The Digital Futures of Work and Learning in Age of Artificial Intelligence

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Between banning and engaging ChatGPT

- In January 2023, the New York City Department of Education restricted access to ChatGPT from its public-school internet and devices.

- Some universities return to 'pen and paper' exams.

- Other universities allow use of AI in assignments, if disclosed.

What is ChatGPT?

The world's most advanced chatbot thus far

A state-of-the-art language model (a variant of OpenAI's Generative Pretrained Transformer (GPT) language model)

Designed to generate text that can be indistinguishable from text written by humans

It can engage in conversation with users in a seemingly natural and intuitive way

It can create impressive prose within seconds

ChatGPT: Bullshit spewer or the end of traditional assessments in higher education?

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Abstract

ChatGPT is the world's most advanced chatbot thus far. Unlike other chatbots, it can create impressive prose within seconds, and it has created much hype and doomsday predictions when it comes to student assessment in higher education and a host of other matters. ChatGPT is a state-of-the-art language model (a variant of OpenAI's Generative Pretrained Transformer (GPT) language model) designed to generate text that can be indistinguishable from text written by humans. It can engage in conversation with users in a seemingly natural and intuitive way.

In this article, we briefly tell the story of OpenAI, the organisation behind ChatGPT. We highlight the fundamental change from a not-for-profit organisation to a commercial business model. In terms of our methods, we conducted an extensive literature review and experimented with this artificial intelligence (AI) software. Our literature review shows our review to be amongst the first peer-reviewed academic journal articles to explore ChatGPT and its relevance for higher education (especially assessment, learning and teaching). After a description of ChatGPT's functionality and a summary of its strengths and limitations,

Introduction

I have the knowledge, I have the lived experience, I'm a good student, I go to all the tutorials and I go to all the lectures and I read everything we have to read but I kind of felt I was being penalised because I don't write eloquently and I didn't feel that was right.
('Essay Witch', a student in New Zealand who used AI tools for their assignments, cited in Heyward, 2022)

The advent of new education technology often engenders strong emotions, ranging from doomsday predictions to unbridled euphoria. GPT-3 and ChatGPT (which is based on GPT-3) are no exceptions. Already GPT-3's introduction garnered a mix of enthusiastic and alarmist responses in news outlets. The BBC asked in its title whether, with GPT-3, we have seen our AI future (Cellan-Jones, 2020). The New York Times wrote that machines "are getting terrifyingly good" at writing (Manjoo, 2020). *The Economist* (2020) noted that "GPT-3 can be eerily human-like – for better and for worse". The Telegraph opined that "we should be very

ChatGPT: Bullshit spewer or the end of traditional assessments in higher education?

Recommendations for Faculty (Assessments)

- Teach students to use chatbots **responsibly** rather than banning them.

- Provide students with opportunities to write about topics they are truly interested in, where their **opinions are valued**, and their **voices are heard**.

- Create **authentic assessments** that engage students in creative, meaningful, and intrinsically motivating learning experiences and test their knowledge and skills.

- Use AI tools in discussions and assignments and educate students on their **judicious** use and the **limitations of text generators** with examples and highlighting the **value of human** writing.

- The use of **chatbots in assessments** should be **differentiated** and non-binary. Students should highlight which steps in their research and writing process AI tools were used, and take responsibility for potential mistakes, copyright violations, and plagiarism.

- Teach students the importance of **(academic) integrity, ethics** and personal **accountability** – responsible for the quality of their work.

Clash of the Tech Titans

- **ChatGPT: 100 million monthly active users within two months**

- (Compare: TikTok, the world's fastest-growing social-media sensation: nine months)

- **Microsoft's chance to challenge Google Search**

- **Microsoft's Bing Chat**

- **Alphabet's Bard**

- **Baidu's Ernie** etc.

ChatGPT Alternatives

ChatGPT is just one chatbot that runs on OpenAI's large language models, GPT-3.5 (free version) or the more sophisticated GPT-4 (premium).

- Anthropic's Claude.ai (can process longer documents in prompts)
- Meta's Llama
- Google's Bard
- Microsoft's Bing combines search with GPT-4

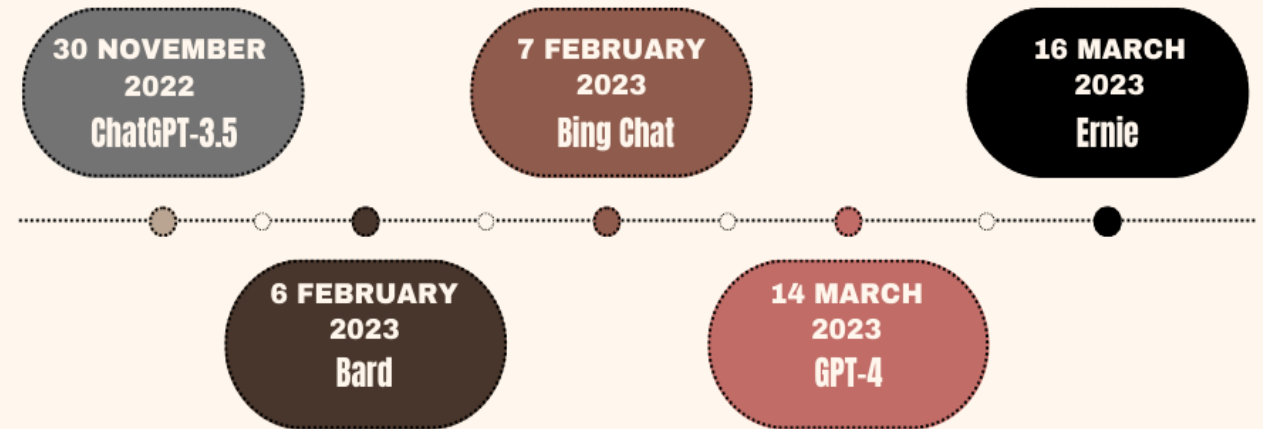- Poe.com allows you to use a number of different models (free and subscriber options):

We could have included other bots, but we decided to focus on the dominant names most relevant to higher education.

Timeline of major LLM-based chatbot launches

30 NOVEMBER 2022
ChatGPT-3.5

7 FEBRUARY 2023
Bing Chat

16 MARCH 2023
Ernie

6 FEBRUARY 2023
Bard

14 MARCH 2023
GPT-4

War of the chatbots: Bard, Bing Chat, ChatGPT, Ernie and beyond. The new AI gold rush and its impact on higher education

Evaluation method

- **Systematic comparison of higher education-relevant capabilities of large language model-based chatbots.**

- **Sample: The *four selected chatbots* are by far the most talked-about and appear to be the most capable ones in the context of higher education**

Chatbot	Price	Features
ChatGPT (GPT-3.5)	Free	Conversational Code-writing capability More simplistic and formulaic than GPT-4 Hallucinates
ChatGPT (GPT-4)	US$20 per month	Largely a more sophisticated version than ChatGPT-3.5 with more precise and articulate prose Hallucinates
Bing Chat	Free	Internet access Provides hyperlinks to sources Uses GPT-4 Succinct No hallucinations.
Bard	Free	'google it' feature Conversational Hallucinates

Test

We asked the Bots *15 questions* and accessed and mark them.

The questions come from a wide variety of academic disciplines:

Sociology, business, mathematics, history, economics, philosophy, American literature, psychology, art history, and German literature.
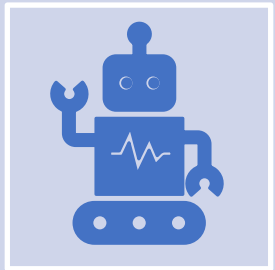
We also tested the bots on Chinese-language non-fiction, literature searches and annotation tasks of English-language and Chinese- language academic literature. All questions are related to higher education assignments and exams.

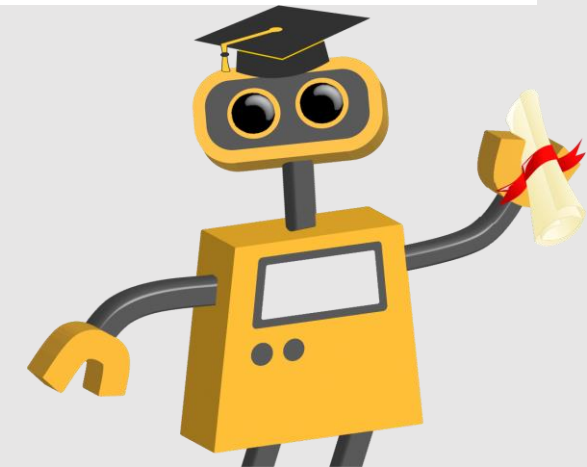| Question number	Discipline	Question/task
1	Sociology	Critically discuss the concept of "cultural relativism".
2	Business	Critically evaluate the advantages and disadvantages of outsourcing.
3	Mathematics	Using only addition, how do you add eight 8's and get the number 1000?
4	History	What were the key factors that contributed to the start of World War II?
5	Economics	What is the difference between a market economy and a command economy?
6	Philosophy	What is the meaning of life, according to Jean-Paul Sartre?
7	American literature	Summarize the plot of John Steinbeck's "The grapes of wrath" in a 1000-word essay.
8	Psychology	Critically discuss the main theories of motivation and how they differ from one another.
9	Art history	Describe in detail Rafael's The School of Athens.
10	Astronomy	What new findings from the James Webb Space Telescope can I tell my 9-year-old about?
11	German literature	Summarise the plot of the two parts of Goethe's Faust in a 1000-word essay. [ask in German and in English]
12	Chinese-language book summary	Summarise Peter Su's memoir 我也曾想过，杀了过去的自己：做自己，是需要付出代价的。 [I have also thought of killing my past self. There is a price to pay to be me]
13	Chinese-language academic article summary	请找以下这篇文章：人工智能技术赋能高等教育变革研究（作者：丁紫钺，胡纵宇），然后请把文章的重点终结出来。谢谢 [Please find the following article: Research on the Transformation of Higher Education Empowered by Artificial Intelligence Technology (Authors: Ding Ziyue, Hu Zongyu), and include the main points of the article.]
14	English-language academic article annotated bibliography	Summarise Razmerita et al.'s (2016) article "What factors influence knowledge sharing in organizations? A social dilemma perspective of social media communication" published in *Journal of Knowledge Management* in around 300 words by using the following six criteria: full reference details (APA7); the aim of the research; research methods; strengths and weaknesses of the article; the conclusions of the article; and your overall critical assessment of it.
15	Literature search and annotated bibliography	Find five of the most-cited articles on ChatGPT and higher education and provide full APA7 references and detailed original abstracts for them.

Test results

Our test show that there are **currently no A-students and no B-students** in this bot cohort, despite all publicised and sensationalist claims to the contrary.

The much-vaunted artificial intelligence is not yet that intelligent. **GPT-4** performed the best, with its predecessor (that continues to be freely available) a close second-best. Bing Chat did not do well because of its overly brief answers, and **Bard**, did poorly and, like **Bing Chat**, is akin to an at-risk student with **a current F-grade average**. **ChatGPT-3.5** did better than GPT-4 on specific questions.

Question number	ChatGPT-3.5	GPT-4	Bing Chat	Bard
1	B- (80)	B (85)	C (75)	B- (80)
2	B- (80)	B+ (89)	C (75)	B- (80)
3	A (95)	A+ (100)	A (95)	F (0)
4	B- (80)	B+ (89)	C- (70)	C (75)
5	B- (80)	B+ (89)	C- (70)	B- (80)
6	C+ (79)	B- (80)	C- (70)	C+ (70)
7	C- (70)	A- (90)	F (0)	D- (60)
8	C+ (79)	B (85)	C- (70)	B- (80)
9	C+ (79)	A- (90)	C- (70)	B- (80)
10	B+ (89)	B (85)	B+ (89)	B+ (89)
11	D- (60)	A- (90)	F (50)	C- (70)
12	C- (70)	F (0)	F (0)	F (0)
13	B- (80)	D- (60)	F (0)	F (0)
14	B+ (89)	B (85)	B (85)	F (0)
15	F (0)	D- (60)	F (0)	F (0)
Overall	1 A, 7 B, 5 C, 1 D, 1 F	4 A, 8 B, 2 D, 1 F	1 A, 2 B, 7 C, 5 F	6 B, 3 C, 1 D, 5 F
Average scores	C (74)	C+ (78)	F (54)	F (51)

Recommendations – Higher Education

- **Don't try to out-design the chatbots**, as this will be a dead end: in the long run, chatbots will be able to provide quotations, discuss current events or hyper-local issues, and analyse a variety of media sources it may be futile to spend our energy figuring out what current AI tools cannot do.

- **Don't count on AI's ability to reliably detect AI** and realise that AI detection software is problematic.

- Incorporate a mentoring and coaching process that breaks down written assignments into bite-sized chunks and creates multiple feedback loops and students keeping a reflective learning log.

- Rethink **rubrics** and consider an increased emphasis on **critical thinking** and **creativity.**

- Focus on motivation and the writing process by communicating that writing practice is intrinsically rewarding and central to intellectual growth.
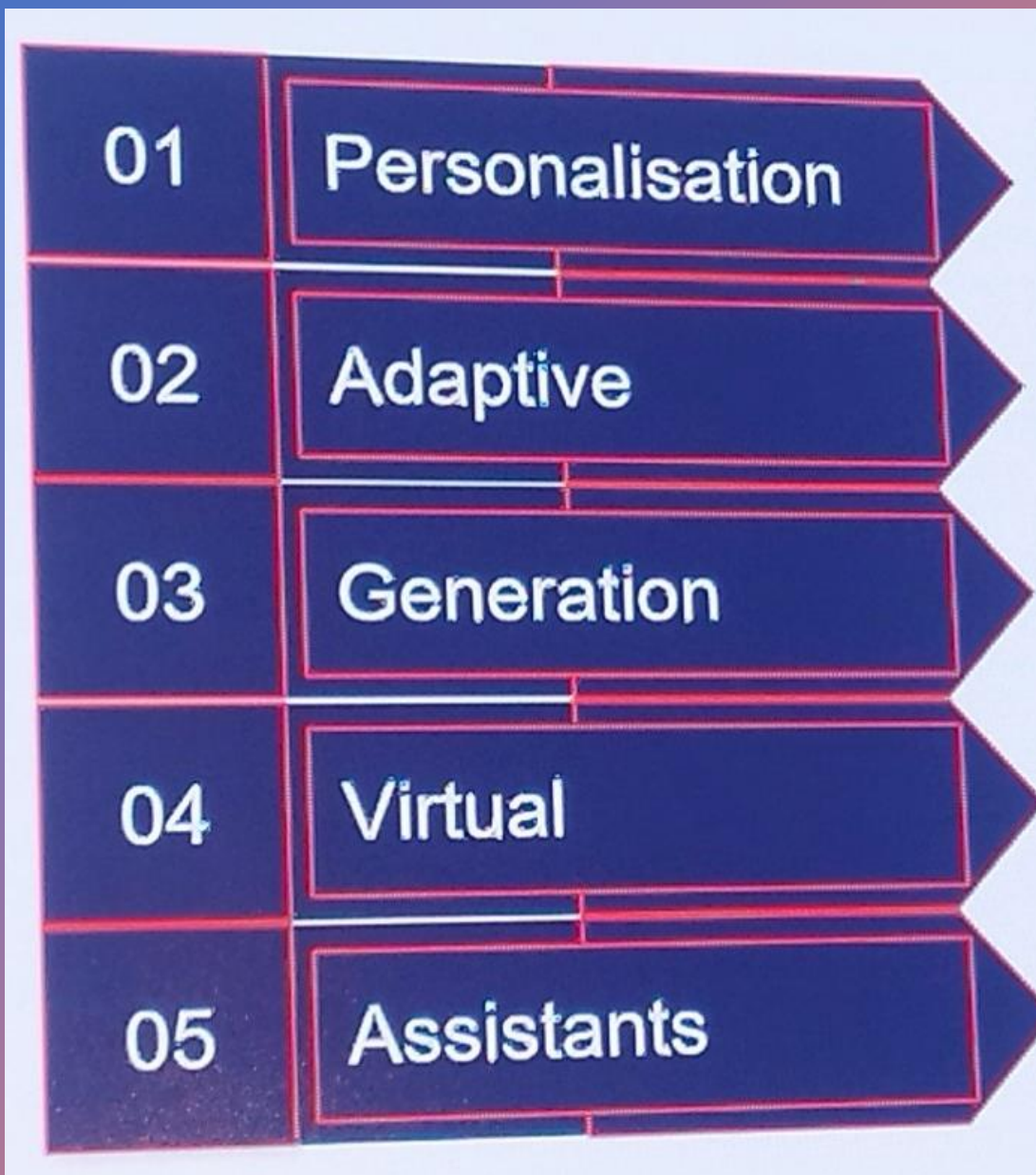
Harnessing Artificial Intelligence for Innovation in Education

- Demystify artificial intelligence (AI), its impact on society and how to harness the power of AI for transformational change in education

- AI applications from three different perspectives: (1**) Learner-facing**, (2) **Teacher-facing** and (3) **System-facing** (Baker and Smith, 2019).

- Open learner model by design can be applied as a framework which explains how AI can be used to enhance teaching and learning in general (Luckin et al., 2016).

Harnessing Artificial Intelligence for innovation in education

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Kumaran Rajaram

Learning Intelligence: Innovative and Digital Transformative Learning Strategies

Cultural and Social Engineering Perspectives

Springer

01	Personalisation	Learning paths Next steps Feedback
02	Adaptive	Learning Assessment
03	Generation	Teaching content Student content Video, image, audio, text
04	Virtual	Classrooms VR, AR, MR
05	Assistants	Automated marking Chabots, virtual tutors Learner analytics

Adapted from Luckin (2023).

Generative AI in the Workplace

Google likely to layoff 30,000 employees post new AI innovation

- Google is considering a substantial workforce reduction, potentially affecting up to 30,000 employees, as part of a strategic move to integrate AI into various aspects of its business processes.

- The **adoption of AI** in this domain could trigger a considerable shake-up within Google, as the report highlights the transformative impact of AI on the revenue streams associated with digital advertising, potentially **diminishing the need** for **human intervention** in these tasks.

Google is actively engaged in advancing its AI model, but recent indications suggest that the tech giant is not just focusing on AI development for external applications but is also contemplating a significant shift in its operational structure.

Google likely to layoff 30,000 employees post new AI innovation (cnbctv18.com)

esla Inc., during a fireside discussion on artificial intelligence risks w
on Thursday, Nov. 2, 2023.

Recent data shows AI job losses are rising, but the numbers don't tell the full story

- More than one-third (37%) of business leaders say AI replaced workers in 2023, according to a recent report from ResumeBuilder.

- Employees say that 29% of their work tasks are replaceable by AI, project management and collaboration software company Asana found in its surveying.

- While positions like research and data analysis are in line for AI automation, companies will still need someone to prompt the AI, make sense of the results and take action.

AI job losses are rising, but the numbers don't tell the full story (cnbc.com)
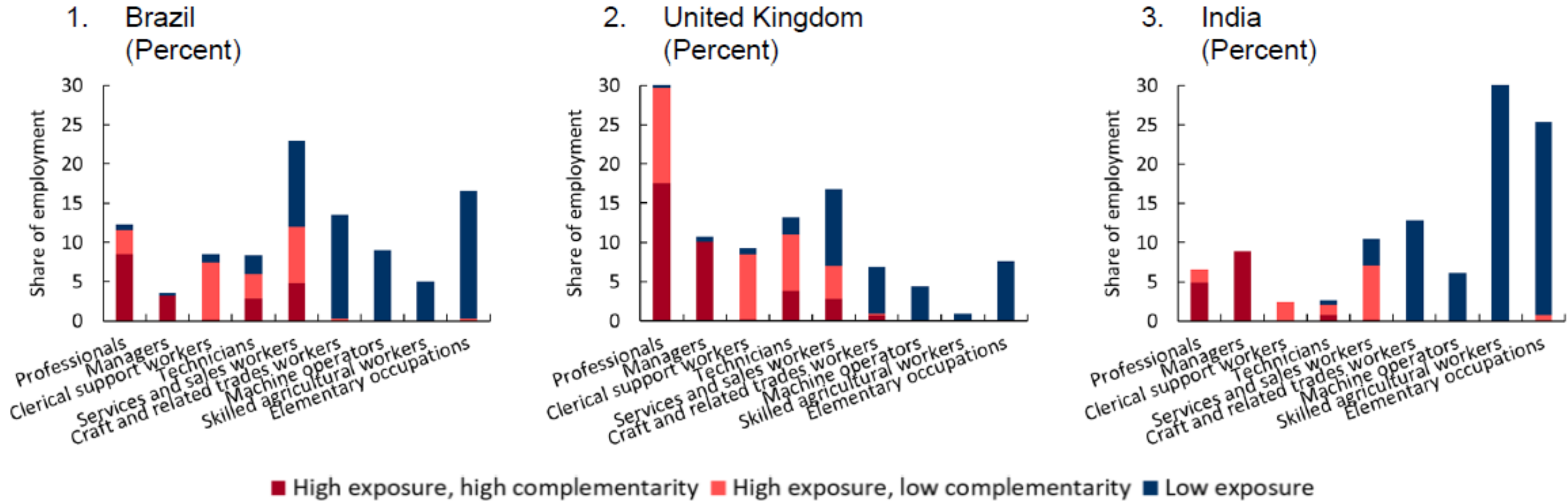
Digital Futures of Work

- Highly paid professionals with no managerial duties may be most impacted as firms use artificial intelligence (AI) to drive down costs and raise productivity, a new global study suggests.

- It need not be a surrender of "destiny" to technology; AI can still **impact jobs positively** if society intervenes in how companies use AI

- Digital hubs like Singapore with a high concentration of tech activities, have prioritised using AI to **enhance professional work** and opportunities rather than **substitute** well-paid workers

AI will threaten S'pore professionals if not used thoughtfully: Study

Professor Phillip Brown believes how the fourth industrial revolution led by AI is viewed will shape the actions taken. PHOTO ...ULT LEARNING

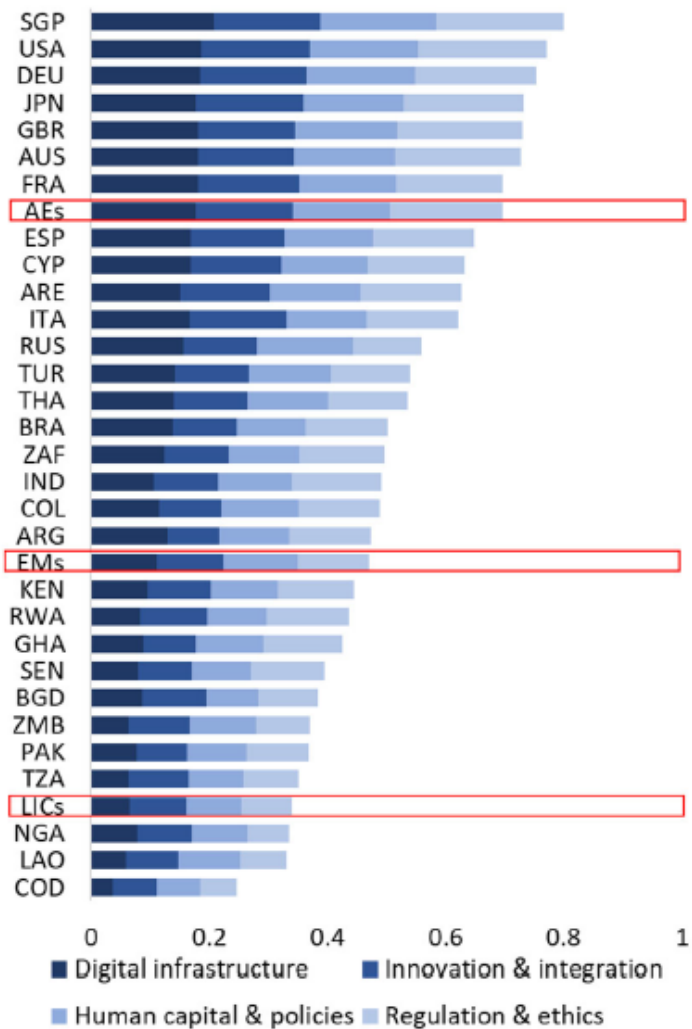# Figure 2. Employment Share by Exposure and Complementarity (Selected Countries)

1. **Brazil**
(Percent)

2. **United Kingdom**
(Percent)

3. **India**
(Percent)

■ High exposure, high complementarity ■ High exposure, low complementarity ■ Low exposure

Sources: India Periodic Labour Force Survey; Pesquisa Nacional por Amostra de Domicílios Contínua; UK Labour Force Survey; and IMF staff calculations.
Note: The charts plot the total employment share by each of the nine 1-digit International Standard Classification of Occupations (ISCO)-08 occupation codes.

Annex Figure 5.1. Cross-Country AI Preparedness Dimensions: Selected Countries
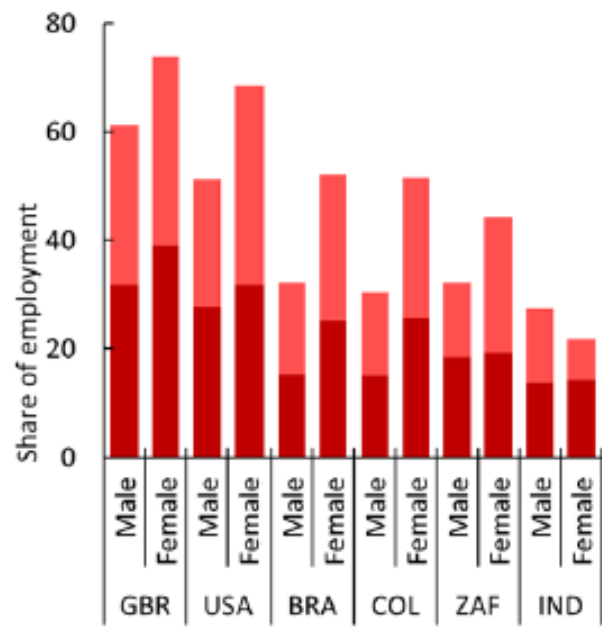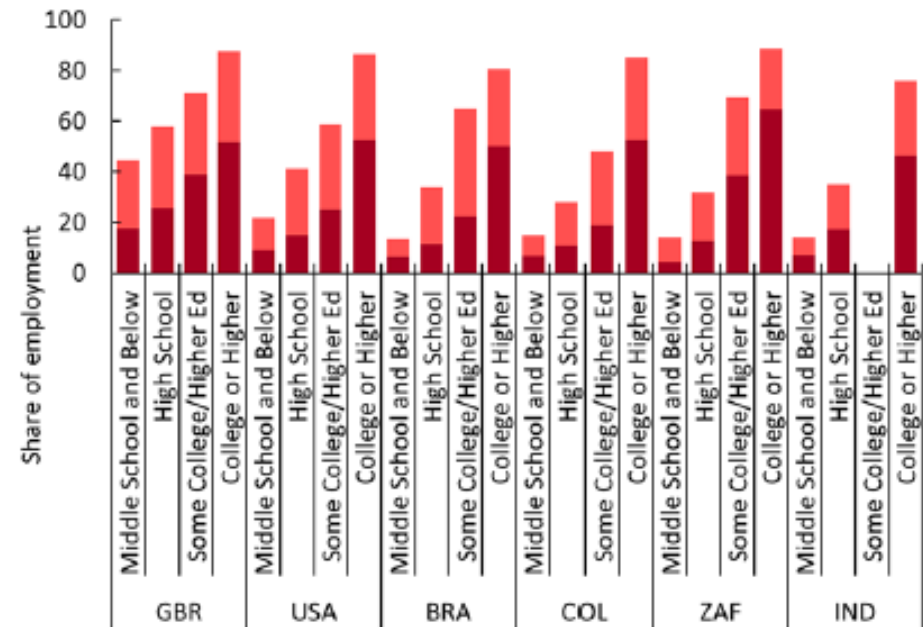
Source:
Note: The figure shows the contribution of digital infrastructure, innovation and integration, human capital and policies, and regulation and ethics to AI preparedness by country. The length of the bar indicates AI preparedness. Highlighted bars denote the country group average. AEs = advanced economies; EMs = emerging market economies; LICs = low-income countries. Country names use International Organization for Standardization (ISO) country codes.

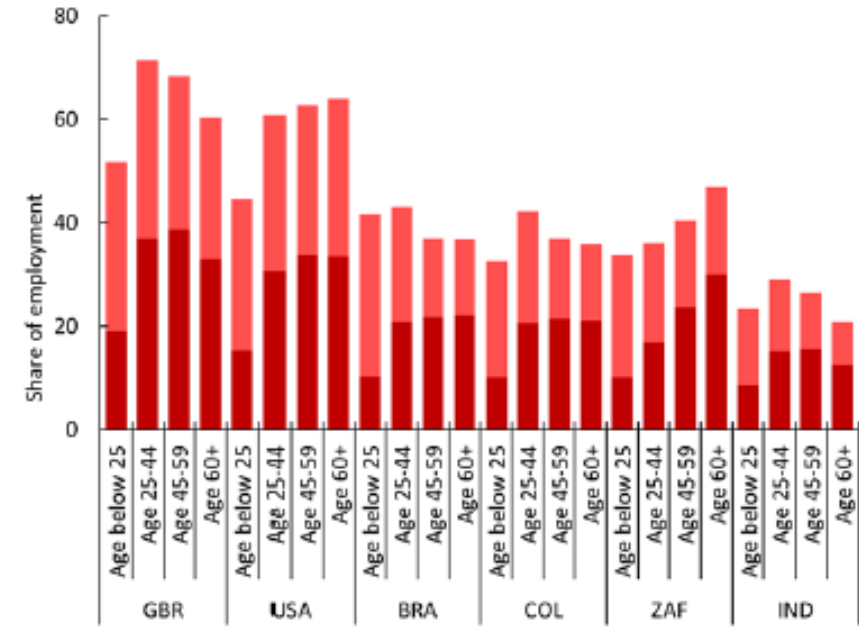# Figure 3. Share of Employment in High-Exposure Occupations by Demographic Groups

1. By Gender
(Percent)

2. By Education
(Percent)

3. By Age
(Percent)

■ High exposure, high complementarity   ■ High exposure, low complementarity

Sources: American Community Survey; Gran Encuesta Integrada de Hogares; India Periodic Labour Force Survey; Labour Market Dynamics in South Africa; Pesquisa Nacional por Amostra de Domicílios Contínua; UK Labour Force Survey; and IMF staff calculations.
Note: The bars represent employment shares in high-exposure occupations. In panel 1, employment shares are conditional on each gender category. In panel 2, employment shares are conditional on each of the four education categories (middle school and below, high school, some college, college or higher). In panel 3, employment shares are conditional on each of the four age intervals. Country labels use International Organization for Standardization (ISO) country codes.

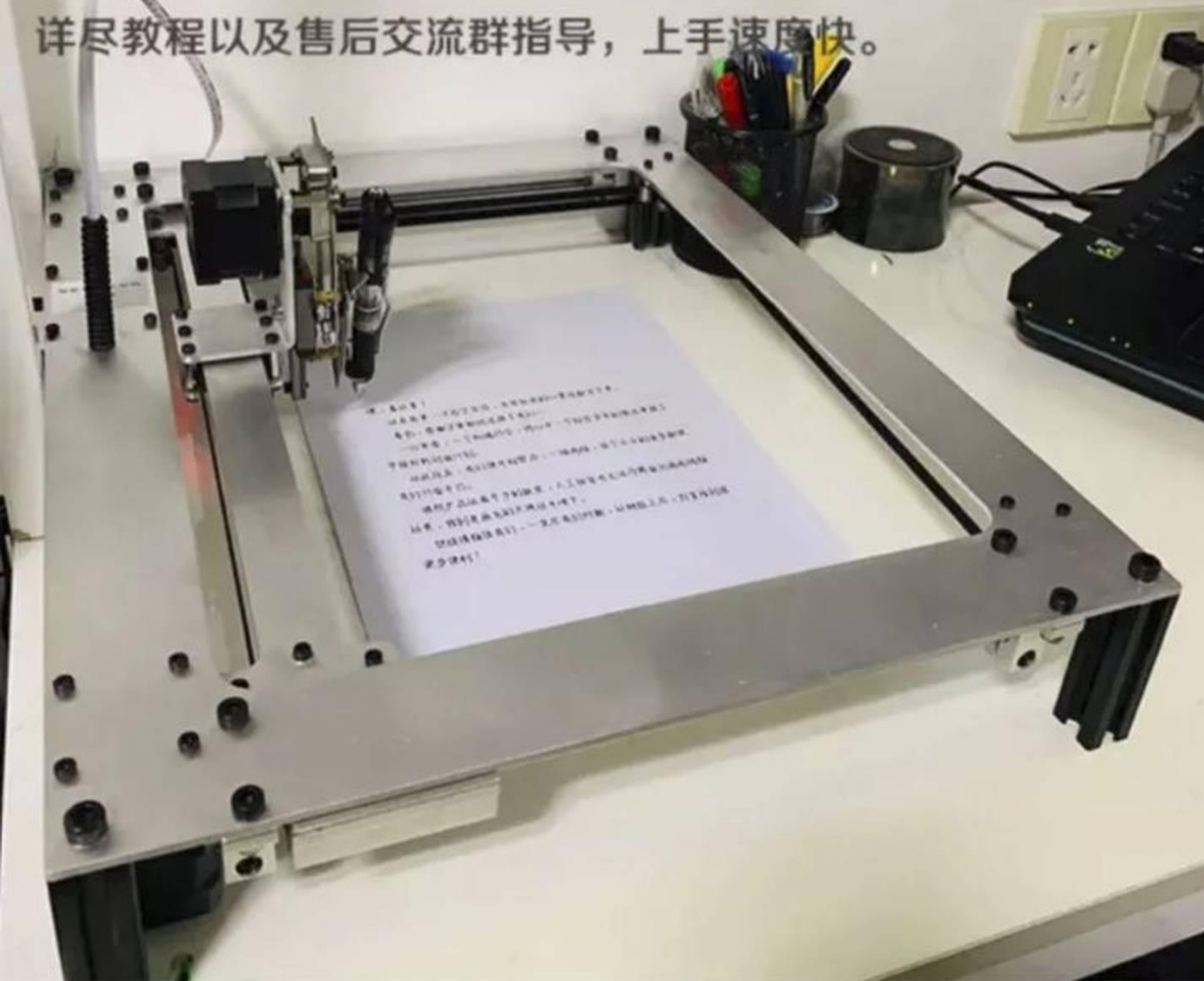# WHAT'S YOUR AI BEHAVIORAL STYLE: CYBORG OR CENTAUR?

Cyborg behavior, named for the science fiction human-machine hybrids, describes the way users "intertwine their efforts with AI at the very frontier of capabilities. This strategy might manifest as alternating responsibilities at the subtask level, such as initiating a sentence for the AI to complete or working in tandem with the AI."

Centaur behavior, named for the mythical half-human, half-horse creatures, describes when users "switch between AI and human tasks," based on their determination of what tasks are best suited for human intervention and which can be handled by AI.

Credit: "Navigating the Jagged Technological Frontier: Field Experimental Evidence of the Effects of AI on Knowledge Worker Productivity and Quality." Fabrizio Dell'Acqua, Karim Lakhani, Edward McFowland III, Ethan Mollick, Hila Lifshitz-Assaf, and Kate Kellogg.

So what's next?

Chinese schoolgirl shamed for using robot to write homework. Now everybody wants one

- Requiring children to copy text — such as vocabulary, textbook passages or poems — hundreds of times is common practice in Chinese schools

Generative AI is the major turning point in skills-first hiring

- "Now you're entering a world where everyone's going to have to change their skills, and people are afraid of what their jobs are going to look like"

- When generative AI fully integrates into the workforce, it will put a premium on soft skills like **collaboration, judgment, and critical thinking.** These are what humans do best, and they're often **skills-built, not degrees-built**, Rometty pointed out.

Sean Gallup/Getty Images

Ginni Rometty, former CEO of tech giant IBM and current chairman of upskilling initiative OneTen

YOU'LL NEVER WALK ALONE

Continuing Professional Development

Pedagogical Innovation

Jumpstart Your Learning Design with Generative AI! - A Hands-On Essentials Workshop

📅 19 Feb 2024 (Mon)
🕐 9:00 am - 5:00 pm

Pedagogical Innovation

AEN Special Interest Groups (Coaching)

📅 20 Feb 2024 (Tue)
🕐 7:00 pm - 9:30 pm

Pedagogical Innovation

Supercharge Your Learning Design with Generative AI! - A Hands-On Intermediate Workshop

📅 21 Feb 2024 (Wed)
🕐 9:00 am - 5:00 pm

Business Insights

Exploring AE Career Journeys: Insights from Practitioners

📅 21 Feb 2024 (Wed)
🕐 7:00 pm - 9:00 pm

Business Insights

AEN Special Interest Groups (Internationalisation)

📅 23 Feb 2024 (Fri)
🕐 7:00 pm - 9:30 pm

Productivity & Performance

Personal Mastery - Self-Management for Holistic Well Being

📅 23 Feb 2024 (Fri)
🕐 9:00 am - 5:00 pm

Technology-enabled Learning

E-learning Instructional Design

📅 26 Feb 2024 (Mon)
🕐 9:00 am - 12:00 pm

Workplace Learning

AEN Special Interest Groups (Workplace Learning)

📅 27 Feb 2024 (Tue)
🕐 7:00 pm - 9:30 pm

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