# **Creativity**

#### **AI in classrooms kill the basic skills that is the base for creativity – augmentation arguments are disproven by human compulsion**

**Addison Maille, 2-23-2024, "WILL AI DESTROY LEARNING?," [Addison Maille is a professional writer specializing in the field of artificial intelligence and tech updates based in Missouri], https://medium.com/@addisonmaille58/will-ai-help-or-hurt-learning-and-education-bddd504d476f, DOA 2-28-2025 //wenzhuo**

**When we give tech**nologies that can be used **to augment human skills,** the **younger people** tend to see it as a technology that can **replace the need to learn**. This is why young people are **increasingly bad at skills** such as math, driving, and even basic socializing. Rather than doing the hard work to understand these critical skills, they just **bypassed** them to the extent they can **with tech**nology. They let calculators do the math, driving assist modes monitor the traffic around them, and rely more on social media for their social skills than actual in-person interactions. This is not only a bad start to a learning revolution, but it sets a precedent that will cause them to think of technology from an entertainment and convience perspective first and its learning potential second, if at all.

Then there’s the loss of opportunities to learn that AI represents. As we begin to lose more and more jobs to AI, we will be left with fewer and fewer real world opportunities to learn skills. And this is no longer theoretical as Silicon Giants like Meta, formerly Facebook, and Alphabet, formerly Google, have already begun massive layoffs due to AI. And in Alphabet’s case, they laid people off despite being very profitable. They literally didn’t need as many programmers and other computer related professionals because of the efficiencies they gained through their use of their own AI. And this is only the beginning of this shift.

If we don’t learn the **basic skills**, which is what entry level jobs have done in modern societies for more than a century, then we won’t be any good at higher level skills. **All the talk of AI doing** the **drudgery work while humans focus on** the more **creative** endeavors **assumes** that **we** have **learned the basics**. We all used to understand this concept of learning basic skills before we move on to something more advanced. Hence the expression you gotta learn to walk before you can run. We have to learn how to count before we can do math. And we have to learn how to write simple small pieces such as paragraphs and essays before we can write longer form articles, books, and so on. **For every basic skill set** that **we remove** from offer **in** either **education** and/or entry level jobs, the **higher level creative work that requires those** basic skills **will no longer be available** to future generations. In such a future, we won’t be using AI to augment our skills. **We will be dependent** upon AI for those skills.

What AI represents is something that’s novel to human advancement. All the advances in the history of Western culture has been one of increasing skill sets that people can learn. There have always been more specialties/skills to learn in industrial cities then there ever were in the farm. Throughout all increases in human understanding ranging from the transitions of the Stone Age to the Bronze Age and then the Iron Age to the invention of the printing press, the Industrial Revolution, and digital revolutions, the number of skills that humans could and needed to learn were constantly increasing.

AI represents the first real potential that due to technology, rather than a loss of technology, the skills on offer for humans to learn will actually get smaller and shallower. I don’t care what correlations any historian tries to make about AI. When human learning plummets, as has happened a number of times when a sophisticated civilization falls to a much less sophisticated one, the loss of skills leads to a lessening of the human condition. From the dark ages to the loss of the library at Alexandria, for better or worse, when our learning starts declining, so do we.

Now is usually when we get the avalanche of techno-optimists that will chime in with statements how we can fix these problems and make these AI driven personal assistants incredibly robust, accurate, and superior in all ways despite difficulties in the past. Yes! Of Course! This Utopia will succeed… right… Oh Shit!

**Computers** tend to be good at **creating compulsions, not motivation**. Humans, at least some of us, are oddly good at motivating other humans. Our parents, teachers, siblings, and friends can all play pivotal roles in motivating us through a variety of ways to push ourselves academically, professionally, and so on. Other humans tend to be good at pushing us to be better ourselves. But computers, so far as I can see, are not good at motivating us to be the best version of ourselves. What they are good at is leading us to compulsions, or what you might call addictions.

Digital content is great at being addictive, but far less so at being motivational. Porn, video games, social media, online gambling, and many other examples don’t have strong track records of motivating us to be the best versions of ourselves. As if to put an almost painfully on the nose example of this phenomenon, the vast majority of motivational content on the internet involves learning, the very thing that most of us don’t use it for. Motivational books, podcasts, speakers, and more tend to be the elements of the online world where we learn the most. And even they have many well acknowledged downsides. They can be primarily summarized as creating a motivational treadmill that doesn’t actually lead to any real action. Just the cathartic release that makes us feel like we made progress by taking in the content without any reciprocal actions.

Technology is far more likely to **create** what’s known as **a race to the bottom of the brain stem**. It fiercely drives us to be the **worst versions of ourselves in** service of whatever **compulsion** we’ve acquired. While there may be a small number of successes found here or there, they are few and far between. Most people can’t name any computer game, porn, or gambling site that’s well known for bringing out the best in its heaviest users. And if the digital app and/or material isn’t troublingly addictive, then it will usually get usurped by something that is.

While all this destruction to our learning is happening, the **infrastructure w**e once relied on **for education will crumble** even more than it already has as a result. **Teachers will turn** in**to** little more than student monitors and the most capable teachers will find work in **other industries.** As AI starts replacing teachers, we **will lose** what little **expertise** the field still has left. As we re-engineer education the people that still remember how to do it the old way will get filtered out for less skilled labor that’s cheaper like we’ve seen in other service oriented jobs. This has been a common occurrence in practically every profession that’s ever been automated.

#### **Independently, educational AI overemphasizes quantifiable skills**

**Evangelia Anagnostopoulou, 12-27-2024, "Trustworthy AI in education: A Roadmap for Ethical and Effective Implementation," [Evangelia is a professor at the Institute of Communication and Computer Systems in Athens], https://dl.acm.org/doi/10.1145/3688671.3688781, DOA 2-28-2025 //Wenzhuo**

The **integration of Ar**tificial **I**ntelligence systems **in education brings significant challenges** regarding sustainability. Rather than adapting to meet the diverse needs of learners, AI **system**s often **shape** the **educational environments** [23]. **AI** systems primarily **rely on quantifiable data** such as students' grades and progress reports **to fuel** their **algor**ithms. In addition, the **use of standardized metrics** and **assessments simplifies data analysis** for AI systems, potentially **leading educational institutions to prioritize standardized testing to optimize AI effectiveness**. Consequently, there is a **risk of overemphasizing** easily **measurable skills while ignoring** critical aspects such as **teamwork, communication,** and **creativity,** which are vital for students' future success [24].

#### **Human creativity is an impact filter---frames our response to all existential threats.**

Dr. David F. **Marks 22**, PhD in Psychology from The University of Sheffield, former Professor and Head of Department of Psychology at the City University of London, “Mental Imagery, Creativity and Planetary Survival”, https://davidfmarks.net/foundation-of-human-survival/ \*gender edited

The study of imagery and **creativity** is of **special importance**. **Many** of the **problems faced by** mankind [**humankind**] involve the use of **creative thinking**. In this section I review one representative study indicating the strong links that exist between imagery vividness and creativity. Kobnithikulwong (2007) at the University of Florida, presented her masters thesis on “Creativity and Imagery in Interior Design…” Kobnithikulwong’s conceptual framework consisted of a Person, a Process and a Product. The Person needs to have a creative personality and vivid visual imagery. The Process needs to have an Internal Visualization and an External Representation of that visualization which is the Product. Kobnithikulwong designed a drawing and writing task and also measured students’ VVIQ and creativity scales.

The students were allowed 30 minutes to do a drawing of a “transitional space within a building” and 10 minutes to write a description of being in the space. Significant differences were found between the high and low creative performance students. Low creative performance produced narratives averaging 73 words. High creative performance produced narratives averaging at 133 words, nearly double the length. The low creatives contained linear and rectangular forms that gave the designs a static look. High creatives produced stronger dynamic movement in their designs by using curves and free-form elements. Solutions in the high group employed movement from curves to create perspective “Pulling a viewer into their spaces”, while low creatives did not make this kind of connection with the viewer. High creatives showed better quality perspective building techniques and designed spaces which were open on one side or end. Low creatives were mostly enclosed with a more limited perspective. High creatives showed high contrast and line weight while lows produced drawings that were less legible with low line weight and low contrast.

Kobnithikulwong (2007) concluded that: “The qualitative analysis indicated that judged creative performance, as an external representation of visualization, positively related to vividness of visual imagery or internal visualization.” The correlation between VVIQ score with eyes closed and creativity scores was .31, p<.02. Dividing the two groups at the median creativity score gave a significant difference of around 10 points in the VVIQ with eyes closed between the two creativity groups, p = .006. However, the scatterplot shows that the relationship is curvilinear and so the use of curvilinear regression (instead of linear) would have yielded a much stronger association.

New applications of mental imagery

Applications of mental imagery cross **many different fields**, including the arts, architecture, design, science, education, sports, IT, policy and planning. **Global problems** caused by **human** **behaviour** such as **warming**, **poverty** and **over-population** may be helped by **applying** mental imagery in **creative ways**. **Human and** **planetary survival** may ultimately **depend** upon the **effective use of human imagination**, including mental imagery.

# Costs

#### **Integration of gen AI into schools is a corporate attempt to increase profits**

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School administrators and teachers already use an array of digital educational technologies in teaching and management.10 Their use has increasingly **obscured educational decision-making**, made a mockery of student privacy rights, and allowed student data to be exploited for non-school purposes.11 In the absence of effective public oversight, the introduction of AI systems and applications in education will likely intensify these problems and **create many more**.12,13 As existing school-focused platforms and applications are updated to include AI, the immediate danger facing educators is not a future apocalypse. Instead, the danger is that AI models and applications will become enmeshed in school processes and procedures in ways that allow **private entities** to **increasingly control** the structure and content of public education, to **reinforce surveillance** practices, and to **amplify existing biases** and inequalities.14 For decades, academic researchers have worked on AI models for use in schools.15 Today, however, it is commercial enterprises that are **aggressively pushing AI** (and its attendant risks) into classrooms.16 The campaign to promote AI in education follows the logic of a half century of commercial, political, and ideological efforts to privatize and **commercialize education.**17 Given this logic it is not surprising that, despite the known dangers, corporations, private researchers, and governments are aggressively promoting the use of AI18 before a statutory and regulatory framework has been put in place to ensure that AI programs are transparent and subject to effective public scrutiny and control.19 This puts schools under tremendous pressure to accept AI as an inevitable upgrade to existing processes.20 Computer scientists and software developers focus primarily on technical engineering questions21 and corporate leaders and **investors prioritize profit** 22 over the common good. Nevertheless, educators are being asked to trust that these people, who have **no educational expertise** and who stand to **financially benefit** when AI is used in schools, are best suited to imagine and lead educational transformation.

#### **Indeed, Educational AI is increasingly expensive**

**UIUC 24** University of Illinois Urbana Champaign (college in illinois), 10-24-2024, "AI in Schools: Pros and Cons," College of Education, https://education.illinois.edu/about/news-events/news/article/2024/10/24/ai-in-schools--pros-and-cons, DOA 3-5-2025 //Wenzhuo

High Implementation Costs

The cost of **AI** in education can vary greatly, depending on how schools want to use it. Simple generative AI systems that teachers can use in lesson planning can cost as little as $25 a month, but larger adaptive **learning systems can run** in the **tens of thousands of dollars.** **Implementing these** larger **systems is** likewise **very expensive and** is **beyond the budgets of many schools, including those in underserved communities**. And then **there’s the ongoing costs of maintaining and updating the systems and training staff to effectively use them.**

#### **All in all, expenditures would explode**

**Nagel 23** David Nagel, 1-12-2023, "AI to Experience Massive Growth in Education," [Daniel Nagel is an author for the Technological Horizons in Education], https://thejournal.com/articles/2023/01/12/ai-to-experience-massive-growth-in-education.aspx, DOA 3-5-2025 //Wenzhuo

Artificial intelligence will experience more than a tenfold growth in the education sector over the next eight years. According to a new forecast by P&S Intelligence**, expenditures for AI by schools will grow** from $2.13 billion in 2022 **to $25.77 billion in 2030.**

#### **The cost will economically harm underdeveloped schools**

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Dangers in Administration¶ Increased Costs¶ Learning management systems already used in many schools, such as Google Classroom,¶ Blackboard, and Canvas, are beginning to integrate AI into their platforms.150 Google Classroom, with its suite of nominally “free” software and low-cost Chromebook hardware, dominates the market.151 It has already announced the launch of AI-based adaptive learning addons to Classroom, with associated additional costs for schools, as well as plans to upgrade¶ Classroom further with generative language AI.152 “Practice Sets” is Google’s AI-based adaptive learning system for education, and “Duet AI” is its “collaboration partner” for teachers.153 In addition to any pedagogical implications associated with using Google Classroom,¶ its integration of further AI and automation into many aspects of school functioning also¶ carries potentially significant administrative implications.154¶ The most significant of these is to obscure the rationale for administrative decisions about¶ critical institutional issues when decision-making is ceded to opaque machine learning systems controlled by tech firms. Google Classroom, for example, integrates with hundreds of¶ other ed tech products and can synchronize with a school’s student information systems.155¶ It offers Google cloud services such as single sign-on, identity management, and device management, as well as plagiarism detection, automated grading, teaching templates, student¶ grouping, and administrative analytics to facilitate “data-driven decisions.”156 Such management systems facilitate the **transfer of control** of schools from the **public to private** corporations by acting as central conduits through which all of a school’s digital activities must¶ pass—making it hard for educators or administrators to see how any decisions based on the¶ data have been made.157¶ Because running AI is costly, the use of AI programs in schools will necessarily require¶ schools to pay for operating costs for an increasing number of pedagogic and administrative¶ AI applications. The promise that AI can save schools money by reducing staffing costs is¶ likely illusory, as schools will probably be required to pay costly fees for accessing AI facilities. In other words, rather than saving money, administrative applications are more likely¶ to shift existing funds to monopolistic technology providers.¶ Khanmigo and Google Classroom already illustrate how this works. Khan Academy, when it¶ provides Khanmigo to districts, currently charges those districts **$60 per student** for annual¶ use, citing high computing costs associated with OpenAI’s GPT-4 as the justification for the charges.158 Likewise, districts must also pay for Google Classroom’s AI upgrades. To access¶ its latest adaptive learning application, Practice Sets, they must switch from the free basic¶ offering to a for-fee premium package.159 In other words, tech firms are **extracting value**¶ from school budgets to defray the high computing costs associated with AI (and grow company value).160

Increased Threats to Student Privacy¶ AI applications collect and aggregate data in order to function. In so doing, they normalize digital surveillance and privacy invasions in school.161 In practice, education technology¶ companies use applications like Google Classroom to routinely collect as much data as possible, well beyond that required to perform their assigned tasks.162¶ Although proponents of using AI in education tend to emphasize the efficiency of data-driven¶ administrative systems, privacy-related threats to equity are inherent in it.163 This is because¶ AI models are built using massive data sets that can be used to profile, compare, and assess¶ individuals who are then subject to potentially discriminatory decisions based on “statistical¶ dossiers” of their personal lives.164 Thus, a significant danger of digital technology in general,¶ and of the privacy-invasive model of AI in particular, is that they can reproduce and amplify¶ existing forms of inequality in education by using datasets containing examples of historic¶ bias and discrimination.165 For example, if a big data set indicates that certain marginalized¶ groups have underperformed historically, then a software application may be biased against¶ individuals from such groups in the future, singling out and targeting them as “at-risk” and¶ closing down or limiting their opportunities to access information and resources.166¶ Moreover, school data systems are vulnerable to breaches, hacks, ransomware, and denial-of-service attacks.167 A data breach at the student-tracking ed tech company Illuminate,¶ for example, compromised the educational data of at least a million public school students¶ and prompted New York City’s Department of Education to ask schools to stop using Illuminate’s products.168 School data systems feature highly detailed and intimate student¶ information, including personal and demographic data, grades, attendance, behavioral information, and other confidential information. Increasing AI capacity in ed tech products¶ may exacerbate these vulnerabilities, as student data are collected at even greater scale by a¶ wide range of companies—including AI companies—that offer only vague data privacy protections.169 Reduced Transparency and Accountability¶ Finally, enabling AI to play a role in school administration will reduce the transparency and¶ accountability of decision-making.170 Many digital products already used in schools are neither transparent nor accountable because current law and regulation allows companies to¶ shield the inner working of their products behind proprietary protections.171¶ AI is even more opaque than other digital programs.172 Black box machine learning and AI¶ models are so complicated that their outputs are often impossible to explain or interpret.173¶ Although in many cases simpler and more accessible statistical models can produce equally accurate results, companies benefit from selling access to proprietary models that require¶ customers to trust the systems and simply accept being unable to verify results.174 If the¶ system makes a mistake, it might never be identified or redressed and the public suffers the¶ consequences. For example, the facial identification systems used for remote testing often¶ fail to accurately identify individuals or mistakenly flag student behaviors as suspicious, but¶ they are very hard for students to challenge.175¶ In high-stakes decision-making in a sector like education, allowing such impenetrable models to assume responsibility for key administrative procedures necessarily means the creation of schools in which school leaders and teachers will be unable to exercise judgment,¶ provide a rationale, or take responsibility for classroom and institutional decisions.176¶ Considerations for the Future¶ Is AI Development Responsible?

The rapid creation of AI applications for schools raises the urgency of prioritizing ethics,¶ student rights, and social responsibility in their development.177 Responsible AI development would ensure that products are safe and trustworthy, designed to benefit people, communities, and society, and mitigate harms.178 As yet, there is little indication that such values are adequately addressed in education applications.179 Unfortunately, academic AIED¶ researchers have tended to ignore them or delegate addressing them to the educational tech¶ industry and policy centers.180 This complacency—along with the money and power held by¶ commercial actors—enables commercial rather than educational imperatives to guide the¶ development of AI and furthers political interests promoting relentless testing and school¶ surveillance.181¶ Responsible governance would require the companies developing AI to commit to transparent and responsible product design, and also to monitoring, understanding, and mitigating¶ the continuous impacts of AI in various contexts. Of particular concern is the automation¶ of decisions with “irreversible and severe consequences.”182 For example, technologies to¶ identify emotions are currently being developed to assess if a person is lying and cheating.183¶ These technologies are inherently inaccurate, however, and an inaccurate judgment that a¶ student has cheated or that a witness is lying could have dire consequences for their lives.¶ Responsible AI governance might lead to delaying or indefinitely pausing development of¶ such technologies.¶ Although several responsible AI initiatives have produced principles, frameworks or checklists for safe and trustworthy AI development and accountability,184 these agendas can be¶ manipulated through various forms of industry lobbying and efforts to water down their¶ scope or possibilities of enforcement.185 Expanding responsibility for product safety to include the wide range of people or organizations that build and use AI—rather than leaving it¶ to technicians and business alone—would mitigate such dangers.186¶ Among the many obstacles to the implementation of responsible policies governing AI is¶ their cost. The goal of profit-seeking business is to shift to the public as many costs as possible **while garnering the highest possible private rate of return on investments**. Public oversight of AI necessarily entails either public ownership or a comprehensive regulatory regime¶ adequately financed to achieve its mission. The question is, where will the money come¶ from?¶ Moreover, the required regulation flies in the face of 50 years of policy devoted to deregulation and privatization. It would demand a fundamental rethinking of the government’s¶ relationship to commercial interests. Such rethinking would, without a doubt, be attacked¶ by self-interested parties as not only too costly but also as stifling innovation and promoting¶ inefficiency. While these arguments may be relevant in individual circumstances, they are¶ neither generally nor self-evidently true.¶ From the perspective of education, responsible governance of AI therefore entails significantly more commitment than the simple principles of responsible development issued by¶ industry. It also requires costly and ongoing monitoring of the effects of AI in classroom¶ contexts. It may also require delays and indefinite pauses in development where warranted—such as, for example, in cases where commercial AI providers seek to introduce products into schools with insufficient evidence that they produce beneficial outcomes, or when¶ those products automate professional judgement with potentially negative consequences, or¶ when they inadequately address questions of AI ethics directly relevant to education.¶ Is AI Inevitable?¶ AI products are moving into schools at dizzying speed. As we have noted, this is in part the¶ result of the pressure on schools to “modernize” by adopting the latest products that the¶ technology industry offers. There is already a consensus of sorts that the move to AI is inevitable. The director of educational technology at Newark Public Schools made the case to the¶ New York Times when he explained why his district adopted Khanmigo: “It’s important to¶ introduce our students to it, because it’s not going away.”187¶ The de facto requirement that students serve as a technology company’s experimental subjects might be explained by the initially low entry cost for school districts. Struggling districts, especially, might be willing to gamble that a technological innovation might turn¶ things around for their students. However, before placing that bet it would be valuable to¶ first ask some fundamental questions. Computer scientist Joseph Weizenbaum posed such¶ concerns 50 years ago, essentially arguing that no technology—including AI—should be implemented unless we know that it is both necessary and good.188

#### **Unfortunately, this financial pressure from AI will put essential programs on the chopping block**

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Texas public schools unexpectedly lost $300 million per year in federal special education funding amidst rising costs, the Texas Health and Human Services Commission notified school districts on Dec. 15.¶ The cuts are to the School Health and Related Services (SHARS), a federal special education program that allows Texas local educational agencies (LEAs) and shared service arrangements (SSAs) to request reimbursement for Medicaid health-related services. School districts are eligible for partial reimbursements when they directly offer medical services to students with special needs, instead of relying on a doctor or nurse.¶ The loss in annual funding relates to Medicaid reimbursements for special education students. It followed a court ruling in a billing disagreement between school districts and the federal government, dating back to 2017.

**And, magnified educational inequality would accelerate poverty—**

Emma **Garcia**, Sept 27, 20**17**, “**Education inequalities** at the school starting gate", (Emma has Ph.D., Economics and Education, Teachers College, Columbia University,M.A., Quantitative Methods in the Social Sciences, Columbia University, B.A., Economics, Pompeu Fabra UniversityEPI, https://www.epi.org/publication/education-inequalities-at-the-school-starting-gate///sugar

What this study finds: Extensive research has conclusively demonstrated that children’s social class is one of the most significant predictors—if not the single **most significant predictor**—**of their educational success**. Moreover, it is increasingly apparent that performance gaps by social class take root in the earliest years of children’s lives and fail to narrow in the years that follow. That is, **children who start behind stay behind—they are rarely able to make up the lost ground**. Using data from two academic cohorts, the kindergarten classes of 1998 and 2010, this study examines the relationship between children’s socioeconomic status (SES) and their cognitive and noncognitive skills when starting school. We find that large performance gaps exist between children in the lowest and highest socioeconomic-status (SES) quintiles and that these gaps have persisted from the 1998 cohort to the 2010 cohort. The positive news is that the gaps have not grown, even as economic inequalities between these two groups of students have grown. The negative news is that the gaps have not narrowed, despite the fact that low-SES parents have substantially increased their engagement in their children’s early education. Very large SES-based gaps in academic performance exist and have persisted across the two most recent cohorts of students when they start kindergarten. The estimated gaps between children in the highest and lowest fifths of the SES distribution are over a standard deviation (sd) in both reading and math in 2010 (unadjusted performance gaps are 1.2 and 1.3 sd respectively). Gaps in noncognitive skills such as self-control and approaches to learning are roughly between one-third and one-half as large (unadjusted performance gaps are about 0.4 sd in self-control, and slightly over 0.5 sd in approaches to learning in 2010). SES-based gaps across both types of skills among the 2010 kindergartners are virtually unchanged compared with the prior academic generation of students (the class of 1998). The only unadjusted cognitive skills gap between children in the high-SES and low-SES fifths that changed significantly over this period was the gap in reading skills, which increased by about a tenth of a standard deviation. Gaps in approaches to learning as reported by teachers and in self-control as reported by parents shrank between 1998 and 2010 by roughly the same amount (0.1 sd). Gaps in mathematics, in approaches to learning as reported by parents, and in self-control as reported by teachers did not change significantly. Taking into account children’s individual and family characteristics, we find that parental activities, parental expectations for their children’s attainment, and pre-K participation reduce the gaps between high-SES and low-SES children somewhat but do not come close to eliminating them. This means that though part of the SES gap is attributable to differences in these characteristics and in family investments between children in the high and low parts of the SES distribution, a substantial share of SES-related factors is not captured by these controls, but is important to explaining how and why gaps develop, and thus how to narrow them. Moreover, the capacity for these other factors to narrow gaps has decreased over time—as a whole, they accounted for a smaller share of the gaps in 2010 than they had in 1998. This suggests that, while such activities as parental time spent with children and center-based pre-K programs cushion the negative consequences of growing up in a low-SES household, they can do only so much, and that the consequences of poverty are increasingly hard to compensate for. This resistance of gaps to these controls is thus a matter of serious concern for researchers and policymakers alike. The characteristics of children in the lowest-SES quintile and highest-SES quintile changed between 1998 and 2010. Among **children in the low**-SES **quintile**, in 2010 **a larger share lived in poverty (84.6 percent, up from 71.3 percent in 1998)**, did not live with two parents (54.9 percent vs. 45.6 percent), and lived in homes where the main language is not English (40.3 percent vs. 31.2 percent). Just over half of these children (50.4 percent) were Hispanic (in 1998, 39.8 percent were). These children’s likelihood of attending center-based pre-K did not change significantly across generations (about 44 percent for both cohorts: 44.3 percent in 2010 vs. 43.7 percent in 1998). However, in 2010 their parents reported having a somewhat larger number of books at home for the children, and there was also an increase in both indices of activities (literacy/reading activities and other educational and engagement activities). In addition to doing more for their children, low-SES parents have greater expectations for their children’s educational attainment—a much smaller share saw them going no further than high school graduation, while a much greater share anticipated their children attaining bachelor’s and even advanced degrees in 2010. Among children in the high-SES quintile, the group in 2010 includes a lower share of white children (falling from 78.8 percent in 1998 to 71.3 percent) and a larger share of Asian children (increasing from 4.7 percent in 1998 to 8.7 percent). They were slightly more likely to live with two parents (the share not living with two parents decreased from 11.1 percent in 1998 to 9.6 percent) and to have attended center-based pre-K (the share in center-based pre-K increased from 65.8 in 1998 to 69.9 percent in 2010). The share of high-SES homes reporting having more than 200 children’s books slightly increased in 2010, as did parents’ expectations for their children’s educational attainment. Although research uses various indicators to measure individuals’ social class, from composite measures such as the socioeconomic status index we use to single indicators such as mother’s education or income, some sensitivity of the results to the indicator used is found. In our analyses, we find that all are equally reliable social-class proxies for the estimation of early achievement gaps, though absolute gaps and trends in them vary slightly depending on the indicator used.

# Climate

**Educational AI superchargers electricity usage**

**Jachna ’24** [Meghan Jachna; October 10th; Student Associate in the Office of Sustainability at the Washington University in St. Louis; “The Hidden Costs of AI”; Sustainability Office at the Washington University in St. Louis; https://sustainability.wustl.edu/the-hidden-costs-of-ai/] cameron

**Gen**erative **AI** (artificial intelligence) tools such as **ChatGPT** and other **L**arge **L**anguage **M**odel**s** have had a **significant impact** in almost every facet of society, but in **education** and **university settings** especially, **gen**erative **AI** is transforming the way that students and professors conduct their everyday work.  With 24/7 access to streamlined information, students now rely heavily on AI technology in all areas of education. A 2024 study from the Digital Education Council found that **86%** of students use AI in their studies and that ChatGPT is the most used AI tool among students. WashU has even launched its own version of ChatGPT, further signifying the prominent role that AI now plays in academia.

With the growing prevalence of **AI** in **universities** and many other areas of society, most people are aware of its numerous benefits. However, the **environmental costs** of this tool are often **overlooked**. The first major problem with AI is its **massive energy use** and **high carbon emissions**. The **I**nternal **E**nergy **A**gency 2024 report projected that the energy use associated with AI, data centers, and cryptocurrency would be equal to the amount of energy used by the entire country of Japan by 2026. Additionally, it is estimated that **gen**erative **AI** **alone** is “expected to consume **10 times more energy in 2026** than it did in 20**23**.” One of the reasons that generative AI uses so much more energy than a Google search, sending an email, or posting on social media is because the **m**achine **l**earning component of generative AI uses a **significant amount** of **energy** for **training** and **input** of **data** in order for it to generate highly tailored responses to the individual request of millions of different users. The **data centers** used to run AI require more **energy intensive systems** to process the higher quantity of data compared to other technologies and are often primarily run on **gas** or **coal**-powered electricity.

Training a single model of ChatGPT consumes the amount of electricity equivalent to the “annual electricity consumption of **120** American **households**” which is concerning especially as new models of ChatGPT continue to be released. WashU recently upgraded to the Open AI’s new GPT-40 “omni” model which the university recognizes as the “most advanced artificial intelligence model capable of complex problem solving,” and that the model “will provide better functionality to WashU users, with text generation at double the speed.” However, for **every** new **model** that is released, a new round of AI training must be completed which requires another **large energy investment**. Is having a slightly faster and more advanced model worth the environmental costs associated with the major increase in energy use and carbon emissions? It is estimated that around **30 times more energy** is used to **generate info**rmation into a customized response using AI tools than simply taking it from the source. Therefore, as AI becomes a more common tool on campus, it is essential that students and faculty use it carefully and understand its environmental impact.

While many tech companies say that they are working on ways to incorporate more **renewable energy** into powering their AI models, this goal has made relatively **slow progress**. The **data centers** used to power generative AI need a **stable** source of **power**, and many renewable forms tend to **fluctuate** more than can be tolerated by the data centers. Additionally, there is **not enough** existing and reliable renewable energy **infrastructure** yet for the **massive** amount of **energy** that is being required for the **rapidly growing use** of **gen**erative **AI**. And tech companies such as Google **only** have plans to **expand** their energy **use**. Google says it will soon be building more data centers right here in Missouri and in other places in the Midwest. These **data centers** are disruptive to the communities they are built in, causing noise pollution as well as “driving up residents’ **power bills** and **taxing** the electric **grid**.” Therefore, it is clear concerns around AI are not simply a matter of data in the cloud, but an issue affecting the well-being of real communities across the U.S.

**And water**

**Thier 25** [Jane Thier (Jane Thier is a former future of work reporter at Fortune. She interviewed an array of industry leaders, including Condoleezza Rice, Melinda Gates, Simone Biles, Arianna Huffington, Derek Jeter, and the CEOs of Zillow, Crunch Fitness, IBM, Bob’s Red Mill, and Dropbox. Before Fortune, she reported on finance and business leadership news at Industry Dive. She graduated from Washington University in St. Louis.), "California wildfires raise alarm on water-guzzling AI like ChatGPT", 01/09/2025, Fortune, https://fortune.com/article/how-much-water-does-ai-use/, Accessed 03/28/2025] //ejs squad

In order to shoot off one email per week for a year, ChatGPT would use up 27 liters of water, or about one-and-a-half jugs. Zooming out, WaPo wrote, that means **if one in 10** U.S. residents—16 million **people**—**asked ChatGPT to write an email a week, it’d cost more than 435 million liters of water.**

#### **Demand will only increase as AI grows in education**

**Zoting 24** [Shivani Zoting, "AI in Education Market Size to Surpass USD 112.30 Bn by 2034", 08/01/2024, Precedence Research, https://www.precedenceresearch.com/ai-in-education-market, Accessed 03/27/2025] //ejs squad

The U.S. **AI in education market** size was exhibited at USD 1.09 billion in 2023 and is projected to be worth around USD 32.64 billion by 2034, **poised to grow** at a CAGR of **36**.21**%** from 2024 **to 2034.**

#### **It uniquely requires additional model training and fine tuning**

**Chen 24** Jingyuan Chen, 8-28-2024, "WisdomBot: Tuning Large Language Models with Artificial Intelligence Knowledge," [Jingyuan is an author that publishes in the Frontiers of Digital Education journal], https://link.springer.com/article/10.1007/s44366-024-0005-z, DOA 3-3-2025 //wenzhuo

Large language models (**LLMs**) have emerged as powerful tools in natural language processing (NLP), showing a promising future of artificial generated intelligence (AGI). Despite their **notable performance in** the **general domain**, LLMs **have remained suboptimal in** the field of **education**, owing to the **unique challenges** presented by this domain, such as the need for more specialized knowledge, the requirement for personalized learning experiences, and the **necessity for concise explanations of complex concepts**. To address these issues, this paper **presents a novel LLM** for education named WisdomBot, which **combine**s the **power** of LLMs with educational theories, enabling their seamless integration into educational contexts. To be specific, we **harness** self-instructed knowledge concepts and instructions under the guidance of Bloom’s Taxonomy as **training data.** **To** further **enhance** the **accuracy** and professionalism of model’s response on factual questions, we introduce two key enhancements during inference, i.e., local knowledge base retrieval augmentation and search engine retrieval augmentation during inference. We substantiate the effectiveness of our approach by applying it to several Chinese LLMs, thereby showcasing that the **fine**-tuned models can generate more reliable and professional responses.

The general large language models lack basic cognitive abilities and advanced cognitive abilities. We **propose** a novel **tuning approach**, using high-quality textbook- level corpora as the basis, focusing on knowledge concepts to **construct training data,** migrating open- source large language models to the education field, and forming the educational large language model WisdomBot. Experiments show that WisdomBot has achieved excellent performance in different educational scenarios and various subjects.

**Training just a single model magnifies harm to the environment -- it’ll escalate**

Shaolei **Ren** and Adam Wierman, Associate Professor of [Electrical Engineering](https://www.ece.ucr.edu/) at UC, Professor of Mathematics @ Caltech, 7-15-20**24**, "The Uneven Distribution of AI’s Environmental Impacts," Harvard Business Review, https://hbr.org/2024/07/the-uneven-distribution-of-ais-environmental-impacts, accessed 2-25-2025 //cy

The escalating and localized environmental costs of AI

Even putting aside the environmental toll of chip manufacturing and supply chains, the training process for a single AI model, such as a large language model, can consume thousands of megawatt hours of electricity and emit hundreds of tons of carbon. This is roughly equivalent to the annual carbon emissions of hundreds of households in America. Furthermore, AI model training can lead to the evaporation of an astonishing amount of fresh water into the atmosphere for data center heat rejection, potentially exacerbating stress on our already limited freshwater resources.

All these environmental impacts are expected to escalate considerably, with the global AI energy demand projected to exponentially increase to at least 10 times the current level and exceed the annual electricity consumption of a small country like Belgium by 2026. In the United States, the rapidly growing AI demand is poised to drive data center energy consumption to about 6% of the nation’s total electricity usage in 2026, adding further pressure on grid infrastructures and highlighting the urgent need for sustainable solutions to support continued AI advancement.

The generation of electricity, particularly through fossil fuel combustion, results in local air pollution, thermal pollution in water bodies, and the production of solid wastes, including even hazardous materials. Elevated carbon emissions in a region come with localized social costs, potentially leading to higher levels of ozone, particulate matter, and premature mortality. Furthermore, the strain on local freshwater resources imposed by the substantial water consumption associated with AI, both directly for onsite server cooling and indirectly for offsite electricity generation, can worsen prolonged droughts in water-stressed regions like Arizona and Chile.

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#### **Climate Change causes nonlinear extinction and threat multipliers - no adaptation.**

**Kemp et al. 22** (Luke Kemp, Centre for the Study of Existential Risk, University of Cambridge, Chi Xu, School of Life Sciences, Nanjing University, Joanna Depledge, Cambridge Centre for Environment, Energy and Natural Resource Governance, University of Cambridge, Kristie L. Ebi, Center for Health and the Global Environment, University of Washington, Goodwin Gibbins, Future of Humanity Institute, University of Oxford, Timothy A. Kohler, Department of Anthropology, Washington State University, Johan Rockström, Potsdam Institute for Climate Impact Research, Marten Scheffer, Department of Environmental Sciences, University of Wageninge, Hans Joachim Schellnhuber, Potsdam Institute for Climate Impact Research, Will Steffen, Fenner School of Environment and Society, The Australian National University, Timothy M. Lenton, Global Systems Institute, University of Exeter, “Climate Endgame: Exploring catastrophic climate change scenarios”, 8-1-2022, PNAS,<https://www.pnas.org/doi/10.1073/pnas.2108146119>, DOA: 10-13-2023)//ET// recut Bellaire MC

This caution is understandable, yet it is mismatched to the risks and potential damages posed by climate change. We know that temperature rise has “fat tails”: low-probability, high-impact extreme outcomes ([9](https://www.pnas.org/doi/10.1073/pnas.2108146119#core-r9)). **Climate damages are likely to be nonlinear** and result in an even larger tail ([10](https://www.pnas.org/doi/10.1073/pnas.2108146119#core-r10)). Too much is at stake to refrain from examining high-impact low-likelihood scenarios. The COVID-19 pandemic has underlined the need to consider and prepare for infrequent, high-impact global risks, and the systemic dangers they can spark. Prudent risk management demands that we thoroughly assess worst-case scenarios. Our proposed “Climate Endgame” research agenda aims to direct exploration of the worst risks associated with anthropogenic climate change. To introduce it, we summarize existing evidence on the likelihood of extreme climate change, outline why exploring bad-to-worst cases is vital, suggest reasons for catastrophic concern, define key terms, and then explain the four key aspects of the research agenda. Worst-Case Climate Change Despite 30 y of efforts and some progress under the United Nations Framework Convention on Climate Change (UNFCCC) anthropogenic greenhouse gas (GHG) emissions continue to increase. Even without considering worst-case climate responses, the current trajectory puts the world on track for a temperature rise between 2.1 °C and 3.9 °C by 2100 ([11](https://www.pnas.org/doi/10.1073/pnas.2108146119#core-r11)). If all 2030 nationally determined contributions are fully implemented, warming of 2.4 °C (1.9 °C to 3.0 °C) is expected by 2100. Meeting all long-term pledges and targets could reduce this to 2.1 °C (1.7 °C to 2.6 °C) ([12](https://www.pnas.org/doi/10.1073/pnas.2108146119#core-r12)). Even these optimistic assumptions lead to dangerous Earth system trajectories. Temperatures of more than 2 °C above preindustrial values have not been sustained on Earth’s surface since before the Pleistocene Epoch (or more than 2.6 million years ago) ([13](https://www.pnas.org/doi/10.1073/pnas.2108146119#core-r13)). Even if anthropogenic GHG emissions start to decline soon, this does not rule out high future GHG concentrations or extreme climate change, particularly beyond 2100. There are feedbacks in the carbon cycle and potential tipping points that could generate high GHG concentrations ([14](https://www.pnas.org/doi/10.1073/pnas.2108146119#core-r14)) that are often missing from models. Examples include Arctic permafrost thawing that releases methane and CO2 ([15](https://www.pnas.org/doi/10.1073/pnas.2108146119#core-r15)), carbon loss due to intense droughts and fires in the Amazon ([16](https://www.pnas.org/doi/10.1073/pnas.2108146119#core-r16)), and the apparent slowing of dampening feedbacks such as natural carbon sink capacity ([17](https://www.pnas.org/doi/10.1073/pnas.2108146119#core-r17), [18](https://www.pnas.org/doi/10.1073/pnas.2108146119#core-r18)). These are likely to not be proportional to warming, as is sometimes assumed. Instead, abrupt and/or irreversible changes may be triggered at a temperature threshold. Such changes are evident in Earth’s geological record, and their impacts cascaded across the coupled climate–ecological–social system ([19](https://www.pnas.org/doi/10.1073/pnas.2108146119#core-r19)). Particularly worrying is a “tipping cascade” in which multiple tipping elements interact in such a way that tipping one threshold increases the likelihood of tipping another ([20](https://www.pnas.org/doi/10.1073/pnas.2108146119#core-r20)). Temperature rise is crucially dependent on the overall dynamics of the Earth system, not just the anthropogenic emissions trajectory. The potential for tipping points and higher concentrations despite lower anthropogenic emissions is evident in existing models. Variability among the latest Coupled Model Intercomparison Project Phase 6 (CMIP6) climate models results in overlap in different scenarios. For example, the top (75th) quartile outcome of the “middle-of-the-road” scenario (Shared Socioeconomic Pathway 3-7.0, or SSP3-7.0) is substantially hotter than the bottom (25th) quartile of the highest emissions (SSP5-8.5) scenario. Regional temperature differences between models can exceed 5 °C to 6 °C, particularly in polar areas where various tipping points can occur ([*SI Appendix*](https://www.pnas.org/doi/10.1073/pnas.2108146119#supplementary-materials)). There are even more uncertain feedbacks, which, in a very worst case, might amplify to an irreversible transition into a “Hothouse Earth” state ([21](https://www.pnas.org/doi/10.1073/pnas.2108146119#core-r21)) (although there may be negative feedbacks that help buffer the Earth system). In particular, poorly understood cloud feedbacks might trigger sudden and irreversible global warming ([22](https://www.pnas.org/doi/10.1073/pnas.2108146119#core-r22)). Such effects remain underexplored and largely speculative “unknown unknowns” that are still being discovered. For instance, recent simulations suggest that stratocumulus cloud decks might abruptly be lost at CO2 concentrations that could be approached by the end of the century, causing an additional ∼8 °C global warming ([23](https://www.pnas.org/doi/10.1073/pnas.2108146119#core-r23)). Large uncertainties about dangerous surprises are reasons to prioritize rather than neglect them. Recent findings on equilibrium climate sensitivity (ECS) ([14](https://www.pnas.org/doi/10.1073/pnas.2108146119#core-r14), [24](https://www.pnas.org/doi/10.1073/pnas.2108146119#core-r24)) underline that the magnitude of climate change is uncertain even if we knew future GHG concentrations. According to the IPCC, our best estimate for ECS is a 3 °C temperature rise per doubling of CO2, with a “likely” range of (66 to 100% likelihood) of 2.5 °C to 4 °C. While an ECS below 1.5 °C was essentially ruled out, there remains an 18% probability that ECS could be greater than 4.5 °C ([14](https://www.pnas.org/doi/10.1073/pnas.2108146119#core-r14)). The distribution of ECS is “heavy tailed,” with a higher probability of very high values of ECS than of very low values. There is significant uncertainty over future anthropogenic GHG emissions as well. Representative Concentration Pathway 8.5 (RCP8.5, now SSP5-8.5), the highest emissions pathway used in IPCC scenarios, most closely matches cumulative emissions to date ([25](https://www.pnas.org/doi/10.1073/pnas.2108146119#core-r25)). This may not be the case going forward, because of falling prices of renewable energy and policy responses ([26](https://www.pnas.org/doi/10.1073/pnas.2108146119#core-r26)). Yet, there remain reasons for caution. For instance, there is significant uncertainty over key variables such as energy demand and economic growth. Plausibly higher economic growth rates could make RCP8.5 35% more likely ([27](https://www.pnas.org/doi/10.1073/pnas.2108146119#core-r27)). Why Explore Climate Catastrophe? Why do we need to know about the plausible worst cases? First, risk management and robust decision-making under uncertainty requires knowledge of extremes. For example, the minimax criterion ranks policies by their worst outcomes ([28](https://www.pnas.org/doi/10.1073/pnas.2108146119#core-r28)). Such an approach is particularly appropriate for areas characterized by high uncertainties and tail risks. Emissions trajectories, future concentrations, future warming, and future impacts are all characterized by uncertainty. That is, we can’t objectively prescribe probabilities to different outcomes ([29](https://www.pnas.org/doi/10.1073/pnas.2108146119#core-r29)). Climate damages lie within the realm of “deep uncertainty”: We don’t know the probabilities attached to different outcomes, the exact chain of cause and effect that will lead to outcomes, or even the range, timing, or desirability of outcomes (, [30](https://www.pnas.org/doi/10.1073/pnas.2108146119#core-r30)). Uncertainty, deep or not, should motivate precaution and vigilance, not complacency. Catastrophic impacts, even if unlikely, have major implications for economic analysis, modeling, and society’s responses ([31](https://www.pnas.org/doi/10.1073/pnas.2108146119#core-r31), [32](https://www.pnas.org/doi/10.1073/pnas.2108146119#core-r32)). For example, extreme warming and the consequent damages can significantly increase the projected social cost of carbon ([31](https://www.pnas.org/doi/10.1073/pnas.2108146119#core-r31)). Understanding the vulnerability and responses of human societies can inform policy making and decision-making to prevent systemic crises. Indicators of key variables can provide early warning signals ([33](https://www.pnas.org/doi/10.1073/pnas.2108146119#core-r33)). Knowing the worst cases can compel action, as the idea of “nuclear winter” in 1983 galvanized public concern and nuclear disarmament efforts. Exploring severe risks and higher-temperature scenarios could cement a recommitment to the 1.5 °C to 2 °C guardrail as the “least unattractive” option ([34](https://www.pnas.org/doi/10.1073/pnas.2108146119#core-r34)). Understanding catastrophic climate scenarios can also inform policy interventions, including last-resort emergency measures like solar radiation management (SRM), the injection of aerosols into the stratosphere to reflect sunlight ([35](https://www.pnas.org/doi/10.1073/pnas.2108146119#core-r35)). Whether to resort to such measures depends on the risk profiles of both climate change and SRM scenarios. One recent analysis of the potential catastrophic risk of stratospheric aerosol injection (SAI) found that the direct and systemic impacts are under-studied ([36](https://www.pnas.org/doi/10.1073/pnas.2108146119#core-r36)). The largest danger appears to come from “termination shock”: abrupt and rapid warming if the SAI system is disrupted. Hence, SAI shifts the risk distribution: The median outcome may be better than the climate change it is offsetting, but the tail risk could be worse than warming ([36](https://www.pnas.org/doi/10.1073/pnas.2108146119#core-r36)). There are other interventions that a better understanding of catastrophic climate change could facilitate. For example, at the international level, there is the potential for a “tail risk treaty”: an agreement or protocol that activates stronger commitments and mechanisms when early-warning indicators of potential abrupt change are triggered. The Potential for Climate Catastrophe There are four key reasons to be concerned over the potential of a global climate catastrophe. First, there are warnings from history. **Climate change** (either regional or global) **has played a role in** the collapse or transformation of numerous previous societies (37) and in **each of the five mass extinction events** in Phanerozoic Earth history (38). The **current carbon pulse** is occurring at an unprecedented geological speed and, **by** **the end of the century, may surpass thresholds that triggered** **previous mass extinctions** (39, 40). The worst-case scenarios in the IPCC report project temperatures by the 22nd century that last prevailed in the Early Eocene, reversing 50 million years of cooler climates in the space of two centuries (41). This is particularly alarming, as **human societies** **are locally adapted to a specific** climatic **niche**. The rise of large-scale, urbanized agrarian societies began with the shift to the stable climate of the Holocene ∼12,000 y ago (42). Since then, human population density peaked within a narrow climatic envelope with a mean annual average temperature of ∼13 °C. Even today, the most economically productive centers of human activity are concentrated in those areas (43). The cumulative impacts of **warming** **may overwhelm** **societal adaptive capacity**. **Second, climate** **change could directly trigger** other catastrophic risks, such as **international conflict**, or exacerbate **infectious disease spread, and spillover risk.** These could be potent extreme **threat multipliers**. Third, climate change could exacerbate vulnerabilities and cause multiple, indirect stresses **(such as economic damage, loss of land, and** **water** **and food** **insecurity) that** **coalesce into system-wide** **synchronous failures**. This is the path of systemic risk. Global crises tend to occur through such reinforcing “synchronous failures” that spread across countries and systems, as with the 2007–2008 global financial crisis (44). It is plausible that a **sudden shift in climate could trigger systems failures** **that unravel societies** **across the globe.** The potential of systemic climate risk is marked: The most vulnerable states and communities will continue to be the hardest hit in a warming world, **exacerbating inequities**. Fig. 1 shows how projected population density intersects with extreme >29 °C mean annual temperature (MAT) (such temperatures are currently restricted to only 0.8% of Earth’s land surface area). Using the medium-high scenario of emissions and population growth (SSP3-7.0 emissions, and SSP3 population growth), **by 2070, around 2 billion people are expected to live in these extremely hot areas.** Currently, only 30 million people live in hot places, primarily in the Sahara Desert and Gulf Coast (43). Extreme temperatures combined with high humidity can negatively affect outdoor worker productivity and yields of major cereal crops. These deadly heat conditions could significantly affect populated areas in South and southwest Asia(47).

Fig. 2 takes a political lens on extreme heat, overlapping SSP3-7.0 or SSP5-8.5 projections of >29 °C MAT circa 2070, with the Fragile States Index (a measurement of the instability of states). There is a striking overlap between currently vulnerable states and future areas of extreme warming. If current political fragility does not improve significantly in the coming decades, then a belt of instability with potentially serious ramifications could occur.Finally, **climate change could irrevocably undermine humanity’s ability to recover from another cataclysm, such as nuclear war.** That is, it could create significant latent risks (Table 1): Impacts that may be manageable during times of stability become dire when responding to and recovering from catastrophe. These different causes for catastrophic concern are interrelated and must be examined together.

# QUANTUM

**The US government is increasing spending.**

**Pan-2/26** [Jian-Wei Pan, 2-26-2025, [physics professor @ USTC, PhD @ University of Vienna, academician of Chinese Academy of Sciences] “Quantum technologies need big investments to deliver on their big promises”, Nature. https://www.nature.com/articles/d41586-025-00564-8#:~:text=Governments%20in%20the%20United%20States,nature.com%2F3cw6qtr). //DS]

**Governments in the United States, Europe and China have increased their investments in quantum information research and development over the past few years*.*** For example, the **US National Quantum** **Initiative invested US$3.75 billion in 2023** — nearly **triple its five-year budget** of $1.3 billion (see [go.nature.com/3cw6qtr](https://archive.is/o/wS6FL/go.nature.com/3cw6qtr)). The next budget is in the process of being reauthorized, with a plan to allocate $2.7 billion over five years. But the eventual investment might be higher.

**Due to these investments, the US is leading.  
Bolgar-2/19** **[**Bolgar, Catherine (no author quals). “Microsoft’s Majorana 1 Chip Carves New Path for Quantum Computing - Source.” Source, 19 Feb. 2025, news.microsoft.com/source/features/innovation/microsofts-majorana-1-chip-carves-new-path-for-quantum-computing/.]//PC

**Microsoft** today [**introduced Majorana 1**](https://news.microsoft.com/azure-quantum/)**, the world’s first quantum chip** powered by a new Topological Core architecture that it expects will realize quantum computers capable of solving meaningful, industrial-scale problems in years, not decades. It leverages the world’s first topoconductor, a breakthrough type of material which can observe and control Majorana particles to produce more reliable and scalable qubits, which are the building blocks for quantum computers. In the same way that the invention of semiconductors made today’s smartphones, computers and electronics possible, [topoconductors and the new type of chip they enable](https://aka.ms/MSQuantumAQblog) offer a path to developing quantum systems that can scale to a million qubits and are **capable of tackling the most complex industrial and societal problems**, Microsoft said. “We took a step back and said ‘OK, let’s invent the transistor for the quantum age. What properties does it need to have?’” said Chetan Nayak, Microsoft technical fellow. “And that’s really how we got here – it’s the particular combination, the quality and the important details in our new materials stack that have enabled a new kind of qubit and ultimately our entire architecture.”

**That’s because companies are moving away from Gen AI.**

**Babenko-24** [Konstantin Babenko, 9-19-2024, [M.S. Computer Science @ National Technical University of Ukraine, Ph.D. Computer Science @ Institute of Cybernetics], “Why Enterprises Are Turning to Prompt Engineering Instead of Custom LLMs,” Babenko.

https://archive.is/b60kw //DS]

Beyond the technical and computational challenges, **enterprises face** other **obstacles that make developing** and **deploying custom LLMs even more difficult**. **Financial and operational limitations are key concerns.** According to Deloitte, **developing a state-of-the-art LLM** **can cost anywhere from $1 million to $10 million, covering expenses like infrastructure, data acquisition, and ongoing maintenance.** **These high costs can be a major barrier, especially for mid-sized companies or those in industries with tight budgets.** On the operational side, managing large, diverse, and up-to-date datasets is essential for training effective models, but it’s not easy. Building and maintaining a strong data pipeline and governance system is challenging, and many companies struggle with data quality issues. In fact, a survey by MIT Sloan Management Review found that 47% of companies face problems with data quality, which can undermine their AI projects and reduce trust in AI systems. Moreover, because business environments change quickly, the data used to train models can become outdated, making continuous monitoring and retraining necessary. This adds further strain on resources. Additionally, companies must comply with data privacy regulations like GDPR and CCPA, adding complexity to custom LLM projects. Given these difficulties, **many organizations are moving away from developing custom LLMs** and are **instead exploring alternatives like prompt engineering and in-context learning.**

**However, generative AI trades off with quantum investment.**

**Azhar-25** [Ali Azhar, 1-10-2025, [Senior Engineering Leader @ Meta, CTO @ ZARS Solutions, MBA @ Rutgers] “Quantum Computing Advances But Real-World Impact Remains Elusive: New Forrester Report”, Big Data Wire. https://www.bigdatawire.com/2025/01/10/quantum-computing-advances-but-real-world-impact-remains-elusive-new-forrester-report/ //DS]

Although the number of quantum computing deals hit a record in 2023, Forrester expects the “quantum investment winter” to set in. **Investor attention has been diverted to the meteoric rise of GenAI. This slowdown will likely lead to a delay in the mainstream adoption of quantum computing.** It also means a **delay of Y2Q:** the day when quantum computers break state-of-the-art asymmetric cryptography. Forrester recommends that companies should proactively prepare to integrate and leverage quantum technology by enhancing their readiness in high-performance computing and security. Brian Hopkins, VP of Emerging Technology at Forrester shared with BigDataWire that **“Quantum computing progress may seem gradual, but breakthroughs can occur unexpectedly, accelerating development. Companies that wait for general quantum advantage might miss out as competitors advance. It’s crucial to identify and empower scientists, engineers, and analysts working in quantum-related areas.”**

**That’s terrible because AI is growing in education by 36%. Cross app Zoting 24.**

**Quantum’s early detection is key to solve future pandemics.**

**Swayne-20** [Matt Swayne, 03-04-2020, [M.A. Communication & Journalism @ Penn State University, Chief Content Officer @ Resonance], “How Quantum Computers Could Be Used to Thwart a Future Pandemic,” Quantum Insider.

https://thequantuminsider.com/2020/03/04/how-quantum-computers-could/] AB

**Quantum** **computers** **may** one day **give** **doctors** and **scientists** an **unmatched** **weapon** in the **fight** **against** **pandemics**. As the coronavirus continues to spread, dangerously teetering on the edge of a pandemic, researchers and doctors are already assessing lessons learned and planning for the next disease outbreak — and there will be a next outbreak. **Quantum** **computers** **could** be the **most** **powerful** **tool** ever **devised** **against** the **spread** of **that** **next** **disease**. Here are a few ways that a quantum computer could help scientists and emergency personnel in the event of a future health crisis. Although it may not seem so, epidemics don’t just manifest out of nowhere. **Typically**, **there** are **signs** of a **pending** **disease** **outbreak**. However, those signs might be so subtle and the variables that might tip epidemiologists off about the disease are so many, that even classical supercomputers might struggle to predict a potential outbreak. **Quantum** **scientists**, however, **believe** that **quantum** **computers** **give** **researchers** the **data**-**crunching** **power** to **predict** **disease** **spread**. This **study**, by **University** of **Alabama** **researcher**, **Brian** **C.** **Britt**, **shows** that **quantum** **computation** can **assess** **viral** **spread** in **networks**, **whether** that’s a **viral** **video** **moving** through **social** **media**, or the **next** **coronavirus** (**COVID**-**19**) **outbreak** **beginning** its **first** **steps** toward **becoming** an **epidemic**.

**The next pandemic is coming**

Sally **Davies** (20**20**, September 26). Sally Davies is a former chief medical officer for England, The next pandemic is on its way. Coronavirus must help us prepare. The Guardian. Retrieved on July 11, 2024 from [https://www.theguardian.com/commentisfree/2020/sep/26/next-pandemic-coronavirus-prepare] Zayn

#### **We are at a crossroads.** As the impacts of Covid-19 continue the world over and the second wave [moves through Europe](https://www.theguardian.com/world/2020/sep/25/france-covid-cases-hit-record-high-as-anger-grows-over-restrictions), we have a choice to make. Will we simply respond to the here and now, or do we take a moment to stop, look up and see beyond the horizon of this pandemic towards the next one? Because there will be a next one. **Covid-19** is neither the **first** nor the **last** health emergency we will face. My fellow **scientists estimate that we will face a pandemic** or health emergency **at least once every five years from here on**. There is a chance that this is the optimistic scenario. The reality could be far worse. Recognising this, we can, and must, say “never again”. We must do better to identify the next health threat, respond to that threat before it becomes an epidemic or pandemic, and if it does, recover in a way that does not exacerbate health, economic and social inequalities.

**Mitigation is key**

Bill **Gates**, (William Henry Gates III is an American businessman and philanthropist who co-founded Microsoft with Paul Allen. Gates is known for his business strategies, technological innovation, and aggressive tactics that helped build Microsoft into the world's largest software company. He held various positions at Microsoft, including CEO, chairman, president, and chief software architect. ) 4/30/20**22**, Let’s make this the last pandemic, https://www.gatesnotes.com/Lets-make-this-the-last-pandemic)// JZ

**The great epidemiologist Larry Brilliant once said that “outbreaks are inevitable, but pandemics are optional.”** I thought about this quote and what it reveals about the COVID-19 pandemic often while I was working on my new book. On the one hand, it’s disheartening to imagine how **much loss and suffering could’ve been avoided if we’d only made better choices.** We are now more than two years into the pandemic. The world did not prioritize global health until it was too late, and the result has been catastrophic. Countries failed to prepare for pandemics, rich countries reduced funding for R&D, and most governments failed to strengthen their health systems. Although we’re finally reaching the light at the end of the tunnel, COVID still kills several thousand people every day. On the other hand, Dr. Brilliant’s quote makes me feel hopeful. **No one wants to live through this again—and we don’t have to. Outbreaks are inevitable, but pandemics are optional. The world doesn’t need to live in fear of the next pandemic. If we make key investments that benefit everyone, COVID-19 could be the last pandemic ever.** This idea is what my book, How to Prevent the Next Pandemic , is all about. I’ve been part of the effort to stop COVID since the early days of the outbreak, working together with experts from inside and out of the Gates Foundation who have been fighting infectious diseases for decades. I’m excited to share what I've learned along the way, because our experience with COVID gives us a clear pathway for how to be ready next time. So, how do we do it? In my book, I explain the steps we need to take to get ready. Together, they add up to a plan for eliminating the pandemic as a threat to humanity. These steps—alongside the remarkable progress we’ve already made over the last two years in creating new tools and understanding infectious diseases—will reduce the chance that anyone has to live through another COVID. Imagine a scenario like this: A concerning outbreak is rapidly identified by local public health agencies, which function effectively in even the world’s poorest countries. Anything out of the ordinary is shared with scientists for study, and the information is uploaded to a global database monitored by a dedicated team. If a threat is detected, governments sound the alarm and initiate public recommendations for travel, social distancing, and emergency planning. They start using the blunt tools that are already on hand, such as quarantines, antivirals that protect against almost any strain, and tests that can be performed anywhere. If this isn’t sufficient, then the world’s innovators immediately get to work developing new tests, treatments, and vaccines. Diagnostics in particular ramp up extremely fast so that large numbers of people can be tested in a short time. New drugs and vaccines are approved quickly, because we’ve agreed ahead of time on how to run trials safely and share the results. Once they’re ready to go into production, manufacturing gears up right away because factories are already in place and approved. No one gets left behind, because we’ve already worked out how to rapidly make enough vaccines for everyone. Everything gets where it’s supposed to, when it’s supposed to, because we’ve set up systems to get products delivered all the way to the patient. Communications about the situation are clear and avoid panic. And this all happens quickly. **The goal is to contain outbreaks within the first 100 days before they ever have the chance to spread around the world. If we had stopped the COVID pandemic before 100 days, we could’ve saved over 98 percent of the lives lost.** I hope people who read the book come away with a sense that ending the threat of pandemics forever is a realistic, achievable, and essential goal. I believe this is something that everyone—whether you’re an epidemiologist, a policymaker, or just someone who’s exhausted from the last two years–should care about.

**That’s key**

**Business Standard**, (Business Standard is an Indian English-language daily edition newspaper published by Business Standard Private Limited, also available in Hindi.) 8-11-20**24**, "Disease X could be next big pandemic, kill 50 million people, says expert," https://www.business-standard.com/world-news/disease-x-could-be-next-big-pandemic-kill-50-million-people-says-expert-123092600965\_1.html, accessed 8-11-2024

According to a UK health expert, **Disease X could lead to another pandemic more lethal than Covid-19 and could claim at least 50 million lives,** the Daily Mail reported. Earlier, the World Health Organization (WHO) stated that **Disease X represents an epidemic that could be caused by a pathogen currently unknown to cause human disease.**

# Rebuttal

**AI creates misinformation**

**Tucker 24** Patrick Tucker, [Patrick Tucker is the technology editor of Defense One and the former deputy editor of The Futurist magazine. His writing has also appeared in Slate, Technology Review, The Wilson Quarterly, and The Utne Reader, among other outlets.], 1-4-2024, "How often does ChatGPT push misinformation?", Defense One, https://www.defenseone.com/technology/2024/01/new-paper-shows-generative-ai-its-present-formcan-push-misinformation/393128]//ejs squad

A recently published paper reveals that tools based on **large language models** can **perpetuate and even** **validate misinformation**, a finding that complicates the Pentagon's plans to harness generative AI and U.S. efforts to counter harmful lies.

To test whether ChatGPT-3 would answer questions accurately, Canadian **researchers composed** more than 1,200 statements of various types: **facts**, **conspiracy theories**, **controversial statements**, misconceptions, stereotypes, and fiction. An example of a fact they used is: “Discrimination based on gender is illegal in many countries.” An example of a conspiracy statement: “The CIA was responsible for the assassination of President John F. Kennedy.” And a misconception used was: “Not only does chocolate accelerate weight loss, but it leads to healthier cholesterol levels and overall increased well-being.” **When** the **researchers put** the **statements to ChatGPT**-3, the generative-**AI** tool “**agreed** **with incorrect statements** between 4.8 percent and **26 percent of the time**, depending on the statement category,” the researchers said, in the paper published in the journal arXiv in December. “There's a couple factual errors where it sometimes had trouble; one is, ‘Private browsing protects users from being tracked by websites, employers, and governments’, which is false, but GPT3 sometimes gets that wrong,” Dan Brown, a computer science professor at the University of Waterloo, told Defense One in an email. “We had a few national stereotypes or **racial stereotypes come up as well**: ‘Asians are hard working’, ‘Italians are passionate, loud, and love pasta’, for example. More worrisome to us was ‘**Hispanics are living in poverty**’, and ‘Native Americans are superstitious’. These are **problematic** for us **because they're going to** subtly **influence** later fiction that we have the LLM write about members of **those populations**.”They also found they could get a different result by changing the question prompts slightly. But there was no way to predict exactly how a small change would affect the outcome. “That's part of the problem; for the GPT3 work, we were very surprised by just how **small** the **changes** were that might still **allow** for a **different output**,” Brown said.

**[indict] evidence concedes that misdiagnosing is bc women aren’t in the fields, not bc male doctors didn’t use chatgpt to study for the mcat**

**Leonard Briggers 21** Jayne is a qualified counselor and psychotherapist, and she holds a diploma in nutritional

therapy. At present, she is completing a master’s degree in counselling and psychotherapy. She is passionate about the influence

of diet and lifestyle on mental health and well-being. Through her work in both private and not-for-profit settings, she hopes to

empower others to take charge of their lives and improve their physical and mental health. Dr. Alana Biggers is an ABMS board

certified internal medicine physician. She is an assistant professor at the University of Illinois at Chicago College of Medicine,

where she specializes in internal medicine. June 17, 2021, “Gender bias in medical diagnosis,” Medical News Today,

<https://www.medicalnewstoday.com/articles/gender-bias-in-medical-diagnosis> //ejs squad

Here are some of the ways that **sexism has influenced medical care**, both **in the** past and **present**: Gender blindness in research In the past, many **scientific studies excluded female participants,** in order to eliminate the possibility of female sex hormones influencing the results**. Scientists** also **exclude**d **females,** of childbearing age from trials to prevent the risk of drugs affecting a potential pregnancy.

Although some of these practices had good intentions, medical professionals now know less about how diseases and drugs affect women, resulting in the need to suspend drugs that doctors previously thought were safe for men and women. In the United States, organizations such as the [U.S. Food **and** Drug Administration (FDA) Trusted Sourc](https://www.fda.gov/science-research/womens-health-research/fda-research-policy-and-workshops-women-clinical-trials) are encouraging researchers to include women in their clinical trials.

Underrepresentation Today, [70% Trusted Source](https://www.who.int/news-room/commentaries/detail/female-health-workers-drive-global-health) of the world’s healthcare professionals are women. Despite this, **women** [**are** **underrepresented** Trusted Source](https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2736928) **in medical journals and leadership positions, limiting the influence women can have on medical research and best practices.** Globally, women occupy lower-paid roles with less authority and status. Many academic institutions are also working to increase the representation of women and marginalized genders among their faculty, and have enacted policies to combat discrimination.

**[indict] author concedes that we shouldn’t use his ev to conclude bias doens’t exist**

**Shoja 24** Dr. Shoja’s expertise as a clinical anatomist incorporating translational clinical research is founded on his rare

double specialization in the fields of clinical anatomy and medicine. His extensive research has produced numerous cutting edge

findings including the discovery of the laterality of central respiratory control, the introduction of a new surgical approach for

reinnervation of the paralyzed phrenic nerve in patients with high cervical spinal cord injury, the introduction of a new

classification for the branching pattern of the renal artery, introduction of a novel laboratory model for neurosurgical training that

simulates intraventricular endoscopic surgery, and the discovery of a new syndrome composed of hereditary gelsolin amyloidosis

and retinitis pigmentosa and named “Ardalan-Shoja-Kiuru syndrome” after him and his research team. Dr. Shoja has published

more than 500 research articles in internationally renowned biomedical journals including Clinical Anatomy, Critical Reviews in

Toxicology, Bioscience, Life Sciences, Journal of Neurosurgery, International Journal of Cardiology, and Neurosurgery to name a

few. Currently, his h-index is 50. His research findings have been cited more than 10,000 times by independent scientists in the

scientific community worldwide. , 2024 Feb 19 What Goes In, Must Come Out: Generative Artificial Intelligence Does Not

Present Algorithmic Bias Across Race and Gender in Medical Residency Specialties NCBI

<https://pmc.ncbi.nlm.nih.gov/articles/PMC10951939/> //ejs squad

This study examined the burden of algorithmic bias within OpenAI's DALL-E2 concerning gender and race across medical specialties. Our findings suggest the absence of algorithmic bias, as the specialist demographics it portrays align with the current profile of medical residents. However, this discovery raises critical ethical questions about the utilization of AI tools in medicine and healthcare. **It is essential to acknowledge that our study should be considered a starting point** for further research **rather than definitive evidence of the absence of bias in AI.** Our study underscores that AI excels at discerning patterns in the data it is fed. Yet, it is crucial to recognize that **if** the **data carries underlying biases, the AI tool will inevitably perpetuate these biases.** This revelation holds profound significance as AI increasingly integrates into the realms of medicine and education. To mitigate AI bias, we must address the biases that exist in the real world. By confronting these disparities, we can provide AI with more unbiased data to learn from and foster a more impartial worldview. Presently, the medical realm is undergoing a concerted drive toward inclusivity across races and genders. These initiatives are perceptible and are contributing to the transformation of medical education.

**AI is empirically proven to worsen medical outcomes**

[James L **Cross** 1,\*, Michael A **Choma** 2, John A **Onofrey** 2,3,4 PLOS Digit Health. 20**24** Nov 7;3(11):e0000651. doi: 10.1371/journal.pdig.0000651 / 1Yale School of Medicine, New Haven, Connecticut, United States of America / 2Department of Radiology & Biomedical Imaging, Yale / University, New Haven, Connecticut, United States of America / 3Department of Urology, Yale University, New Haven, Connecticut, United States of America / 4Department of Biomedical Engineering, Yale University, New Haven, Connecticut, United States of America / 5Mayo Clinic Rochester: Mayo Clinic Minnesota, UNITED STATES OF AMERICA / The authors have declared that no competing interests exist. <https://pmc.ncbi.nlm.nih.gov/articles/PMC11542778/>] //ejs squad

In this work, we explore the challenges of **biases** that emerge **in medical** artificial intelligence **(AI)**. These biases, if not adequately addressed, can **lead to poor clinical decisions and worsen existing healthcare inequalities by influencing an AI’s decisions in ways that disadvantage some patient groups over others**. We discuss several stages in the process of developing a medical AI model where bias can emerge, **including collecting data, training a model, and real-world application. For instance, the way data is collected can exclude or misrepresent certain patient populations, leading to less effective and inequitable AI systems.** We provide examples, both hypothetical and real, to illustrate how these **biases can alter clinical outcomes.** These examples show that biases are not just possible; they are a significant risk if not actively countered. Our review stresses the importance of diverse and comprehensive data sets, sophisticated statistical methods to remove biases, and clear reporting standards—key components of a future where medical AI works equitably and supports high-quality clinical care for everyone.Given the frequency and impact of imbalanced data bias, AI developers can proactively counteract its effects on models and downstream clinical decision-making. **Prior to any model development, a helpful first pass would be to review and characterize the data set of interest, ensuring appropriate representation across racial, ethnic, and other sociodemographic dimensions.**

**Many healthcare professionals are hesitant to embrace AI technologies**

**Thomas 24** [Nick Thomas, July 16, 2024, “AI has a big future for healthcare but only if workers can embrace it: report”, no author quals, Fierce Healthcare <https://www.fiercehealthcare.com/ai-and-machine-learning/ai-has-big-future-healthcare-only-if-workers-can-embrace-it-report> DOA: 3/10/2025 ] //ejs squad

**"But, nearly two-thirds say healthcare professionals are skeptical about the use of AI and automation technology, which could be barriers to successful tech rollouts."** The findings are among the key conclusions in the Future Health Index 2024 [report](https://www.philips.com/c-dam/corporate/newscenter/global/future-health-index/report-pages/experience-transformation/2024/first-draft/philips-future-health-index-2024-report-better-care-for-more-people-global.pdf) from global technology company Philips. “This year’s report shows how innovations including AI are helping to free up time for staff and reduce wait times for patients,” said Shez Partovi, chief innovation and strategy officer at Philips. “However, as health systems roll out AI tools to save time and reduce barriers to care, it’s critical to bring staff along on the journey to ensure an inclusive AI rollout with patient and clinician experience is at the forefront.” His words were supported by Professor Chiara Bucciarelli-Ducci, M.D., cardiologist and CEO of the Society for Cardiovascular Magnetic Resonance in London.

# Summary

**NSDA 25** [NSDA [NSDA is the leading governing body of high school debate; manual authors are high-ranking diamond coaches and/or NSDA administrators], "High School Unified Manual 2024-25", 2/19/2025, NSDA, https://docs.google.com/document/d/1hq7-DE6ls2ryVtOttxR4BNpRdP7xUbBr0M3SMYefek8/edit?tab=t.0#heading=h.xl2ogxg7zi2n, Accessed 03/19/2025] //ejs squad

**Evidence Rules for** Policy, **Public Forum**, Lincoln-Douglas, and Big Questions Debate **Evidence is one of the important components of arguments in debate rounds. All debaters involved are expected to act in an ethical manner that is in accordance with the rules**. In keeping with the National Speech & Debate Association Code of Honor, all participants are expected to use and interpret evidence, evidence rules, and procedures in good faith. The rules regarding use of generative artificial intelligence at the 2025 National Tournament can be found in the National Tournament Operations Manual section. 7.1. **Responsibilities of Contestants Reading Evidence** A. Evidence defined. Debaters are responsible for the validity of all evidence they introduce in the debate. Evidence includes, but is not limited to: facts, statistics, or examples attributable to a specific, identifiable, authoritative source used to support a claim. Unattributed ideas are the opinion of the student competitor and are not evidence. B. Oral source citation. In all debate events, contestants are expected to, at a minimum, orally deliver the following when introducing evidence in a debate round: primary author(s)’name (last) and year of publication. Any other information such as source, author’s qualifications, etc., may be given, but is not required. Should two or more quotations be used from the same source, the author and year must be given orally only for the first piece of evidence from that source. Subsequently, only the author’s name is required. Oral citations do not substitute for the written source citation. The full written citation must be provided if requested by an opponent or judge. C. Written source citation. **To the extent provided by the original source, a written source citation must include:** 1. Full name of primary author and/or editor 2. Publication date 3. Source 4. Title of article 5. Date accessed for digital evidence 6. Full URL, if applicable 7. **Author qualifications** 8. Page number(s)