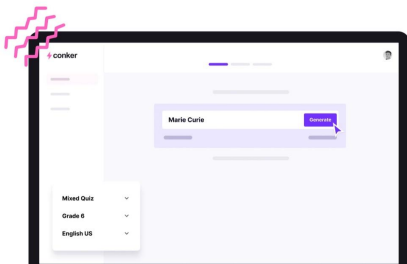
As seen on:



Create Awesome Assessments In a Flash

Powered by AI, and brought to you by Mote Technologies, Conker is your number one online quiz creator.

Launch Conker View features



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The Digital People Platform

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Developer Hub



Examples of AI tool functionality

- Adaptive or personalised learning paths and feedback
- Automated grading
- Adaptive assessment
- AI powered dashboards for learner analytics
 - Content generation for students and educators
- Chatbots
- Teacher assistants

New Skills focus

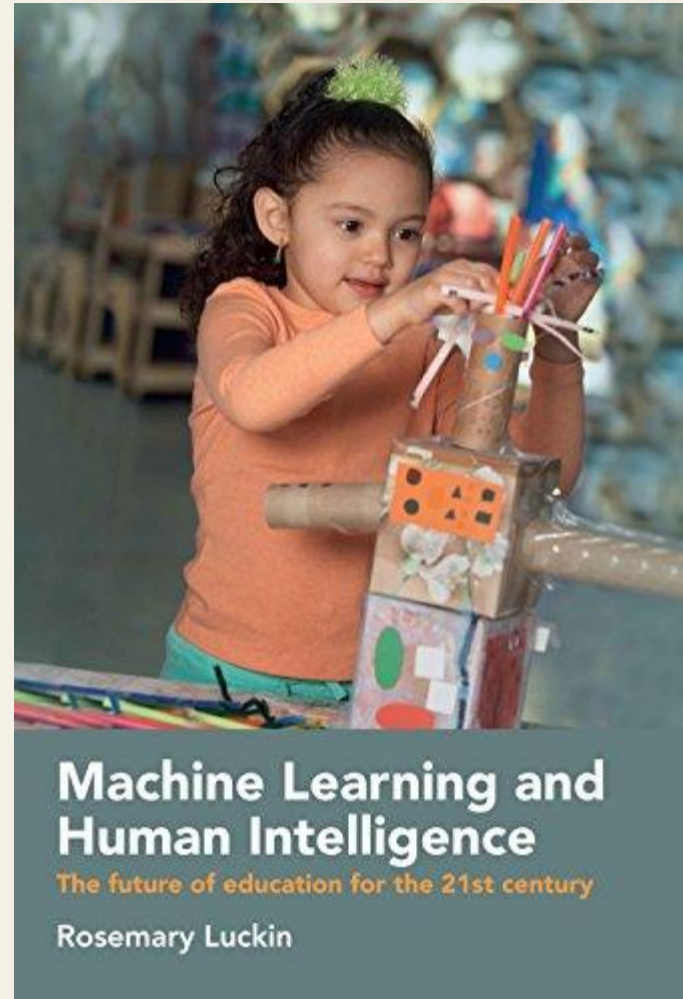
Changing Education so that we focus on human intelligence and prepare people for an AI world



Learning is Complex

Our ability to learn must continue
to evolve to be ever more
sophisticated

https://www.educateventures.com/_files/ugd/c43582_3950bb11755d4306ba9dc33811bbfc25.pdf

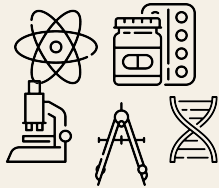




3. Social intelligence

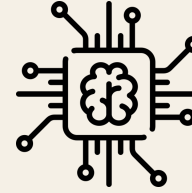


2. Meta-knowing intelligence



1. Interdisciplinary Academic intelligence

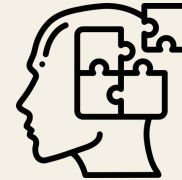
4. Meta-cognitive intelligence



5. Meta-subjective intelligence



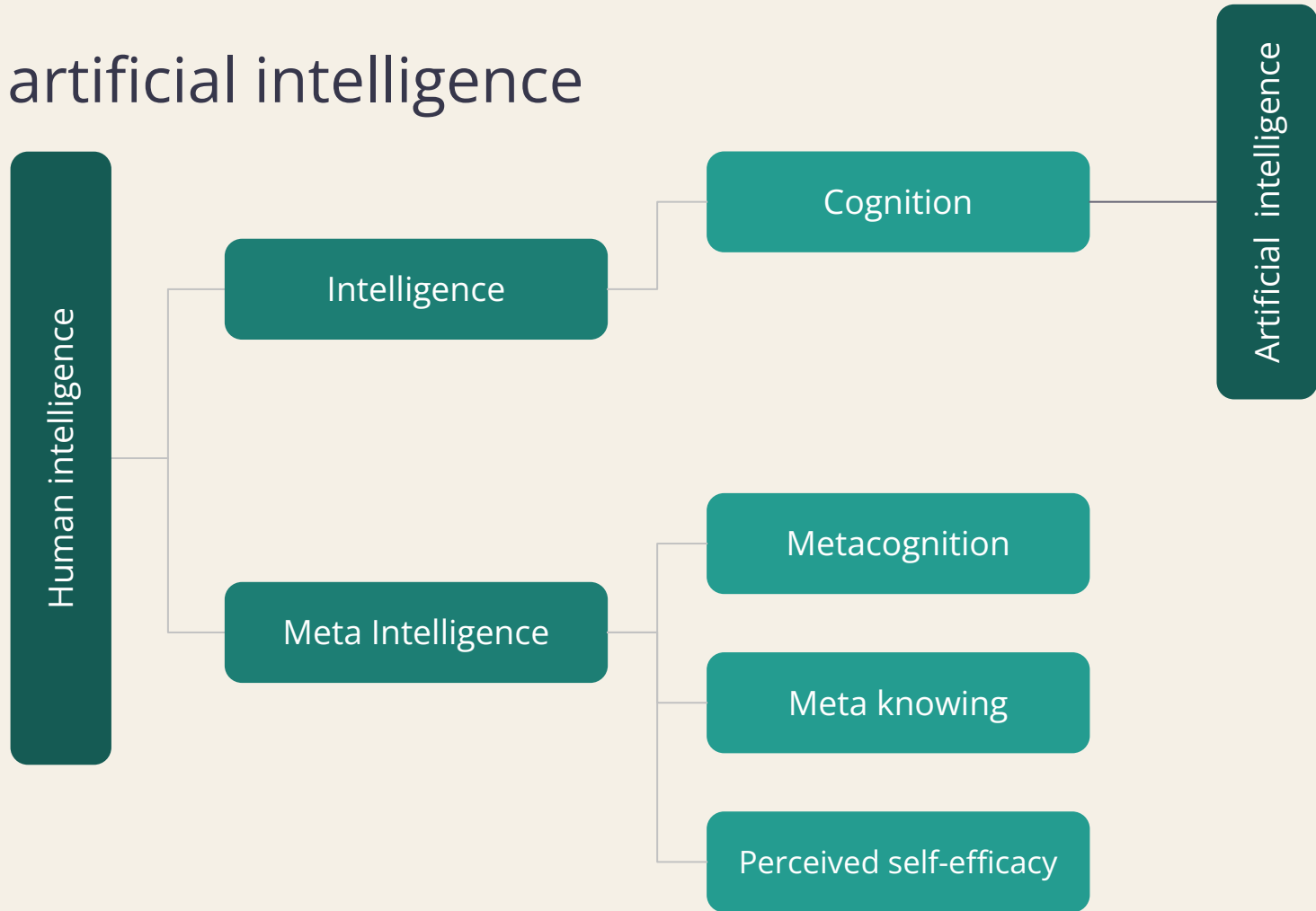
6. Meta-contextual intelligence



7. Perceived self-efficacy



Human vs artificial intelligence



A Framework for Living in Prosperity with AI

Numeracy

Literacy



A Framework for Living in Prosperity with AI



A Framework for Living in Prosperity with AI

AI Literacy

A non-technical. What AI is, how it is different from Human Intelligence. What AI is good at and how to use AI effectively and responsibly

Numeracy



Literacy



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Learning Mastery

How to learn, how to know what you do and don't know and how to plan and regulate your learning

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Knowledge Mastery

Knowledge about the World, Knowledge about Knowledge and Knowledge about ourselves

Numeracy



Literacy



A Framework for Living in Prosperity with AI

Traditional Subject Areas

AI Literacy

A non-technical. What AI is, how it is different from Human Intelligence. What AI is good at and how to use AI effectively and responsibly

Learning Mastery

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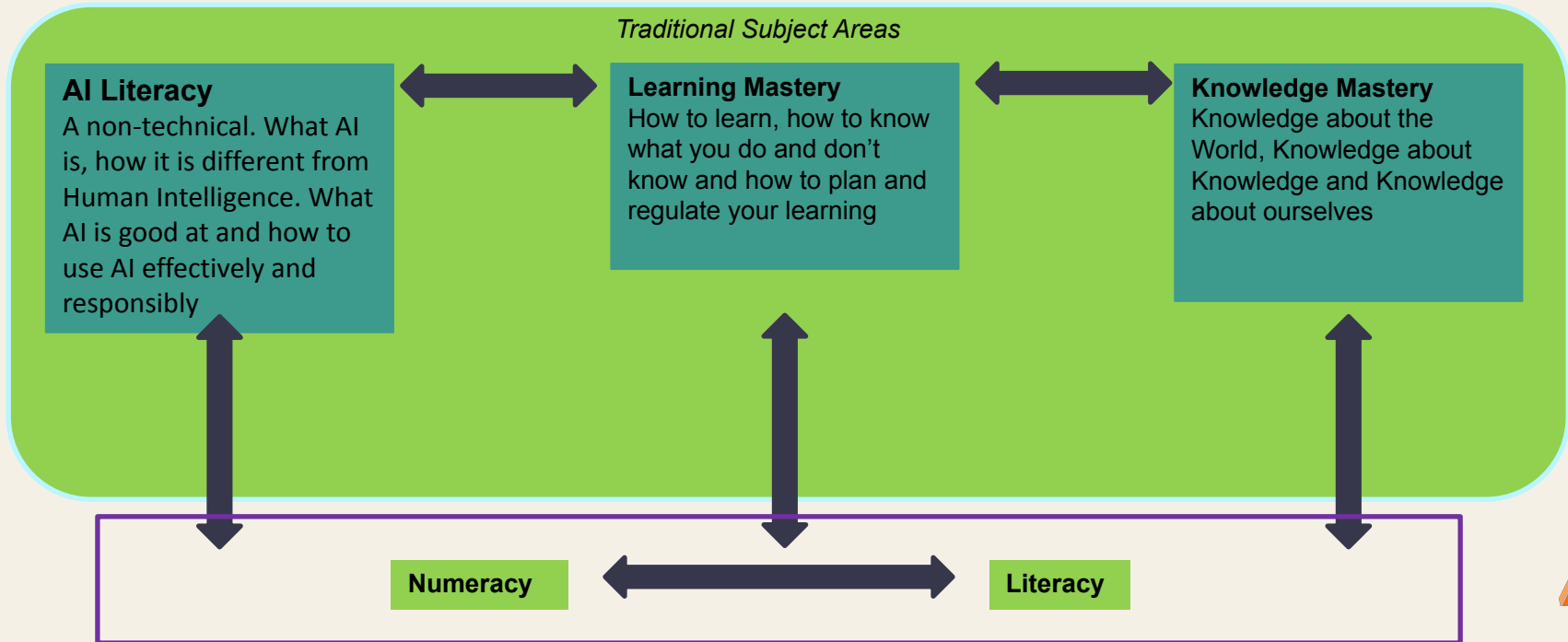
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Literacy



A Framework for Living in Prosperity with AI



Learning about AI

Educating People about AI so that they can use it safely and effectively

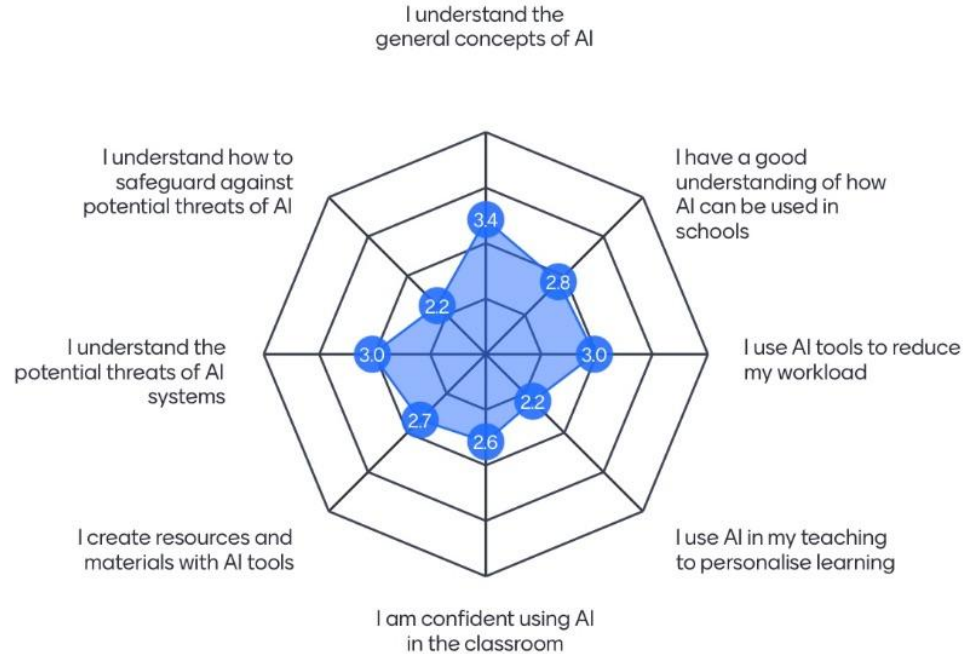


Skills focus

Changing Education so that we focus on human intelligence and prepare people for an AI world

- What does it mean for my school?
- What does it mean for my teaching?
- What does it mean for my learners?

AI awareness check



How might we go about that?

Training for staff

- What is AI? What tools are available?
- How might you use it in your teaching?
- What are the risks?

Awareness for students

- What is AI? What tools are available?
- How should you consider using it?
- Will this impact my future?

Policy

- What is our AI policy as an institution?
- How can we ensure equal access?
- Ethics – NB the IEAIED

The challenges and opportunities for schools and teachers

- What new competencies will educators need to leverage AI effectively?
- How should teacher training programs adapt?
- How can educational organisations develop effective strategic plans in order to help them leverage AI for their teachers and learners?
- What is the impact on the teaching profession as more and more workplace and professional activities are automated?

How can
Education
approach and AI
Strategically?



1

Sector leadership on AI (and Edtech) All sectors are grappling with the risks and opportunities of AI tools.

2

Education Institutions need AI **strategies** Educational Institutions with effective AI strategies will gain benefits, Proportionate strategy-making with a focus on cost-neutrality and early benefits would likely be successful.

3

Capacity building is critical Human behaviour changes pose the greatest challenges in AI and Edtech implementation.

How can
Education act to
leverage AI h for
their benefit?

Vision: The ambition for AI and EdTech within the institution

Governance and ethics: What are the parameters in which AI and EdTech will be explored, tested and implemented

Iterative Unit applications: Where will AI and EdTech be applied? For example, 24/7 teaching support, admin...

Technology and Data: Can the institution support the tools and processes of AI and EdTech?

Staff Capability: What are the implications of the AI and EdTech strategy for for all staff wherever they work?

Big questions...

Do we **really** need to understand AI?
Why? What does that **mean** for us?

What can AI **do**?
What are the **benefits**? How can it **help** us with our **priorities**?

What does our AI **journey** look like?
Where are we going? **How** will we get there?

What should we be **concerned** about?
What are the **threats**? How can we **mitigate** them

Ethics must also
be considered



IOE professor co-founds the UK's first Institute for Ethical Artificial Intelligence in Education

18 October 2018



conceived by Sir Anthony Seldon, Priya Lakhani OBE, and Professor Rose Luckin

The Institute for Ethical AI in Education

The Ethical Framework for AI in Education

The Institute for Ethical AI in Education has been kindly funded by:



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<https://www.buckingham.ac.uk/wp-content/uploads/2021/03/The-Institute-for-Ethical-AI-in-Education-The-Ethical-Framework-for-AI-in-Education.pdf>

The Institute for Ethical AI in Education



The Ethical AI in Education Framework

The Institute for Ethical AI in Education



Objective	Criteria	Checklist
Transparency and Accountability. Humans are ultimately responsible for educational outcomes and should therefore have an appropriate level of oversight of how AI systems operate (See Annex Section 7 for justification)	7.1 Conduct a risk assessment to establish whether AI resources could undermine the authority of practitioners and disrupt accountability structures, and take action based on the risk assessment	Will implementing the actions arising from this risk assessment ensure that the authority of educators and/or other relevant practitioners is not undermined, and that accountability structures are not disrupted as a result of using AI? (Pre-procurement)
	7.2 Insist that suppliers make explicit whether there were any trade-offs between accuracy and explainability in the design of the AI resource, specifying where any compromises have been made and providing a justification	Have you received the relevant information from the suppliers? Where compromises have been made, are you satisfied with the justification you have received? (Pre-procurement)
Informed Participation. Learners, educators and other relevant practitioners should have a reasonable understanding of artificial intelligence and its implications (See Annex Section 8 for justification)	8.1 Teach students about artificial intelligence and its societal and ethical implications	Where in the curriculum, or when during extracurricular time, will students be taught about this? What content will they learn? (Implementation)
	8.2 Provide educators and/or other relevant practitioners with sufficient training to ensure that they are able to use AI resources effectively, discerningly and with confidence. As part of this training, educators and practitioners should be trained to scrutinise the decisions made and behaviours displayed by AI systems, in order to guard against undue deference	What will the content of this training be, and how much training will educators and/or other relevant practitioners receive? (Implementation)
Ethical Design. AI resources should be designed by people who understand the impacts these resources will have (see Annex Section 9 for justification)	9.1 Insist that suppliers provide relevant information to confirm that a range of stakeholders (e.g. learners, educators, careers advisers, youth workers) were consulted as part of the design process	What information have you received from the suppliers, and are you satisfied that a range of stakeholders (e.g. learners, educators, careers advisers) were consulted as part of the design process? (Pre-procurement)
	9.2 Insist that suppliers provide relevant information to confirm that a diverse range of people contributed to the design and development of the AI resource	What information have you received from the suppliers, and are you satisfied that a diverse range of people contributed to the design of the AI resource? (Pre-procurement)
	9.3 Ensure that the supplier can confirm that AI resources were designed by practitioners who have had training on the ethical implications of AI in education	What information have you received from the suppliers, and are you satisfied that AI resources were designed by practitioners who have had training on the ethical implications of AI in education? (Pre-procurement)

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Objectives:

1. Achieving Educational Goals
2. Forms of Assessment
3. Administration and Workload
4. Equity
5. Autonomy
6. Privacy
7. Transparency and Accountability
8. Informed Participation
9. Ethical Design

To conclude

- AI is increasingly ubiquitous and we must all engage with learning more about what it is and how it works (non technical for most);
- Educational organisations need a strategic plan for AI including ethical governance;
- Capacity building within the teaching workforce is essential to build a confident and competent workforce who can apply AI and help students apply AI;
- Education and Educators should lead the way in developing advanced Human Intelligence through the development in students of sophisticated thinking expertise

Some useful resources



Book

<https://www.routledge.com/AI-for-School-Teachers/Luckin-George-Cukurova/p/book/9781032037714>

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Thank You

