

First an Overview

You should be skeptical of AI's effectiveness – almost no research supports it

Williamson '24 concludes

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AI in Education. Since the 1960s, scientists and technology companies have explored ways to apply AI in education. AI in Education (AIED) is a major field of research and development.⁵⁵ The AI applications being promoted to schools today were preceded in the 1960s and 1970s by "Intelligent Tutoring Systems" and "Computer-Assisted Instruction" systems.⁵⁶ Since the early 2000s, researchers have gathered, stored, and analyzed massive quantities of educational data with the intention of informing institutional and instructional strategies.⁵⁷ These approaches are now routinely considered synonymous with AIED, and have also been rapidly commercialized by the ed tech industry.⁵⁸ Most AIED applications employ big data and machine learning to produce various predictions and automated actions—such as predicting that a student may fail an assessment or creating a "personalized" intervention intended to produce a desired learning outcome.⁵⁹ Research on AI in education has developed and tested various approaches and reported modest effectiveness on measurable learning achievement—performance on quizzes and tests; for example.⁶⁰ Current excitement about its potential is motivating both public and private sources to generously fund researchers trying to find ways to improve learning outcomes using AI.⁶¹ However, the assumption that AI in education can be understood primarily as a technical matter best addressed by scientists and companies is increasingly challenged by researchers who argue that a narrowly technical perspective may lead to both bad policy and bad pedagogy.⁶² They point out that AI exists in social, economic, and political contexts that shape its development and uses.⁶³ How AI is adopted by different educational stakeholders (including AIED researchers, ed tech entrepreneurs, corporate leaders, and policymakers) will have significant implications for its use in schools.⁶⁴ The fact that entrepreneurs and corporations funded by venture capital and private equity are rushing to promote AI in education will inevitably narrow possible applications to those preferred by stakeholders with financial interests.⁶⁵ Small-scale ed tech start-ups and Big Tech corporations alike see AI as an opportunity.⁶⁶ Leveraging popular hype to market such education products as personalized learning programs, automated lesson plan generators, and AI tutoring chatbots, called "tutorbots," to schools.⁶⁷ Compelling evidence for the effectiveness of tutorbots in education remains scarce.⁶⁸ Though this does not prevent entrepreneurs and researchers from proclaiming their usefulness.⁶⁹ Policymakers routinely invoke AI rhetorically, calling on schools to embark on "digital transformation,"⁷⁰ often with little attention to social, economic, legal, or ethical implications.⁷¹ These calls dovetail with existing political priorities on performance monitoring, accountability, efficiency, and effectiveness—all of which require extensive collection of data about students.⁷² Although systems of test-based accountability have existed in schools since the 1990s,⁷³ they will expand and intensify as AI is used to continuously monitor and assess student learning.⁷⁴ As a result, commercial AI systems will increasingly serve as private actors in public education: schools, districts, and governments relinquish key tasks, functions, and responsibilities to third-party technology vendors.⁷⁵ Existing and potential uses of AI in education are not merely innovative technical add-ons to teaching and learning practices or engineering solutions to schools' existing pedagogic and administrative problems. Rather, AI in education has been spurred by multiple forces: longstanding efforts by scientists to measure, predict, and support learning processes and outcomes; commercial aspirations to profit from selling products to schools; and the political objective of being perceived as having improved school efficiency and accountability while cutting costs. As things currently stand, these ambitions have begun to coalesce into a vision of AI-driven schooling in which commercial products assess student learning, automate teaching, and make decisions about student progress. Inadequate Research Base

Despite the extensive research in the field of AI in Education (AIED) and the burgeoning

research on machine learning, there is remarkably little evidence to support claims

of AI's ability to "transform" schools.⁷⁶ While AIED researchers have produced many research

findings, their studies tend to focus primarily on measures of individual student engagement and performance (assessed by standardized achievements tests), or on "engineering" problems such as designing increasingly sophisticated algorithms and enhancing machine learning effectiveness.⁷⁷ Overall, AIED studies tend to find ambiguous results, lack independence and scale, and fail to address more fundamental questions about educational goals.⁷⁸ AIED research therefore often promotes a view of education transformation as improving measurable individual outcomes despite very limited evidence that AI "works."⁷⁹ In effect, such studies reduce well-researched and nuanced theories of how humans learn to whatever can be made into a mathematical model (however complex), and they ignore the contested terrain of exactly which goals and curriculum public schools should embrace.⁸⁰ Moreover, claims that AI can solve major educational problems—such as lack of qualified teachers, student underachievement, and educational inequalities—rely

to a considerable extent on conjecture rather than evidence.⁸¹ Even more problematic are the

serious methodological flaws in machine learning research that call into question the

validity of hundreds of studies.⁸² The nature of the flaws, in general, leads toward "over optimism" with

respect to the usefulness and value of machine learning applications in a variety of fields.⁸³ These findings are particularly concerning because they call into question not only commercial marketing claims, but also the scientific evidence base supporting the widespread implementation of AI systems in all sectors,⁸⁴ including education. Finally, because of the very high computing costs associated with

running machine learning models, most [and] researchers have to rely on systems from the dominant AI companies

themselves in order to conduct research⁸⁵—the same corporations that often fund AI studies.⁸⁶ This makes research dependent

on corporate resources, funds, and business practices, giving AI firms considerable

influence over not only AI development, but also the academic research that depends on their systems.⁸⁷ It also compromises an important part of the research process, which is reproducing findings to verify their validity. **When a**

company changes or **stops** supporting a particular model, **researchers cannot reproduce studies conducted earlier.**⁸⁸ This **renders** the **research** base **unstable and unverifiable**—and thus unusable as a basis for assessing subsequent models.

Teachers

Society is facing a massive teaching crisis, even with years of gen AI

White 25[Scott White, March 7, 2025, "Teacher Funding Cut As National Shortage Reaches Breaking Point", I have worked in college admissions and college counseling for over 40 years, and have written extensively on the college admissions process. I have served as the Director of Guidance at Morristown High School, as a school counselor and Director of Guidance at Montclair High School, and as Director of College Counseling at Montclair Kimberley Academy. My early experience as an admissions counselor at Bard College was vital to my understanding of college admissions. I have been a featured expert on CBS Sunday Morning, the Washington Post's Answer Sheet and in most major national publications. I currently work as an independent college counselor, *Forbes*, <https://www.forbes.com/sites/scottwhite/2025/03/07/teacher-funding-cut-as-national-shortage-reaches-breaking-point/>]

America's education system is facing a crisis that threatens to undermine the future of millions of students: a severe and growing teacher shortage. This issue, simmering for years, has reached a boiling point as **schools nationwide struggle to fill classrooms with qualified educators.** Compounding the problem is a recent decision by the Trump administration to eliminate federal funding for teacher preparation programs, which has sparked lawsuits and intensified the debate over how to address the shortage. The stakes are high, and the consequences of inaction could reshape the educational landscape for decades.

It's has been and gets worse with AI.

Marshall et al. 25 [David T. Marshall, Teanna Moore & Timothy Pressley, 2-4-2025, David T. Marshall is an associate professor of educational research at Auburn University. "Tech Aims to Reduce Teacher Burnout - But it Can Sometimes Make it Worse," No Publication, <https://www.the74million.org/article/tech-aims-to-reduce-teacher-burnout-but-it-can-sometimes-make-it-worse/>, DOA: 2-21-2025] //beta squad

When we set out to study pandemic-related changes in schools, we thought we'd find that learning management systems that rely on technology to improve teaching would make educators' jobs easier. Instead, we found that teachers whose schools were using learning management systems had higher rates of burnout.

Our findings were based on a survey of 779 U.S. teachers conducted in May 2022, along with subsequent focus groups that took place in the fall of that year. Our study was peer-reviewed and published in April 2024.

During the COVID-19 pandemic, when schools across the country were under lockdown orders, schools adopted new technologies to facilitate remote learning during the crisis. These technologies included learning management systems, which are online platforms that help educators organize and keep track of their coursework.

We were puzzled to find that teachers who used a learning management system such as Canvas or Schoology reported higher levels of burnout. Ideally, these tools should have simplified their jobs. We also thought these systems would improve teachers' ability to organize documents and assignments, mainly because they would house everything digitally, and thus, reduce the need to print documents or bring piles of student work home to grade.

But in the follow-up focus groups we conducted, the data told a different story. Instead of being used to replace old ways of completing tasks, the learning management systems were simply another thing on teachers' plates.

A telling example was seen in lesson planning. Before the pandemic, teachers typically submitted hard copies of lesson plans to administrators. However, once school systems introduced learning management systems, some teachers were expected to not only continue submitting paper plans but to also upload digital versions to the learning management system using a completely different format.

Asking teachers to adopt new tools without removing old requirements is a recipe for burnout.

Teachers who taught early elementary grades had the most complaints about learning management systems because the systems did not align with where their students were at. A kindergarten teacher from Las Vegas shared, "Now granted my kids cannot really count to 10 when they first come in, but they have to learn a six digit student number" to access Canvas. "I definitely agree that ... it does lead to burnout."

In addition to technology-related concerns, teachers identified other factors such as administrative support, teacher autonomy and mental health as predictors of burnout.

Why it matters

Teacher burnout has been a persistent issue in education, and one that became especially pronounced during and after the COVID-19 pandemic.

If new technology is being adopted to help teachers do their jobs, then school leaders need to make sure it will not add extra work for them. If it adds to or increases teachers' workloads, then adding technology increases the likelihood that a teacher will burn out. This likely compels more teachers to leave the field.

Schools that implement new technologies should make sure that they are streamlining the job of being a teacher by offsetting other tasks, and not simply adding more work to their load.

The broader lesson from this study is that teacher well-being should be a primary focus with the implementation of schoolwide changes.

AI increases teacher burnout because it forces them to adapt their curriculum to prevent cheating Shah 24

Priten **Shah** (Priten Shah is an education entrepreneur and the author of *AI & The Future of Education: Teaching in the Age of Artificial Intelligence* (Jossey-Bass, 2023). He is the founder of Pedagogy.Cloud, an educational consulting firm that supports educators in K-12 schools, higher education, and the nonprofit sector adapt to the increasing capabilities of AI.

), 6-5-2024, "I Was an AI Optimist. Now I'm Worried It's Making Teacher Burnout Worse (Opinion)," Education Week, <https://www.edweek.org/technology/opinion-i-was-an-ai-optimist-now-im-worried-its-making-teacher-burnout-worse/2024/06>, accessed 2-27-2025]//beta squad

Seemingly overnight, understanding AI technology went from being a niche skill to an essential life skill. While many educators across the country have diligently spent their free time, prep periods, and summer vacations pursuing professional development, an overwhelming majority are rightfully daunted by the prospect of learning how to navigate this new technology. The learning curve for many educators has been much steeper than is being acknowledged. The prospect of learning a brand-new tool can be overwhelming as you learn its features, capabilities, and limitations, and how it works best for you. Using AI tools also involves learning more than just the user interface of a new tool; it requires our educators to learn how this technology works to feel empowered to use it responsibly and have meaningful conversations with their students about it. For others, the technology remains unaffordable as major tools begin to paywall their strongest features. Absent support from their district, this often means that many teachers have an additional expense that they must pay out of pocket to use these technologies in the powerful ways advertised. This only further limits the number of teachers who are seeing the benefits of developing AI literacy. Even those who manage to find the time and money to pursue some professional development or are part of a small contingent of American teachers who receive resources from their schools still face the task of staying current with the developments and rapid changes that the AI space is currently undergoing. Schools and districts need to acknowledge the challenge AI creates for teachers who want to become active, responsible users of the technology. They must find space in their existing professional development schedules and allow teachers to spend meaningful time learning about and using AI technology in ways that can eventually reduce their workload. How AI has changed curriculum Part of the frustration we hear from educators is how many of their assignments need to be restructured, given the ability for students to use AI technologies to complete their homework easily. This has creat[ing]ed a crisis for educators who assign out-of-class work, especially those who extensively use independent writing as an assessment tool. Teachers are facing the need to rethink their assessments and pedagogical practices, with very little guidance on how to effectively and sustainably make these changes. The definition of "AI-proof assignments" shifts so rapidly that it has become a relatively futile goal for educators to pursue. Some "AI proofing" has relied on generative AI's limited knowledge of recent events and its inability to perform math, while other anti-cheating efforts turned to now-defunct AI detectors or the lack of students' voices in writing. As AI programs continue to overcome these limitations, teachers will likely have to move toward different types of student assessments that capitalize on classroom time and use independent time only for preparatory work.

Human teachers are uniquely key for learning.

Walter 25, Walther, Cornelia C. "AI Is Changing How We Learn: The New Role of Human Teachers." Forbes, 1 Mar. 2025, Dr. Cornelia C. Walther is a humanitarian leader with 20+ years at the UN driving social change. Now a Wharton/University of Pennsylvania Fellow, she pioneers research on hybrid intelligence and prosocial AI through the global POZE alliance to build Agency amid AI for All. Her focus is on harnessing AI to bring out the best in and for people and planet. www.forbes.com/sites/corneliawalther/2025/03/01/ai-is-changing-how-we-learn-the-new-role-of-human-teachers/ //beta squad

This incident highlights the tension between artificial and natural Intelligences: while AI excels at processing data, it lacks the deeper dimensions of human understanding that characterize NI. Natural Intelligence: A Multidimensional Framework. Going far beyond the rational thought process the type of intelligence that each of us is naturally equipped with operates on multiple levels that AI can't replicate, so far: Personal Aspects: Aspirations: Our goals and visions that animate us to learn[ing] and give knowledge purpose. Emotions: Empathy, compassion, and other feelings that shape how we interpret experiences. Thoughts: Logical reasoning, creativity, and moral judgment that converge in our thinking. Sensations: Our embodied awareness of the world that can trigger intuition or creativity.

When AI inserts scholarly sources that don't exist in the real world it does not come with the intent of deception in the human sense. AI models don't understand truth or falsehood: they merely generate patterns that mimic authoritative language. What makes this particularly challenging is the polished, articulate nature of AI outputs, which can easily convince even discerning readers. This is precisely why teachers are irreplaceable. They help students develop cognitive agency — the ability to think independently despite technological shortcuts — before entering workplaces where time pressures constantly tempt them to outsource their thinking. Just as physical strength requires consistent exercise, critical thinking is a muscle that atrophies without use. Teachers serve as vital trainers, guiding students to flex their curiosity, creativity, and analytical skills in a world that increasingly rewards the passive consumption of machine-generated content.

Can't be solved - AI can never be creative because it only alters previously known data.

De Cremer 21, *Professor in Management and Organizations at the NUS Business School at the National University of Singapore; Director of the Centre on AI Technology for Humankind at NUS Business School; **Chairman of the Human Rights Foundation, Founder of the Renew Democracy Initiative. *David De Cremer and **Garry Kasparov, "AI Should Augment Human Intelligence, Not Replace It," Harvard Business Review, 03-18-2021, <https://hbr.org/2021/03/ai-should-augment-human-intelligence-not-replace-it> // beta squad

In general, people recognize today's advanced computers as intelligent because they have the potential to learn and make decisions based on the information they take in. But while we may recognize that ability, it's a decidedly different type of intelligence what we possess.

In its simplest form, AI is a computer acting and deciding in ways that seem intelligent. In line with Alan Turing's philosophy, AI imitates how humans act, feel, speak, and decide. This type of intelligence is extremely useful in an organizational setting: Because of its imitating abilities, AI has the quality to identify informational patterns that optimize trends relevant to the job. In addition, contrary to humans, AI never gets physically tired and as long it's fed data it will keep going.

These qualities mean that AI is perfectly suited to put at work in lower-level routine tasks that are repetitive and take place within a closed management system. In such a system, the rules of the game are clear and not influenced by external forces. Think, for example, of an assembly line where workers are not interrupted by external demands and influences like work meetings. As a case in point, the assembly line is exactly the place where Amazon placed algorithms in the role of managers to supervise human workers and even fire them. As the work is repetitive and subject to rigid procedures optimizing efficiency and productivity, AI is able to perform in more accurate ways to human supervisors.

Human abilities, however, are more expansive. Contrary to AI abilities that are only responsive to the data available, humans have the ability to imagine, anticipate, feel, and judge changing situations, which allows them to shift from short-term to long-term concerns. These abilities are unique to humans and do not require a steady flow of externally provided data to work as is the case with artificial intelligence.

Education is essential for society

Serdyukov 17, Peter Serdyukov 17, Professor in the Department of Teacher Education at National University, 3/27/2017, "Innovation in Education: What Works, What Doesn't, and What to Do about It?" Journal of Research in Innovative Teaching & Learning, Vol. 10, No. 1, pp. 4-33, <http://dx.doi.org/10.1108/JRIT-10-2016-0007> //beta squad

Education, being a social institution serving the needs of society, is indispensable for society to survive and thrive. It should be not only comprehensive, sustainable, and superb, but must continuously evolve to meet the challenges of the fast-changing and unpredictable globalized world. This evolution must be systemic, consistent, and scalable; therefore, school teachers, college professors, administrators, researchers, and policy makers are expected to innovate the theory and practice of teaching and learning, as well as all other aspects of this complex organization to ensure quality preparation of all students to life and work. Here we present a systemic discussion of educational innovations, identify the barriers to innovation, and outline potential directions for effective innovations. We discuss the current status of innovations in US education, what educational innovation is, how innovations are being integrated in schools and colleges, why innovations do not always produce the desired effect, and what should be done to increase the scale and rate of innovation-based transformations in our education system. We then offer recommendations for the growth of educational innovations. As examples of innovations in education, we will highlight

online learning and time efficiency of learning using accelerated and intensive approaches. Innovations in US education For an individual, a nation, and humankind to survive and progress, innovation and evolution are essential. Innovations in education are of particular

importance because education plays a crucial role in creating a sustainable future. "Innovation resembles mutation, the biological process that keeps species evolving so they can better compete for survival" (Hoffman and Holzhuter, 2012, p. 3). Innovation, therefore, is to be regarded as an instrument of necessary and positive change. Any human activity (e.g. industrial, business, or educational) needs constant innovation to remain sustainable. The need for educational innovations has become acute. "It is widely believed that countries' social and economic well-being will depend to an ever greater extent on the quality of their citizens' education: the emergence of the so-called 'knowledge society', the transformation of information and the media, and increasing specialization on the part of organizations all call for high skill profiles and levels of knowledge. Today's education systems are required to be both effective and efficient, or in other words, to reach the goals set for them while making the best use of available resources" (Cornali, 2012, p. 255). According to an Organization for Economic Cooperation and Development (OECD) report, "the pressure to increase equity and improve educational outcomes for students is growing around the world" (Vieluf et al., 2012, p. 3). In the USA, underlying pressure to innovate comes from political, economic, demographic, and technological forces from both inside and outside the nation.

DPC 04: Which has long term impacts, as according to dropout Prevention Center 04, the dea Dropout Prevention Center 04 [National Dropout Prevention Center, "Economic Impacts of Dropouts - National Dropout Prevention Center", 2004, Alliance for Excellent Education, no author quals
<https://dropoutprevention.org/resources/statistics/quick-facts/economic-impacts-of-dropouts/>, Accessed 05/22/2023] //beta squad

Teen girls in the bottom 20% of basic reading and math skills are five times more likely to become mothers over a two-year high school period than teen girls in the top 20% (Alliance for Excellent Education, 2003b). Male and female students with low academic achievement are twice as likely to become parents by their senior year of high school, compared to students with high academic achievement (Alliance for Excellent Education, 2003b).

The U.S. death rate for those with fewer than 12 years of education is [250%] 2.5 times higher [250%] than the rate of those with 13 or more years of education (alliance for Excellent Education, 200

Water Scarcity

The use of gen AI in education is growing

Rosenbaum 24 [Eric Rosenbaum, "AI is getting very popular among students and teachers, very quickly", Senior Editor at CNBC, 06/11/2024,
<https://www.cnbc.com/2024/06/11/ai-is-getting-very-popular-among-students-and-teachers-very-quickly.html>] //JS

The percentage of K-12 students and teachers who say they are using AI and approve of it **has risen sharply over the past year**, according to a new poll conducted by Impact Research for the Walton Family Foundation. Almost half of U.S. teachers and K-12 students say they are using ChatGPT weekly. Less than 20% of students say they never use generative AI. The American public as a whole remains on the fence with artificial intelligence, according to many polls, but in education, adoption among teachers and students is rapidly rising. In a little over a year, the percentage of teachers who say they are familiar with ChatGPT — the breakthrough generative AI chatbot from Microsoft-backed OpenAI, which is next headed to the Apple iPhone — rose from 55% to 79%, while among K-12 students, it rose from 37% to 75%, according to a new poll conducted in May by Impact Research for the Walton Family Foundation, in conjunction with the Learning Engineering Virtual Institute's AI Lab. When it comes to actual usage, a similar spike occurred, with **46% of teachers and 48% of students saying they use ChatGPT at least weekly**, with student **usage up 27 percentage points** over last year.

Gen AI only results in the use of more AI infrastructure Voruganti

23[Kaladhar Voruganti, August 7, 2023, "What Generative AI Means for Data Centers", Senior Business Technologist, <https://blog.equinix.com/blog/2023/08/07/what-generative-ai-means-for-data-centers/>] //JS

he original prompt you put into the AI engine is highly important in delivering good results. Generative AI query response times can be slower (in the order of multiple seconds) compared to that of traditional AI queries (with sub-second response times) because of the extra processing and larger data sets. **Generative AI involves much larger AI training infrastructure and higher power consumption**, thus **requiring denser server racks and advanced cooling techniques**. In many use cases, subject matter experts can interact directly with generative AI systems instead of going through data scientists. Data scientists are still required for foundational model customization. Because of **the high computation and infrastructure requirements to create AI** models from scratch, companies are starting to share AI models through Model as a Service and open-source AI model marketplaces.

That's bad-they consume too much water University of Tulsa 24

[The University of Tulsa, July 19, 2024, "Data centers draining resources in water-stressed communities", no author quals, <https://utulsa.edu/news/data-centers-draining-resources-in-water-stressed-communities/#:~:text=Unfortunately%2C%20many%20data%20centers%20rely,thousands%20of%20households%20or%20farms.>] //JS

The rapid growth of the technology industry and the increasing reliance on cloud computing and artificial intelligence have led to a boom in the construction of data centers across the United States. Electric vehicles, wind and solar energy, and the smart grid are particularly reliant on data centers to optimize energy utilization. These facilities house thousands of servers that require constant cooling to prevent overheating and ensure optimal performance. **Unfortunately**, many **data centers rely on water-intensive cooling systems that consume millions of gallons of** potable (**drinking**) **water annually. A single data center can consume[s] up to 5 million gallons of drinking water per day, enough to supply thousands of households** or farms. **The increasing use and training of AI models has further exacerbated the water consumption challenges faced by data centers.** Machine learning, particularly deep learning models, requires significant computational power, which generates a lot of heat. As a result, data centers housing these machine learning servers need even more cooling to maintain optimal performance and prevent overheating. Graphics processing units, which are commonly used to accelerate machine learning workloads, are known for their high energy consumption and heat generation..

Look to ChatGPT, a gen AI McNally 24

[Paul McNally, April 3, 2024, "Critical impact-ChatGPT consumes 500 ml of water for every 50 texts you send it", Paul McNally is the Founder of Develop AI, an innovative company that reports on AI, provides training and consulting services and builds AI tools. He is the Founder of podcasting company Develop Audio and the community radio non-profit Citizen Justice Network. He has received awards and recognition for his podcast Alibi and his influential book, The Street, that investigated corrupt cops and drug lords in Johannesburg. In 2016 he was a Visiting Nieman Fellow at Harvard.

<https://www.dailymaverick.co.za/article/2024-04-03-critical-impact-chatgpt-consumes-500ml-of-water-for-every-50-texts-you-send-it/>]//JS

Similarly, as we ramp up towards a world of constantly generating content with AI, we are being asked to consider the environmental cost of its production. According to a paper published [late last year](#), it is estimated that **ChatGPT is thirsty for 500ml of fresh water to generate** between **[just] five** and 50 **prompts** or questions. The range varies depending on where its servers are located and the season. The estimate includes indirect water usage which is needed to cool power plants that supply the data centres with electricity. And, frankly, **this is only the beginning**... The big guys can't hide how much more water they now need. In this [environmental report](#), Microsoft said that its **global water consumption spiked 34% from 2021 to 2022 (to over 6 billion litres)**. This is a sharp increase compared to previous years and researchers reckon this has to do with all its work with AI.

AI is taking more water than ever Rucker and Hill 24 [Karah Rucker and Zachary Hill, October 8, 2024, "AI tools consume up to 4 times more water than estimated", Karah Rucker is a morning anchor and reporter for Straight Arrow News. Her journalism career has spanned two of our largest states, covering news in Texas and California and Zachary is a Video Editor at Straight Arrow News. Straight Arrow News, <https://san.com/cc/ai-tools-consume-up-to-4-times-more-water-than-estimated/>]//JS

A new report shows that **artificial intelligence tools, including ChatGPT, are using up to four times more water than previously** believed. **This discovery raises concerns** about the sustainability of data centers **as AI continues to expand**. [Researchers](#) from the University of California, Riverside found that processing 10 to 50 queries on AI chatbots can consume up to 2 liters of water, far exceeding the earlier estimate of half a liter. The increase is attributed to the intense cooling needs of data centers, where

Firstly, gen AI is only hurting wildfires, look at California, Tobin 25 [Taylor Tobin, Jan 11, 2025, "ChatGPT Is Under Attack For Its Use Of Water — But How Does That Even Work?", Taylor Tobin is a Brooklyn-based food and lifestyle writer whose work can be seen in publications like Insider, Observer, Fairygodboss, and Apartment Therapy. She spends most of her free time on some combination of bikes, books, and bourbon. https://www.huffpost.com/entry/how-does-chatgpt-use-water_l_6782a3d6e4b0788bdb62b2ba]// JS

AI platforms can't generate content without the help of massive data center servers. These centers "contain thousands of high-performance computer chips that process user queries," explained Daniel Kearney, the chief technology officer of Firmus Technologies, which focuses on creating sustainable operating solutions for AI companies. "Because the computers and chipsets that power servers are so densely packed, they generate an incredible amount of heat. Running complex AI applications like **ChatGPT requires immense amounts of computing power**, which generate lots of heat 24 hours a day," explained HP Newquist, an artificial intelligence historian and the author of "The Brain Makers: Genius, Ego, and Greed in the Quest for Machines That Think." To prevent servers from crashing, cooling systems are put in place to help regulate data center temperatures. And, in many cases, "water is used to physically cool AI servers," explained Mia Montoya Hammersley, an assistant professor specializing in environmental law and the director of the Environmental Justice Clinic at the Vermont Law and Graduate School. So how much water are we talking about here? "Many of these systems rely on water to absorb and dissipate the heat through cooling towers or evaporative cooling methods,"

Kearney told us. "For some large facilities, this can mean using millions of gallons of water per year." The current wildfires were caused in part by drought affecting much of Southern California. **With California already**

experiencing an ongoing drought, the water necessary to fight these fires is further straining the state's water supply." Montoya Hammersley said.

"Water is a finite resource, and cutting back on AI use will have direct impacts on the state's water availability and ability to respond to this climate disaster."

Waddick 25 explains [Karissa Waddick, January 14, 2025, "How many homes have burned in the Los Angeles wildfires so far?", no author quals, AOL

https://www.aol.com/many-homes-burned-los-angeles-175405693.html#:~:text=How%20many%20homes%20have%20burned%20in%20the%20Los%20Angeles%20wildfires%20so%20far%3F_-Karissa%20Waddick%2C%20USA&text=More%20than%2012%2C000%20homes%2C%20businesses.Los%20Angeles%20area%20last%20Tuesday.]//JS

More than **12,000 homes**, businesses, schools and other structures **have been destroyed by** raging **wildfires** that began ripping **through** the Greater **Los Angeles** area last Tuesday. Cal Fire said in an update Monday that a total of 40,300 acres have burned across multiple blazes including the Pacific Palisades fire west of Los Angeles, the Eaton Fire near Altadena and the Hurst fire near Sylmar. At least 24 people have died and more than **100,000 have been forced to flee their homes.**

But secondly, millions in the US suffer from a lack of water Shane 23 finds

[Cari Shane, Cari Shane is a D.C.-based freelance journalist who writes on subjects she finds fascinating — especially science, medicine, and health. Her work can be found in a wide variety of publications, from *Scientific American* to *Smithsonian*. "'We're going backwards in water access': How 46 million Americans still don't have safe drinking water", 03/17/2023, Fast Company,

<https://www.fastcompany.com/90858376/were-going-backwards-in-water-access-how-46-million-americans-still-dont-have-safe-drinking-water>]//JS

They're not alone. **More than 46 million people in the U.S. live with water insecurity—either no running water or water that may be unsafe to drink.** Experts say at least \$18.4 billion is

needed over the next 10 years to bring water security to more people, although the Environmental Protection Agency and American Water Works Association estimates it would cost close to fully \$1 trillion to replace and repair the U.S.' aging infrastructure. People are likely familiar with the water crises in Jackson and Flint, Michigan. In the former, flooding last summer overwhelmed the main water plant, and nearly 200,000 residents woke up to a boil water advisory; reports showed that high levels of lead in the city's drinking water were ignored for years. In the latter, toxic levels of lead in the water system—the result of aging, corroded pipes—sickened 100,000 residents and killed more than a dozen. But issues like this are happening all over the country in places like Tallulah, Louisiana; Grapeland, Texas; and parts of New Hampshire, Idaho, Kansas, Nevada, South Dakota, and Puerto Rico, where residents also don't have safe running water—their stories simply haven't made national headlines.

Water scarcity only results in deaths United Nations ND finds that

[United Nations, No Date, "World Water Day Reminds Us of the Value of a Precious Resource", no author qual, <https://www.un.org/en/academic-impact/world-water-day-reminds-us-value-precious-resource#:~:text=Approximately%203.5%20million%20people%20die,water%20supply%2C%20sanitation%20and%20hygiene.>] //JS

(Young girls fetch water at a communal water pump drilled by the United Nations Children's Fund (UNICEF) in Bubango, Tanzania.) According to the World Health Organization unsafe drinking water, inadequate availability of water for hygiene, and lack of access to sanitation together contribute to about 88 percent of deaths from diarrheal diseases, which kill 900 children under 5 years old per day according to new UN estimates, or one child every two minutes. UN-Water, the United Nations inter-agency coordination mechanism for all freshwater related issues including sanitation, concluded that the major sources of water pollution are from human settlements and industrial and agricultural activities. Approximately **3.5**

million people die each year due to inadequate water supply, sanitation and hygiene.

Rebuttal:

A2 Scholarships

Their Brown evidence is in the context of what could happen. East in blue

Brown 24 [Monika; Freelancer in data visualization; 3-21-2024; "How Generative AI Can Improve Scientific Experiments", University of Chicago Booth School of Business; <https://www.chicagobooth.edu/review/how-generative-ai-can-improve-scientific-experiments>; DOA: 2-12-2025] sumzom

Artificial Intelligence is rapidly changing jobs and industries, causing no small amount of consternation as it does. But on the bright side, it **has the potential** to greatly aid economists by **streamlining experiments' design and implementation and leveraging behavioral insights**, suggests research by University of California at Santa Barbara's Gary Charness, Chicago Booth principal researcher Brian Jabarian, and University of Chicago's John A. List.

Recent advances in generative AI, mainly through large language models, have sparked considerable interest. For one example, after OpenAI launched LLM-based ChatGPT, its valuation exploded, competitors rushed to keep up, and Microsoft kicked in \$10 billion. Across the world, people are scrambling to understand how LLMs will transform jobs, the labor market, and various companies and sectors.

Science, as many researchers have noted, is not immune. And as Charness, Jabarian, and List explain, LLMs can help revolutionize how it is practiced. Addressing economists in particular, they write that **LLMs could be harnessed to scale up experiments, make findings more accessible, and foster a culture of critical**

thinking of evidence-based analysis. LLMs could be used to **improve** nearly **every step of an experiment** they explain—and they propose specific approaches for doing so. “All these offered directions require experimental benchmarking before becoming established scientific policies,” qualifies Jabarian.

They group their recommendations into three categories: the design phase of an experiment, the implementation phase, and the analysis phase. Design involves crafting and **coding** an experiment, and here, they write, LLMs offer a groundbreaking approach to **literature review, hypothesis generation, and experimental setup. LLMs could be used to analyze** extensive **data** sets, **identify gaps in knowledge, and help generate research ideas.** AI **could speed** up the brainstorming phase while ensuring that research hypotheses are well-grounded.

Once a research question or hypothesis is in hand, **LLMs could recommend a** suitable experimental **design**, be it an economic game, market simulation, or something else. Drawing on knowledge learned from their training data, they could guide whether an experiment should be conducted in the lab or the field (or both). AI could help determine the optimal sample size for study and calculate the minimum number of participants needed to achieve statistically significant results—balancing the need for robustness with practical considerations such as cost and time limitations.

In the implementation phase of an experiment, the real-time capabilities of LLMs become particularly useful, the researchers write. By functioning as interactive chatbots, **LLMs could provide immediate support** to participants, **clarify instructions, answer questions, and ensure compliance with the experimental protocol.** They would produce a better experience for participants while also safeguarding the integrity of and monitoring an experiment. **If a participant were to misunderstand instructions, become less engaged or even cheat, LLMs could detect that and take steps to address it—all while** reducing the workload for human researchers and **minimizing the potential for errors.**

And **LLMs** would significantly expand the scope and depth of data interpretation in the analysis phase, according to the research. Through state-of-the-art natural language processing techniques, they **could analyze qualitative data** such as participant feedback or chat logs, and extract insights **that traditional statistical methods might miss.** They could **organize and clean data efficiently,** which not only **speeds up** the pre-**analysis** process but **allows researchers to focus on interpreting results** and drawing conclusions. And LLMs **could be used** to **conduct statistical tests, generate visualizations, and identify patterns or correlations.**

Ultimately, generative AI opens up new avenues for exploration and discovery, the researchers write. But while outlining these and other advantages, Charness, Jabarian, and List acknowledge risks to using LLMs in experiments, “including concerns about intellectual property (IP), digital privacy issues, user deception, scientific fraud by fabricating data or strategies to hide data manipulation, hallucinations,” and more. Reliance on LLMs could result in less creative research questions, they posit, as standardization in prompts and other processes “could, in principle, create research drones” and “lead to lost opportunities for new wisdom, thought, hypotheses, and scholarship needed in the face of every new societal challenge.”

But the **advantages** of using LLMs, they conclude, **outweigh** these **drawbacks**—and **the scientific community should adopt a structured approach** that amplifies the **benefits** and reduces the risks. Creating such a **framework** would hopefully, they write, “foster a culture of policy and industry experimentation at scale.”

GAI causes fake and misinformed research---they erode trust, cause investor pullout, and misguide policies. Prefer, their evidence is about checking cognitive bias, not misinformation.

PYMNTS 24 . PYMNTS is a recognized global leader for data, news and insights on innovation in payments and the platforms powering the connected economy, “AI-Generated Junk Science Research a Growing Problem, Experts Say | PYMNTS.com.” PYMNTS.com, 10 Sept. 2024, www.pymnts.com/news/artificial-intelligence/2024/ai-generated-junk-science-research-a-growing-problem-experts-say/. Accessed 17 Feb. 2025. AP //ARC

A surge of artificial intelligence-generated fake research papers is permeating academic search engines like Google Scholar, potentially **eroding public trust in scientific findings and derailing product development** across industries that rely on cutting-edge research. A study from Harvard Kennedy School Misinformation Review uncovered an academic research trend, first reported by Newsweek. The researchers identified 139 papers suspected of being generated by AI tools, with more than half focused on topics including health, environmental issues and computing technology. “**Large language models (LLMs) generate results based on a probability skewed to the data** on which the foundation model has been trained,” Sid Rao, CEO and co-founder of AI company Positron Networks, told PYMNTS. “This can result in biases in the text that have no relation to the scientific method used to conceive the paper, as **the foundation model is not required to follow a rigorous, fact-based process.**” “[T]he public release of ChatGPT in 2022, together with the way Google Scholar works, has increased the likelihood of lay people (e.g., media, politicians, patients, students) coming across questionable (or even entirely GPT-fabricated) papers and other problematic research findings,” wrote the paper’s authors. **This flood of fabricated studies poses risks to companies investing in research and development. It could lead to misguided product launches and wasted resources. It also threatens to undermine public trust in science** and the reliability of evidence-based decision-making. Eroding Trust and R&D Risks The consequences of this trend could be far-reaching, affecting not just academic circles but also consumer trust in scientific claims. “Fake research is a cancer to consumer trust,” Andy Stapleton, an AI education YouTuber with over 250,000 subscribers, told PYMNTS. “Once people realize that the ‘science-backed’ label can be bought or fabricated, they’ll start treating real research like snake oil. It’s a one-way ticket to a world where facts are optional and trust in legitimate innovation takes a nosedive. Consumers will stop believing any company that claims to have science on

their side." Rao said AI hallucinations produce inaccurate results and subtly generate erroneous content. For example, a paper could present the correct conclusion but still have unreferenced or subjective supporting statements. "Even at a 1% error or hallucination rate, these two problems would fundamentally erode trust in scientific research" Rao said. "We have already seen this behavior in psychiatric telemedicine chatbots that have accidentally told patients to harm themselves." The implications for research and development investments are significant. "AI-generated papers are a huge liability," Stapleton explained. "If investors can't tell what's real and what's algorithmic fluff, they'll start pulling back." R&D is already risky enough — adding a layer of uncertainty from questionable AI-driven publications makes it even worse. You're not just losing credibility; you're bleeding money because bad data leads to bad decisions." Real-World Consequences The impact of fake papers on business regulations could also be severe. "Unreliable studies muddy the waters for regulators," Stapleton said. "If the science behind a product is shaky, lawmakers will either clamp down with over-regulation to protect consumers or worse, they'll make bad policies based on false data. Either way, businesses get stuck in a mess of red tape and uncertainty. The bottom line? Bad studies lead to bad laws, which is a death sentence for innovation." Rao warned that regulators might respond with overly broad restrictions, potentially banning AI use in medical research altogether, despite the technology's applications in areas like forecasting and data analysis. "Worse yet, in critical environments such as medicine, healthcare, civil engineering or material sciences, faulty papers' negative real-world and material consequences will potentially shut[ing] down legitimate avenues of scientific research," he added.

Researchers don't want AI in studies -- prefer -- most recent and cites actual researchers

Wiggers 3/5 [Kyle Wiggers is a senior reporter at TechCrunch with a special interest in artificial intelligence. His writing has appeared in VentureBeat and Digital Trends, as well as a range of gadget blogs including Android Police, Android Authority, Droid-Life, and XDA-Developers. Experts don't think AI is ready to be a 'co-scientist', TechCrunch, <https://techcrunch.com/2025/03/05/experts-dont-think-ai-is-ready-to-be-a-co-scientist/>, 3.5.25] doa: 3.7.25 //ejs squad

Last month, Google announced the "AI co-scientist," an AI the company said was designed to aid scientists in creating hypotheses and research plans. Google pitched it as a way to uncover new knowledge, but experts think it — and tools like it — fall well short of PR promises. "This preliminary tool, while interesting, doesn't seem likely to be seriously used," Sara Beery, a computer vision researcher at MIT, told TechCrunch. "I'm not sure that there is demand for this type of hypothesis-generation system from the scientific community." Google is the latest tech giant to advance the notion that AI will dramatically speed up scientific research someday, particularly in literature-dense areas such as biomedicine. In an essay earlier this year, OpenAI CEO Sam Altman said that "superintelligent"

AI tools could “massively accelerate scientific discovery and innovation.” Similarly, Anthropic CEO Dario Amodei has boldly predicted that AI could help formulate cures for most cancers. But many researchers don't consider AI today to be especially useful in guiding the scientific process. Applications like Google's AI co-scientist appear to be more hype than anything, they say, unsupported by empirical data. For example, in its blog post describing the AI co-scientist, Google said the tool had already demonstrated potential in areas such as drug repurposing for acute myeloid leukemia, a type of blood cancer that affects bone marrow. Yet the results are so vague that “no legitimate scientist would take [them] seriously.” said Favia Dubyk, a pathologist affiliated with Northwest Medical Center-Tucson in Arizona. “This could be used as a good starting point for researchers, but [...] the lack of detail is worrisome and doesn't lend me to trust it.” Dubyk told TechCrunch. “The lack of information provided makes it really hard to understand if this can truly be helpful.” It's not the first time Google has been criticized by the scientific community for trumpeting a supposed AI breakthrough without providing a means to reproduce the results. TechCrunch Disrupt 2025 From AI and startups to space, fintech, and IPOs—experience game-changing insights across five main stages, breakouts, roundtables, unparalleled networking, and so much more. San Francisco, CA | October 27-29 REGISTER NOW In 2020, Google claimed one of its AI systems trained to detect breast tumors achieved better results than human radiologists. Researchers from Harvard and Stanford published a rebuttal in the journal Nature, saying the lack of detailed methods and code in Google's research “undermine[d] its scientific value.” Scientists have also chided Google for glossing over the limitations of its AI tools aimed at scientific disciplines such as materials engineering. In 2023, the company said around 40 “new materials” had been synthesized with the help of one of its AI systems, called GNoME. Yet, an outside analysis found not a single one of the materials was, in fact, net new. “We won't truly understand the strengths and limitations of tools like Google's 'co-scientist' until they undergo rigorous, independent evaluation across diverse scientific disciplines,” Ashique KhudaBukhsh, an assistant professor of software engineering at Rochester Institute of Technology, told TechCrunch. “AI often performs well in controlled environments but may fail when applied at scale.”

Complex processes Part of the challenge in developing AI tools to aid in scientific discovery is anticipating the untold number of confounding factors. AI might come in handy in areas where broad exploration is needed, like narrowing down a vast list of possibilities. But it's less clear whether AI is capable of the kind of out-of-the-box problem-solving that leads to scientific breakthroughs. “We've seen throughout history that some of the most important scientific advancements, like the development of mRNA vaccines, were driven by human intuition and perseverance in the face of skepticism,” KhudaBukhsh said. “AI, as it stands today, may not be well-suited to replicate that.” Lana Sinapayen, an AI researcher at Sony Computer Science Laboratories in Japan, believes that tools such as Google's AI co-scientist focus on the wrong kind of scientific legwork. Sinapayen sees a genuine value in AI that could automate technically difficult or tedious tasks, like summarizing new academic literature or formatting work to fit a grant application's requirements. But there isn't much demand within the scientific community for an AI co-scientist that generates hypotheses, she says — a task from which many researchers derive intellectual fulfillment. “For many scientists, myself included, generating hypotheses is the most fun part of the job,” Sinapayen told TechCrunch. “Why would I want to outsource my fun to a computer, and then be left with only the hard work to do myself? In general, many generative AI researchers seem to misunderstand why humans do what they do, and we end up with proposals for products that automate the very part that we get joy from.” Beery noted that often the hardest step in the scientific process is designing and implementing the studies and analyses to verify or disprove a hypothesis — which isn't necessarily within reach of current AI systems. AI can't use physical tools to carry out experiments, of course, and it often performs worse on problems for which extremely limited data exists. “Most science isn't possible to do entirely virtually — there is frequently a significant component of the scientific process that is physical, like collecting new data and conducting experiments in the lab,” Beery said. “One big limitation of systems [like Google's AI co-scientist] relative to the

actual scientific process, which definitely limits its usability, is context about the lab and researcher using the system and their specific research goals, their past work, their skillset, and the resources they have access to." **AI risks AI's technical shortcomings and risks — such as its tendency to hallucinate — also make scientists wary of endorsing it for serious work. KhudaBukhsh fears AI tools could simply end up generating noise in the scientific literature, not elevating progress. It's already a problem. A recent study found that AI-fabricated "junk science" is flooding Google Scholar, Google's free search engine for scholarly literature. "AI-generated research, if not carefully monitored, could flood the scientific field with lower-quality or even misleading studies, overwhelming the peer-review process,"** KhudaBukhsh said. "An overwhelmed peer-review process is already a challenge in fields like computer science, where top conferences have seen an exponential rise in submissions." Even well-designed studies could end up being tainted by misbehaving AI, Sinapayen said. While she likes the idea of a tool that could assist with literature review and synthesis, Sinapayen said she wouldn't trust AI today to execute that work reliably. "Those are things that various existing tools are claiming to do, but those are not jobs that I would personally leave up to current AI," Sinapayen said, adding that she takes issue with the way many AI systems are trained and the amount of energy they consume, as well. "Even if all the ethical issues [...] were solved, current AI is just not reliable enough for me to base my work on their output one way or another."

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