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The future of society will include AI and automation. Cassar of Hult international business school writes:

S. Cassar et. al, 3-11-2019, No Publication, <https://library.iated.org/view/CASSAR2019NEW, //VJ> 🍷

There is vast amount of literature detailing **the impact of** technological developments, and specifically **Artificial Intelligence (AI)**, **on the world of work**. **As the world of work changes, so too do the skills that workers need.** In a world of thinking machines, humans must possess the ability to understand and take advantage of AI, as well as maintain their ability to compete for jobs against a talent pool of both human and robotic candidates. Therefore, **individuals must be able to keep up with changes in emerging tech, make effective use of the tools of modern technology, and identify and develop skills that technology cannot replace.** In this context, **educators face the challenge of preparing today's students for** the new world of work; enabling students to navigate their way through shifting opportunities and make **decisions about what seem to be increasingly uncertain employment prospects.** A number of studies have focused on predictions about job losses as robots replace human workers (e.g. World Economic Forum, 2018). However, fewer research studies have investigated the perceptions and feelings of affected individuals, and their plans to navigate **a future increasingly shared with** technology. The aim of our research is to explore student's attitudes, perceptions and reported behaviours regarding the impact of **AI** on the world or work and education. Our **research provides a detailed understanding of a specific set of individuals: the current generation of undergraduate students.** This group of students are on the cusp of entering the workforce, they are the first generation for whom automation will definitely impact on their working lives, yet they have been educated in a system which is only just beginning to wake up to the implications of automation for the workforce. Many students are themselves not fully aware of what the future will hold. We explore these students' visions of their futures; their awareness of how technological development may affect them; their hopes and fears; how they plan to prepare themselves for the coming changes, and; their attitudes to the impact of AI on the world of work and education. Qualitative and quantitative data will be presented from surveys, discussion groups, written work and interviews. Participants include both a general undergraduate student population studying in the UK and US (n=356), and a specific group of undergraduate students studying a "Robotics, Business and Society" course in the UK (n=53).

TEACHERS EVIDENCE

Educators are leaving the profession due to burnout. Diesel '24 finds:

Dana C. Diesel, 4-15-2024, Schools That Lead,

<https://www.schoolsthatlead.org/blog/teacher-burnout-statistics, VJ> 🍷

Many educators experience tremendous exhaustion, fatigue, and stress. Such conditions can compromise their ability to properly execute their professional duties. **Teacher burnout** can lead to cynicism, detachment, and ultimately negative effects on mental health. It also **pushes teachers towards** the nearest **exit** ramp. At the end of the 2020–2021 school year, 8% of public school teachers left the profession. Stakeholders should explore teacher burnout statistics to make an impact by addressing workforce challenges and enhancing policy developments. Utilizing teacher burnout statistics can spearhead advocacy and awareness to help push for changes and address common issues. Find out how schools and districts can better support teachers in their classrooms and their careers. 2024 Teacher Burnout Statistics Teachers who have quit have countless recounted their experiences, claiming low pay, deteriorating mental health, and a lack of support. For the next three

years, over 270,000 teachers are expected to quit each year. Beginner teachers with little or no preparation are 2.5 times more likely to quit after the first year than those who are well prepared. 8 percent of teachers quit every year, and younger teachers are the most likely to quit. 90% of teachers claim it's a "serious" problem, and 67% claim it's "very serious." **55% of teachers say they'll leave sooner than initially planned due to burnout and a lack of fulfillment in their position.** **There's a racial gap in discontent, with 62% of black teachers and about 59% of those with a Hispanic origin claiming they will quit.** Teachers quit for a number of reasons, but **burnout is** among **the leading causes**, which has been **repeatedly affirmed**. Burnout is rooted in different underlying causes. Increasing Emotional Demands Teachers face high emotional demands as they interact with students who may come from diverse backgrounds and have unique needs. The pressure from administrators, policymakers, and other stakeholders can be overwhelming, especially when students fail to meet academic expectations.

But teachers are increasingly using generative AI.

Meghan McCormick, 6-27-2024, No Publication,

<https://www.the74million.org/article/generative-artificial-intelligence-may-help-teachers-does-it-work-for-students/>, //VJ 🍷

The public release of ChatGPT in April 2022 sparked a **wave of** fear and **excitement among educators**. While some expressed hesitation about the ability of generative artificial intelligence to make cheating undetectable, others pointed to its potential to provide real-time, personalized support for teachers and students, making differentiated learning finally seem possible after decades of unmet promises. Today, that potential has begun to come to fruition. Recent national survey data indicate **18% of teachers have used genAI**, mostly to support differentiated lesson planning, **and 56% of educators believe its use in schools will continue to grow**. Increasingly, districts are introducing students to this technology, with products like Khanmigo — which provides individualized tutoring — already being adopted in Indiana, Florida and New Jersey. And **students are experimenting with it outside the classroom as well. According to a recent survey, approximately half of 14- to 22-year-olds report having used genAI at some point.** But rapid changes in technology and the speed of adoption are far outpacing the field's understanding of impacts on teaching and learning. Every day there is a new story about an exciting AI-related development, but given the time it takes to conduct careful evaluation, very limited evidence exists about whether any of these tools have positive benefits for students. As schools start facing hard choices about where to spend their resources in response to continued learning gaps and the ESSER funding cliff, it's important to take a look at what we know about the impact of genAI on education and what more we need to learn.

That can revitalize teaching as a career. Twinkl '23 quantifies:

Twinkl 23 [Twinkl Educational Publishing (), Report: Adopting AI could prevent \$77 billion of unpaid teacher overtime, 12-11-2023, K-12 Dive,

<https://www.k12dive.com/press-release/20231211-report-adopting-ai-could-prevent-77-billion-of-unpaid-teacher-overtime/>] accessed 2-18-2025 // bellaire FL

NEW YORK CITY, N.Y. — A new report has revealed that **U.S. teachers work a combined 1.75 billion hours of overtime every year** - equivalent to \$84 billion in unpaid hours - but that the support offered by **AI tools could shrink that figure by over 85 percent**. According to the analysis published by educational publisher Twinkl, **U.S. teachers work an average of 15.1 hours a week above what they're contracted to work** - but are exempt from receiving overtime pay under current Department of Labor regulations. The findings reference **2023 data from the Department of Education**, which **suggests teachers could each regain as many as 13 hours a week by embracing AI tools**. The repercussions of **high work**

hours for America's 3.2 million teachers have severely impacted teacher turnover, which has experienced highs over the past three years. During the 2021-2022 school year, national turnover rates reached 10%, while in some of the most underserved schools, teacher turnover exceeded 16 percent. "The numbers speak for themselves. Teachers are leaving the profession in unprecedented numbers, and unpaid overtime is a major contributing factor," said Jude Schroeder, ex-teacher and now U.S. Manager at Twinkl. "Teachers will always be crucial, and AI will never replace the essential element of face-to-face instruction, but there are so many ways in which AI can help make teaching a more sustainable and rewarding career." These saved hours, the report says, are from saved time completing non-teaching activities such as lesson planning, grading papers, and reporting data. "It's not about taking teachers out of the classroom, but rather empowering them within the classroom. Teachers spend so much time completing administrative tasks that less and less energy is left for actual in-class teaching. AI is fantastic for eliminating the time-draining aspects of teaching, which are causing teacher burnout and, ultimately, driving them out of the profession," added Schroeder. Several AI-powered tools supporting educators have been released in recent months by EdTech organizations aiming to create teaching efficiency. These tools save time and allow educators to tailor materials to individual skill levels, which is especially critical as educators work to address gaps in students' knowledge caused by pandemic disruptions. Twinkl offers a teacher report writer tool that generates student report cards based on raw performance information and a personal AI teaching assistant, "Ari," which can create adapted lesson materials aligned with curriculum standards and differentiated to meet the needs of all learners.

And overall, Dr. Poth, an expert on instructional technology projects explains that as AI develops:

Dr. Poth 24 [Dr. Rachele DenÉ Poth (An edtech consultant, presenter, attorney, author, and teacher. Teaches Spanish and STEAM: Emerging Technology at Riverview High School in Oakmont, PA. Juris Doctor degree from Duquesne University School of Law and a Master's in Instructional Technology. An ISTE Certified Educator and a Microsoft Innovative Educator Expert. A past-president of the ISTE Teacher Education Network and served on the Leadership team of the Mobile Learning Network for five years. Has written seven books. She presents regularly at state, national, and international conferences and provides professional development and coaching for educators on a variety of topics including assessments, and emerging technologies such as AI, AR and VR, and STEM. Rachele has more than five years of experience teaching about, presenting on and writing about AI.), 7 Ways AI is Set to Make Teachers' Jobs Easier, 10-29-2024, Learning as I go: Reflections & lessons learned, <https://rdene915.com/2024/10/29/7-ways-ai-is-set-to-make-teachers-jobs-easier/>] accessed 2-20-2025 // bellaire FL

Since the early 2000s, education has had to evolve with the rapid integration of technology into the classroom. From the general use of computers and laptops for schoolwork to the rise of smartphones and tablets in the classroom, teachers have had to be agile to keep up with these changing trends. Unfortunately, despite these advancements, many teachers struggle in their jobs, leading to a mass exodus in recent years. In August this year alone, Statista reported that 51,000 teachers and other educational staff quit their jobs in the United States. As the education sector is struggling to find teachers to replace them, artificial intelligence (AI, could be the next advancement that not only changes how students learn but also improve the teaching profession by making the job easier. In a guest post by Matthew Rhoads, Ed.D., he wrote that AI can improve teachers' workflow by providing opportunities for them to optimize their workflow and instruction in the classroom. Below are 7 ways that AI will make teachers' jobs easier. Grading One of the biggest reasons for teacher stress and burnout is the extra work they must do in addition to teaching. Grading is one of the most time-consuming tasks and is often done outside of regular school hours, eating into a teacher's work-life balance. As discussed in A Look Back at AI in Education, AI grading tools can automate this process. AI can appraise student work instantaneously with very little human input needed, thereby increasing the time teachers can spend on other aspects of their job as well as increasing their free time. These tools also provide much faster feedback to the students, which in turn will help with engagement. Roleplaying One factor of AI that will provide a new dimension to how students learn about different subjects is Generative AI (GenAI). MongoDB details how GenAI is based on foundation models that can perform tasks like classification, sentence completion, the generation of images or voice, and synthetic (artificially generated) data. This means that teachers can use AI to educate students through roleplaying. Gabriel Rshaid, co-founder and director at The Learnerspace & The Global School, writes on LinkedIn that GenAI systems that can impersonate a famous, historical, or even current person as well as replicate historical situations. He argues that not only will it

foster critical thinking, but it will also elevate the level of interest and engagement for students. Lack of engagement in lessons is regularly touted as a common issue in modern classrooms, leading to added stress for teachers. Foreign Language Teaching Language learning in the classroom can be very difficult for teachers due to the lack of one-on-one time with students. With AI, students can speak to a Language Learning Model such as ChatGPT or an AI interlocutor to create a dialogue that is exactly pitched at their level. In a previous post on AI Literacy, we asked a student about the benefits of using AI for language learning. She replied: "The chatbot was very helpful. Immersing yourself with technology that helps you learn Spanish or any other language can help a lot. You have real-time conversations, and the chatbot expands the conversation so you can learn even more about the language. It also helps you become more comfortable speaking!" As students engage with the AI on their own terms, foreign language teachers will have more time to address individual needs. Plan Lessons Like grading, a good amount of time outside teaching is spent planning lessons due to the amount of research and reinvention needed. AI can streamline and optimize this process by not only creating new plans from scratch very quickly but also analyzing past lesson plans to cater to the teacher's own preferences and style of teaching. Curriculum standards also change very frequently, and AI can be used to ensure that the lessons are updated with the latest requirements. This decreases the time teachers spend on planning lessons and increases their ability to work with students. Personalized Learning For Students One of the major issues that makes a teacher's job difficult is not being able to adapt their teaching methods for individual students. It is not possible for teachers to create personalized learning plans for each student in their classroom, which can lead to some students getting left behind and resulting in a lack of engagement. AI-powered adaptive learning platforms can analyze students' strengths and weaknesses and provide personalized lessons and study paths. Improve Classroom Management While AI will revolutionize how teachers can adapt their lessons to students to improve their learning outcomes, another important aspect of AI that will make a teacher's job easier is classroom management. A Medium post notes how "one of the most pressing challenges for teachers has always been classroom management," with discipline being one of the most difficult aspects of the job. When it comes to class management, AI can create a more harmonious classroom environment by being able to "detect when a student is distracted, struggling with a concept, or even feeling unwell." This will allow teachers to immediately intervene and address the issues before they escalate and result in classroom disruption. Reduce Burnout As the above benefits show, AI can have a positive impact on many different facets of teaching to make the job easier. As the above benefits show, AI can have a positive impact on many different facets of teaching to make the job easier. By improving each of the above aspects, AI will reduce overall burnout in teachers, which is having a massive impact on the industry. HMH's 9th Annual Educator Confidence Report found that burnout is a critical issue, with 82% of educators citing that what they need most is a more balanced workload. Education and students are changing fast, with one teacher noting that "today's student is different from students even five years ago." AI will not only allow teachers to keep up, but it will also reduce their workload and give them more time to focus on their students. This will make their job easier and improve their work-life balance, which will hopefully stem the number of teachers leaving the profession.

Indeed, schools are already seeing benefits. Legar '24 finds:

Researcher Leger 24 [Matthew Leger (Research Manager, IDC Worldwide Education Digital Strategies, IDC), 3-2024, Microsoft,

<https://www.microsoft.com/en-us/education/msdownloads/Finding-High-Impact-Opportunities-for-AI-in-Education.pdf>] accessed 2-16-2025 // bellaire FL

While it is still early for many institutions, education respondents believe they are getting an average return of 3.4 times on their investment for AI initiatives, and they are seeing these returns just 15 months after implementation. They cited benefits such as faster innovation, reduced institutional risk, and faster time to market for new education services and experiences.

Absent changes, teacher shortages decimate educational quality. Whizara '24 finds:

Whizara 24 [Whizara (), How educator shortages impact instructional growth?, 1-23-2024, <https://www.whizara.com/post/how-educator-shortages-impact-instructional-growth>] accessed 2-19-2025 // bellaire FL

Research, such as studies conducted by the National Bureau of Economic Research, suggests that teacher shortages can lead to lower student achievement and have long-term economic consequences. With lesser teachers, larger class sizes and an increased teacher-to-student ratio, the quality of education suffers. The challenges of teacher turnover and burnout further disrupt the continuity of instruction, making it difficult for students to develop strong, lasting teacher-student relationships. Disadvantaged communities are disproportionately affected by these challenges, leading to educational inequities and achievement gaps. We will explore further the two immediate and tangible consequences emerging from educator shortages. Learning Loss Studies published in journals like the American Educational Research Journal have found a correlation between teacher shortages and lower math and reading scores, particularly in disadvantaged students from disadvantaged communities. Such communities face a double burden, as they are more likely to experience shortages of highly qualified teachers. Reports from organizations like the Education Trust emphasize the achievement gaps that persist in these areas, perpetuating educational inequalities. The impact on student performance is not limited to test scores; it also affects critical skills and competencies that students need for success beyond the classroom. Learning loss can also accumulate over time, potentially leading to a widening achievement gap between students who have consistent access to educational resources and those who do not.

ACCESS EVIDENCE

National Center for Education Statistics xx — (null null, xx-xx-xxxx, "", No Publication, <https://nces.ed.gov/pubs2001/2001071.pdf>, accessed 3-17-2025) //VJ 🍕

Since 1994, the National Center for Education Statistics (NCES) has surveyed public schools to measure what proportion of them are connected to the Internet. These annual surveys enable the U.S. Department of Education to monitor the progress made by public schools in providing access for all students and teachers to information technology in their classrooms and schools. In the fall of each academic year, a new nationally representative sample of approximately 1,000 public schools has been surveyed about Internet access and, since 1996, about the types of Internet connections used. In 2000, questions were also asked about access to the Internet at times outside of regular school hours and on “acceptable use policies.” How much progress have public schools made in connecting to the Internet? By the fall of 2000, almost all public schools in the United States had access to the Internet: 98 percent were connected. In comparison, 35 percent of public schools had access to the Internet in 1994 (table 1). Unlike in previous years, there were virtually no differences in school access to the Internet by school characteristics (e.g., poverty level¹ and metropolitan status) in 1999 or 2000. The increase in Internet access over the years may have been aided by the allocation of funds through the Education rate (E-rate) program. The E-rate program was established in 1996 to make services, Internet access, and internal connections available to schools and libraries at discounted rates based upon the income level of the students in their community and whether their location is urban or rural.² As of February 28, 2001,

AI improves educational access to marginalized communities

Van Cappelle 23 [Frank Van Cappelle (He co-leads Gateways to Public Digital Learning, an initiative that is jointly led by UNICEF and UNESCO to establish digital learning as a public good.), Can AI transform learning for marginalized communities?, 10-17-2023, World Economic Forum,

<https://www.weforum.org/stories/2023/10/ai-education-learning-marginalized-unicef/>) accessed 2-20-2025 // bellaire FL

Hundreds of millions of children lack access to tablets, computers or reliable Internet connectivity at home, posing challenges to home learning when schools close. To reach the most marginalized at scale, we need to consider how solutions leveraging AI can run on shared, low-cost smartphones and function offline. We also require more and better digital learning solutions to help children acquire foundational literacy. Nearly two-thirds of 10-year-olds are estimated to be unable to read and understand a simple text. AI solutions, such as ChatGPT, are of little use for those who have yet to learn how to read and write, unless they embed multilingual speech recognition. Regardless of advances in AI tutoring systems and other technologies that support independent learning, teachers should remain central to the learning process. This is also true for home-based learning during school closures. Our research revealed that the frequency of contact with teachers significantly correlated with self-reported learning during COVID-19. So, we see that AI has huge potential to support teachers, not replace them.

Tools are already showing progress.

Contributors xx — (Eschool Media Contributors, xx-xx-xxxx, "AI-enhanced tutoring: Bridging the achievement gap in American education", eSchool News, <https://www.eschoolnews.com/digital-learning/2024/12/09/ai-tutoring-bridging-equity-achievement-gap/>, accessed 3-17-2025) //VJ 🍕

Virtual HDT has made great strides in addressing some of these challenges. Research on Saga Education's Virtual Math Tutoring Program has demonstrated that students who received more virtual tutoring showed the most improvement in math achievement. However, program participation overall was unexpectedly low, even though students were provided with free laptops and Wi-Fi—further highlighting the need for innovative solutions to increase engagement and scalability. **AI tutoring: A paradigm shift?** AI-enhanced tutoring systems are iterating on the insights and results presented by traditional HDT and show promise in delivering significant academic gains at scale. Tools like Tutor CoPilot, Wolfram, LiveHint AI, and Khanmigo provide personalized, adaptive learning experiences. They have the potential to capitalize on the impact of HDT and afford HDT opportunities for underserved students. As the use of generative AI in educational settings accelerates, it is essential to prioritize tools that enhance, rather than replace, students' interactions with teachers, and to ensure that AI remains a tool for equity and inclusion. This idea of pedagogical excellence supported by AI-powered tools has several notable and exciting foreseeable benefits for students and educators:

Personalization and adaptability: AI-powered tutoring systems can provide tailored learning experiences that adapt to each student's needs in real time. This personalization is particularly beneficial for students who may struggle in traditional classroom settings and provides teachers with actionable data to cater to the needs and strengths of each student. **Scalability, accessibility, and efficiency:** AI expands high-quality tutoring services to reach more students, regardless of location or economic background. By automating routine tasks and providing data-driven insights, AI empowers teachers to focus on higher-level instructional strategies rather than facilitating the tutoring tactically. This increased efficiency could allow for more widespread implementation of HDT programs. **Enhancing educational equity:** AI-enhanced tutoring can make educational outcomes more equitable, not just more accessible. By democratizing access to high-quality educational support, AI-driven tutoring could particularly benefit underserved students who would not otherwise have access to need-based supplemental education.

WORKFORCE EVIDENCE

In the next few years, automation will drastically change the job market.

Quereshi of Brookings warns:

Zia Qureshi, Cheonsik Woo, 1-19-2022, Brookings,

<https://www.brookings.edu/articles/understanding-the-impact-of-automation-on-workers-jobs-and-wages/>, //VJ 🍷

The “new **automation**” of the next few decades—with much more advanced robotics **and** artificial intelligence (**AI**)—**will** widen the range of tasks and jobs that machines can perform, and have the potential to **cause much more worker displacement** and inequality than older generations of automation. This can potentially affect college graduates and professionals much more than in the past. Indeed, the **new automation will eliminate millions of jobs for vehicle drivers and retail workers, as well as those for health care workers, lawyers, accountants, finance specialists, and many other professionals.** The new automation will eliminate millions of jobs for vehicle drivers and retail workers, as well as those for health care workers, lawyers, accountants, finance specialists, and many other professionals. **So** we must ask: Is this time really different? Will **the ability of workers to adapt to automation by gaining new education and skills** be swamped by the frequency and breadth of tasks that machines with AI will perform? AI will increase the challenges many workers will face from automation, while still contributing to higher standards of living due to higher worker productivity. At the same time, we will **need** a much more robust set of policy responses to make sure that workers can adapt, so that the benefits of automation are broadly shared.

Gregg 24 — (Indiana (Indy) Gregg, 3-12-2024, "The Future Of Work: Embracing AI's Job Creation Potential", Forbes,

<https://www.forbes.com/councils/forbestechcouncil/2024/03/12/the-future-of-work-embracing-ais-job-creation-potential/>, accessed 3-17-2025) //VJ 🍷

The World Economic Forum's Future of Jobs Report illuminates the dual nature of AI's impact: **By 2025, while 85 million jobs may be displaced by automation, an impressive 97 million new roles are projected to emerge**, reflecting a shift in the division of labor between humans, machines and algorithms. This paradigm shift **emphasizes the need for significant workforce evolution** rather than a reduction in the workforce.

That’s why the future of the economy rests on how prepared workers are to enter a labor market that is interspersed with generative AI. Ellingrud ‘23 projects:

Kweilin Ellingrud, 7-26-2023, McKinsey & Company,

<https://www.mckinsey.com/mgi/our-research/generative-ai-and-the-future-of-work-in-america>, //VJ 🍷

During the pandemic (2019–22), the US labor market saw 8.6 million occupational shifts, 50 percent more than in the previous three-year period. Most involved **people leaving food services, in-person sales, and office support for different occupations.** **By 2030, activities that account for up to 30 percent of hours currently worked**

across the US economy could be automated—a trend accelerated by generative AI. However, we see generative AI enhancing the way STEM, creative, and business and legal professionals work rather than eliminating a significant number of jobs outright. Automation's biggest effects are likely to hit other job categories. Office support, customer service, and food service employment could continue to decline. Federal investment to address climate and infrastructure, as well as structural shifts, will also alter labor demand. The net-zero transition will shift employment away from oil, gas, and automotive manufacturing and into green industries for a modest net gain in employment. Infrastructure projects will increase demand in construction, which is already short almost 400,000 workers today. We also see increased demand for healthcare workers as the population ages, plus gains in transportation services due to e-commerce. An additional 12 million occupational transitions may be needed by 2030. As people leave shrinking occupations, the economy could reweight toward higher-wage jobs. Workers in lower-wage jobs are up to 14 times more likely to need to change occupations than those in highest-wage positions, and most will need additional skills to do so successfully. Women are 1.5 times more likely to need to move into new occupations than men. The United States will need workforce development on a far larger scale as well as more expansive hiring approaches from employers. Employers will need to hire for skills and competencies rather than credentials, recruit from overlooked populations (such as rural workers and people with disabilities), and deliver training that keeps pace with their evolving needs. The US labor market is going through a rapid evolution in the way people work and the work people do. Months after MGI released its last report on the future of work in America, the world found itself battling a global pandemic.¹ Since then, the US job market has come roaring back from its sudden drop. The nature of work has changed as many workers have stuck with remote or hybrid models and employers have sped up their adoption of automation technologies. More recently, the accelerated development of generative AI, with its advanced natural language capabilities, has extended the possibilities for automation to a much wider set of occupations. Amid this disruption, workers changed jobs at a remarkable pace—and a subset made bigger leaps and moved into entirely different occupations (Exhibit 1). Some 8.6 million occupational shifts took place from 2019 through 2022. Now even more change is in store. We expect an additional 12 million occupational shifts by 2030.² The total number of transitions through 2030 could be 25 percent higher than we projected a little over two years ago.²

Independently, AI in education teaches students how to live in the future. Roose '23 argues:

Kevin Roose, 1-12-2023, No Publication,

<https://www.nytimes.com/2023/01/12/technology/chatgpt-schools-teachers.html>, //VJ 🍷

I also don't believe that educators who are reflexively opposed to ChatGPT are being irrational. This type of A.I. really is (if you'll excuse the buzzword) disruptive — to classroom routines, to longstanding pedagogical practices, and to the basic principle that the work students turn in should reflect cogitation happening inside their brains, rather than in the latent space of a machine learning model hosted on a distant supercomputer. But the barricade has fallen. Tools like ChatGPT aren't going anywhere: they're only going to improve, and barring some major regulatory intervention, this particular form of machine intelligence is now a fixture of our society. "Large language models aren't going to get less capable in the next few years," said Ethan Mollick, a professor at the Wharton School of the University of Pennsylvania. "We need to figure out a way to adjust to these tools, and not just ban them." That's the biggest reason not to ban it from the classroom, in fact — because today's students will graduate into a world full of generative A.I. programs. They'll need to know their way around these tools — their strengths and weaknesses, their hallmarks and blind spots — in order to work alongside them. To be good citizens, they'll need hands-on experience to understand how this type of A.I. works, what types of bias it contains, and how it can be misused and weaponized. This adjustment won't be easy. Sudden technological shifts rarely are. But who better to guide students into this strange new world than their teachers?

And government investment is boosting AI literacy. Ware '24 explains:

AI Ware, 11-14-2024, The Future of Learning: How the U.S. Government is Driving Innovation in Education with AI and XR. (n.d.). Deep Research.

<https://www.deeprsearch.us/p/the-future-of-learning-how-the-u-s-government-is-driving-innovation-in-education-with-ai-and-xr>

AI in Education Market Growth: The global AI in education market is projected to expand to \$6 billion by 2025. This rapid growth highlights the sector's potential to support learning through data-driven, adaptive tools (*All About AI*). Teacher Utilization of AI: Approximately 50% of educators are now using AI to plan lessons, track student progress, and identify areas where students may require additional support. This adoption rate demonstrates how **AI tools are supporting teachers in personalizing and improving educational outcomes** (*All About AI*). Federal Investment in Research and Development: **In 2024, the U.S. government dedicated over \$18 million to** 44 multidisciplinary research teams to **explore responsible** design and **deployment of AI**, including **applications in education.** This funding **demonstrates the government's commitment to advancing AI ethically, particularly in areas that directly impact students** (*White House*). U.S. Government Initiatives and Support for AI and XR The government's investment in AI and XR for education is multifaceted, focusing on funding research, developing ethical standards, and preparing students for the future workforce.

Absent preparedness, workers will lose jobs to automation. Crist '24 finds:

Carolyn Crist, 10-20-2024, HR Dive,

<https://www.hrdive.com/news/AI-training-for-the-future-of-work/730406/, VJ> 🍌

Among AI users, half said AI skills expand their job opportunities, and 46% said AI has given them more opportunities to learn skills and progress in their jobs. When AI saves time, workers said they're using that time for creative work, strategic thinking and better work/life balance. However, **13% of workers said they've lost their job due to AI, and only 11% of workers were considered to be** "future-ready," or **adaptable**, willing to be flexible in their careers and proactive in acquiring new skills. Among these future-ready workers, 93% received a personalized development plan and 95% frequently participated in leadership training provided by their companies. Most workers want reskilling and internal mobility opportunities, too. About three-quarters said companies should prioritize cross-training for different roles before hiring externally. At the same time, only 9% said they plan to stay with their company to be reskilled. **By 2032, generative AI tools will significantly shift work and productivity, potentially changing 52% of all jobs, according to research by** Cognizant and **Oxford** Economics. In the U.S., **9% of the current workforce may be displaced, and 1% of displaced workers may struggle to find new employment.** As a result, the future of work may hinge on upskilling, particularly around AI skills, according to a report by the AI-Enabled ICT Workforce Consortium, which is led by Cisco and includes companies such as Google, Indeed, Intel and Microsoft. Workers will need training in AI literacy, AI preparedness, data analytics and prompt engineering, the consortium said.

Unemployment is deadly. Crudele '20 finalizes:

[John Crudele [John Crudele is a columnist and business journalist in the United States. He writes syndicated political columns for the New York Post. Earlier in his career he worked for Reuters, The New York Times, and as a columnist for New York Magazine. He was also a Financial News Network host.], 04-20-2020, "Is unemployment really as deadly as coronavirus?",

<https://nypost.com/2020/04/20/explaining-the-link-between-unemployment-deaths-amid-coronavirus/>, //LL]

In the 2015 movie "The Big Short" about the Great Recession, Brad Pitt's character Ben Rickert is strolling in Las Vegas with two Wall Street colleagues who are elated about all the money they made betting that the US economy was in trouble. Their bet, of course, was that problems with mortgage-backed securities would hurt banks and the entire American financial system. That's exactly what happened in real life. Pitt's Rickert chastises his colleagues for acting so happy and says: **Every 1 percent unemployment goes up, 40,000 people**

die. Did you know that?" Is that 40,000 figure just Hollywood nonsense? Well, it's not. Or at least it is close. And that, in a nutshell, is what President Trump has to deal with right now. If he opens up the economy, there could be a spike in cases of coronavirus and a rise in deaths unless there is some medical breakthrough. Already, 41,000 people are reported to have died from the disease in the US alone. But if the president keeps the economy closed, the unemployment rate is bound to climb and if you believe Pitt's character — and the academic research upon which that statement is based — people will die because of that as well. There's a technical term for this — it's called being damned if you do and damned if you don't. Before the economic mess this virus caused, the US unemployment rate was just 3.5 percent. In March, it rose to 4.4 percent. And there are predictions that it will go as high as 13 percent and maybe even 15 percent before people start returning to work. So, if the calculations are correct, that **10 percentage point-plus rise in the jobless rate would cause more than 400,000 deaths** that have nothing to do with the virus and everything to do with the distressed economy. And, of course, there will be a lot of financial troubles for those who don't die. But let's just look at just the death rate. The actual figure in academic research is a 37,000 increase for each percentage-point rise in the unemployment rate. It comes from a book called "Corporate Flight: The Causes and Consequences of Economic Dislocation" by Barry Bluestone, Bennett Harrison and Lawrence Baker. "Corporate Flight" was published in 1982 and mainly had to do with companies moving operations overseas. I couldn't reach Bluestone, Harrison or Baker, but last week I was able to contact Wade Thomas, who teaches economics and business at SUNY Oneonta and who quoted those figures in his own co-written 2005 book called "Economic Issues Today: Alternative Approaches." Here's the paragraph from Thomas' book that applies: "According to one study [the one by Bluestone et al.] a 1 percent increase in the unemployment rate will be associated with 37,000 deaths [including 20,000 heart attacks], 920 suicides, 650 homicides, 4,000 state mental hospital admissions and 3,300 state prison admissions." Thomas says things are different today, but those old studies may help us understand the hidden problems that the coronavirus is causing. "I would hesitate to extrapolate from the old estimates of corporate flight as a means of quantifying present circumstances," Thomas wrote to me in an email, adding that "there are too many variables involved now to assert definitive cause and effect between unemployment and the litany of health consequences cited in the 1981 study." But, Thomas said, "it informs our thinking about some of the potential problems that may accompany this wave of joblessness." Two things are definitely different today. One, Washington acted quickly to help the unemployed. It didn't when companies were moving overseas. And, as I said in my last column, a great deal of those who have lost their jobs because of the virus are only being furloughed. They are scheduled to get their jobs back once companies reopen their doors. Let's hope that the data from 1981 is — excuse the expression — dead wrong.

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Zhu 25 --- (Kayla Zhu, 1-10-2025, "TechnologyRanked: AI Models With the Lowest Hallucination Rates", <https://www.visualcapitalist.com/ranked-ai-models-with-the-lowest-hallucination-rates/>)
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Smaller or more specialized models, such as Zhipu AI GLM-4-9B-Chat, OpenAI-o1-mini, and OpenAI-4o-mini have some of the lowest hallucination rates among all models. Intel's Neural-Chat 7B is also a smaller model. According to Vectara, small-size models can "achieve hallucination rates comparable or even better (lower) than LLMs that are much larger in size." Measuring hallucination rates is becoming increasingly critical as AI systems are deployed in high-stakes applications across fields such as medicine, law, and finance. While larger models generally outperform smaller ones and are continually scaled up for better results, they come with drawbacks like high costs, slow inference, and complexity. Smaller models, however, are closing the gap, with many performing well on specific tasks. For example, a study showed that the smaller Mistral 8x7B model successfully reduced hallucinations in AI-generated text. In terms of foundational models, Google's Gemini 2.0

slightly outperforms **OpenAI GPT-4 with a hallucination rate difference of just 0.2%.**

However overall, several variants of GPT-4 (e.g., Turbo, Mini, Standard) fall within the **1.5%**–1.8% range, highlighting a strong focus on accuracy across different tiers of the same architecture.

Yanklowitz '13 [Shmuly Yanklowitz; PhD, contributor to HuffPost; 08-15-2013; "A Society with Poor Critical Thinking Skills: The Case for 'Argument' in Education"; HuffPost; https://www.huffpost.com/entry/a-society-with-poor-criti_b_3754401; accessed 03-07-2025] leon

Researchers have shown that **most students today are weak in critical thinking skills. They do poorly on simple logical reasoning tests** (Evans, 2002). **Only a fraction of graduating high school seniors (6 percent of 12th graders) can make informed, critical judgments about written text** (Perie, Grigg, and Donahue, 2005). This problem applies to both reading and writing. Only 15 percent of 12th graders demonstrate the proficiency to write well-organized essays that consisted of clear arguments (Perie et al., 2005).

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Researchers have shown that most students today are weak in critical thinking skills. They do poorly on simple logical reasoning tests (Evans, 2002). Only a fraction of graduating high school seniors (6 percent of 12th graders) can make informed, critical judgments about written text (Perie, Grigg, and Donahue, 2005). This problem applies to both reading and writing. Only 15 percent of 12th graders demonstrate the proficiency to write well-organized essays that consisted of clear arguments (Perie et al., 2005). Critical thinking and argument skills -- the abilities to both generate and critique arguments -- are crucial elements in decision-making (Byrnes, 1998; Klaczyński, 2004; Halpern 1998). When applied to academic settings, argumentation may promote the long-term understanding and retention of course content (Adriessen, 2006; Nussbaum, 2008a). According to the ancient Greeks, dialogue is the most advanced form of thought (Vygotsky, 1978). Critical thinking and dialogue are often made manifest in the form of argument. Dialectical arguments require an appeal to beliefs and values to make crucial decisions, what Aristotle referred to as endoxa (Walton, Reed, & Macagno, 2008). In all careers, academic classes, and relationships, argument skills can be used to enhance learning when we treat reasoning as a process of argumentation (Kuhn, 1992, 1993), as fundamentally dialogical (Bakhtin, 1981, 1986; Wertsch, 1991), and as metacognitive (Hofer & Pintrich, 1997). Significant differences in approach have emerged as to how best cultivate the skills necessary to form, present and defend an argument. Differences have emerged as to whether the best practices include the use of computers, writing exercises, metacognitive activities, debates, modeling, or frontal instruction. To many "argument" sounds combative and negative but the use of argument can be constructive and generative. Epistemological understanding becomes most evident when an individual is confronted with uncertain or controversial knowledge claims (Chandler et al., 1990; King and Kitchener, 1994; Kuhn et al., 2000; Leadbeater and Kuhn, 1989). It is imperative that high school students, of diverse personal, moral and intellectual commitments, become prepared to confront multiple perspectives on unclear and controversial issues when they move on to college and their careers. This is not only important for assuring students are equipped to compete in the marketplace of ideas but also to maximize their own cognitive development more broadly. Longitudinal studies focused on high school students (Schommer et al., 1997) show a positive correlation between educational level and epistemological level. Cross-sectional studies demonstrate that educational experiences influence epistemological development and that it is the quality of education and not age or gender that contributes to different developmental levels of epistemological understanding (Chandler et al., 1990; Leadbeater and Kuhn, 1989). Education is therefore key. Argument is a more complex and challenging cognitive skill for students than other genres of reading and writing, such as exposition or narration. It is also more challenging for most teachers who may not have the knowledge or experience of working with argumentative reading and writing (Hillocks, 1999, 2010). In addition, most teachers try to avoid conflict when it comes to learning (Powell, Farrar, and Cohen, 1985).

<<LINE BREAKS CONTINUE>>

Many teachers have observed that students sitting in classrooms today are bored by the frontal authoritarian model of learning. For years, as a student, **I was told to take out my notebook and copy what was written on the board.** A curriculum in which they are active participants and engaged in democratic, and cognitively challenging for students works better. In the frontal model, teachers provide the questions and answers. In the argument model, the students provide the questions and the answers while the teachers provide the structure, the facilitation, and the guidance. Students gain the necessary skills to be critical thinkers in a complex society with many different agendas, facts, and perspectives.

Tan 24 [Myles Joshua Toledo Tan is a tenured professor at University of Florida, and is also an assistant professor at University of St. La Salle in the Philippines. Nicholle Mae Amor Tan Maravilla is an independent collaborative researcher in the Philippines, who specializes in mental health and learning.], 10-23-2024, "Shaping integrity: why generative artificial intelligence does not have to undermine education," Frontiers, <https://www.frontiersin.org/journals/artificial-intelligence/articles/10.3389/frai.2024.1471224/full>, DOA: 2-3-2025] oli

GAI- generative artificial intelligence

Self-determination theory: fostering intrinsic motivation

SDT posits that **individuals are most motivated when their needs for autonomy, competence, and relatedness are met**. GAI, with its capability to **provide personalized feedback and tailored learning resources**, can significantly support SDT by **fostering intrinsic motivation among students**. By **empowering students to take control of their learning**, AI can **enhance engagement and academic integrity** (Deci and Ryan, 2000; Ryan and Deci, 2017).

Autonomy

GAI can **enhance students' sense of autonomy** by **offering them more control over their learning process**. In a high school history class studying the Industrial Revolution, an AI tool can create interactive timelines and simulations. **Students** can **explore** these tools **at their own pace**, choosing which aspects of the Industrial Revolution to delve into more deeply. This **self-directed exploration encourages students to take ownership of their learning**, **fostering** a sense of **autonomy** (Reeve, 2006).

For example, a student interested in labor conditions during the Industrial Revolution might use the AI tool to simulate different labor policies and observe their impacts. This personalized exploration helps students develop a deeper understanding of historical complexities, driven by their own curiosity and interests (Niemic and Ryan, 2009).

Competence

GAI tools can also **support** the need for **competence** by **providing personalized feedback** that helps students improve their skills and knowledge. In a language arts classroom, an AI-driven writing assistant can **analyze a student's work and provide targeted feedback** on grammar, tone, and narrative structure. This **real-time, individualized feedback helps students understand their strengths and areas for improvement**, **fostering** a sense of **competence** (Black and Deci, 2000).

Imagine a student writing a short story. The AI tool can suggest improvements in plot development and character interactions, guiding the student to refine their narrative. As students see their writing improve through this iterative process, they gain confidence in their abilities, which enhances their intrinsic motivation to engage with the subject matter (Vansteenkiste et al., 2004).

Relatedness

GAI can also facilitate relatedness by enabling collaborative learning and providing opportunities for meaningful interactions. In a project-based learning environment, AI tools can help students work together on presentations or reports. For instance, in a science class, an AI-powered lab assistant can guide groups of students through virtual experiments, encouraging collaboration and discussion (Ryan and Powelson, 1991).

Consider a group of students using AI to simulate a chemical reaction. The AI provides each group member with specific tasks and prompts them to share their findings and discuss results. This collaborative process fosters a sense of relatedness, as students work together to achieve common goals and learn from each other (Jang et al., 2010).

Promoting academic integrity

By fostering intrinsic motivation through autonomy, competence, and relatedness, GAI can also promote academic integrity. When students are genuinely interested and engaged in their learning, they are less likely to resort to dishonest practices. Personalized learning experiences make education more relevant and enjoyable, reducing the temptation to cheat (Deci et al., 1991).

In history class, for example, students using AI to explore the Industrial Revolution are likely to develop a genuine interest in the subject. This intrinsic motivation drives them to produce original work and engage deeply with the material. Similarly, in the language arts class, students motivated by the desire to improve their writing skills are more likely to take pride in their work and avoid plagiarism (Vansteenkiste and Ryan, 2013).

Real-world application

In a business class where students develop business plans using AI-generated market analysis reports and financial projections, educators can emphasize the importance of ethical decision-making and transparency. The AI tool provides personalized insights, allowing students to explore various business strategies and their consequences. This hands-on learning approach fosters intrinsic motivation by making the subject matter relevant and engaging (Ryan and Deci, 2000).

For instance, a student interested in starting a sustainable business can use AI to analyze the environmental impact of different business models. This personalized exploration helps the student develop a deeper understanding of sustainability in business, driven by their own interests and values (Deci and Ryan, 2008).

GAI, by supporting the principles of SDT, can foster intrinsic motivation among students. Through personalized feedback and tailored learning resources, AI empowers students to take control of their learning, enhancing their sense of autonomy, competence, and relatedness. This intrinsic motivation not only increases engagement but also promotes academic integrity. By integrating AI tools in educational settings, educators can create enriching learning environments that prepare students for the complexities of the modern world, ensuring that they are motivated, ethical, and engaged learners (Ryan and Deci, 2019).

Discussion: generative artificial intelligence as a catalyst for enhancing academic integrity

The integration of GAI in education has sparked significant debate regarding its impact on academic integrity. Critics argue that AI tools facilitate dishonesty by providing easy shortcuts for students to complete assignments. However, a closer examination of established educational theories and ethical frameworks reveals a different perspective. When used responsibly, GAI can foster intrinsic motivation, enhance digital literacy, and support constructivist learning principles, thereby promoting academic integrity rather than eroding it.

Spector 23 [Carrie Spector, senior communications associate at the Stanford Graduate School of Education. 10-31-2023, "What do AI chatbots really mean for students and cheating?", DOA 2-8-2025, Stanford University News, <https://ed.stanford.edu/news/what-do-ai-chatbots-really-mean-students-and-cheating>] //dg

The launch of ChatGPT and other artificial intelligence (AI) chatbots has triggered an alarm for many educators, who worry about students using the technology to cheat by passing its writing off as their own. But two Stanford researchers say that concern is misdirected, based on their ongoing research into cheating among U.S. high school students before and after the release of ChatGPT.

“There’s been a ton of media coverage about AI making it easier and more likely for students to cheat,” said Denise Pope, a senior lecturer at Stanford Graduate School of Education (GSE). “But we haven’t seen that bear out in our data so far. And we know from our research that when students do cheat, it’s typically for reasons that have very little to do with their access to technology.”

Pope is a co-founder of [Challenge Success](#), a school reform nonprofit affiliated with the GSE, which conducts research into the student experience, including students’ well-being and sense of belonging, academic integrity, and their engagement with learning. She is the author of *Doing School: How We Are Creating a Generation of Stressed-Out, Materialistic, and Miseducated Students*, and coauthor of *Overloaded and Underprepared: Strategies for Stronger Schools and Healthy, Successful Kids*.

[Victor Lee](#) is an associate professor at the GSE whose focus includes researching and designing learning experiences for K-12 data science education and AI literacy. He is the faculty lead for the [AI + Education initiative](#) at the [Stanford Accelerator for Learning](#) and director of [CRAFT](#) (Classroom-Ready Resources about AI for Teaching), a program that provides free resources to help teach AI literacy to high school students.

Here, Lee and Pope discuss the state of cheating in U.S. schools, what research shows about why students cheat, and their recommendations for educators working to address the problem.

What do we know about how much students cheat?

Pope: We know that cheating rates have been high for a long time. At Challenge Success we’ve been running surveys and focus groups at schools for over 15 years, asking students about different aspects of their lives — the amount of sleep they get, homework pressure, extracurricular activities, family expectations, things like that — and also several questions about different forms of cheating.

For years, long before ChatGPT hit the scene, some 60 to 70 percent of students have reported engaging in at least one “cheating” behavior during the previous month. That percentage has stayed about the same or even decreased slightly in our 2023 surveys. when we added questions specific to new AI technologies, like ChatGPT, and how students are using it for school assignments.

Isn’t it possible that they’re lying about cheating?

Pope: **“Because these surveys are anonymous, students are surprisingly honest,”** — especially when they know we’re doing these surveys to help improve their school experience. We often follow up our surveys with focus groups where the students tell us that those numbers seem accurate. If anything, they’re underreporting the frequency of these behaviors.

Lee: **“The surveys are also carefully written so they don’t ask, point-blank, “Do you cheat?” They ask about specific actions that are classified as cheating,”** like whether they have copied material word for word for an assignment in the past month or knowingly looked at someone else’s answer during a test. With AI, most of the fear is that the chatbot will write the paper for the student. But there isn’t evidence of an increase in that.

So AI isn’t changing how often students cheat — just the tools that they’re using?

Lee: The most prudent thing to say right now is that the data suggest, perhaps to the surprise of many people, that AI is not increasing the frequency of cheating. This may change as students become increasingly familiar with the technology, and we’ll continue to study it and see if and how this changes.

But I think it’s important to point out that, in Challenge Success’ most recent survey, students were also asked if and how they felt an AI chatbot like ChatGPT should be allowed for school-related tasks. Many said they thought it should be acceptable for “starter” purposes, like explaining a new concept or generating ideas for a paper. But the vast majority said that using a chatbot to write an entire paper should never be allowed. So this idea that students who’ve never cheated before are going to suddenly run amok and have AI write all of their papers appears unfounded.

But clearly a lot of students are cheating in the first place. Isn’t that a problem?

Pope: There are so many reasons why students cheat. They might be struggling with the material and unable to get the help they need. Maybe they have too much homework and not enough time to do it. Or maybe assignments feel like pointless busywork. Many students tell us they’re overwhelmed by the pressure to achieve — they know cheating is wrong, but they don’t want to let their family down by bringing home a low grade.

We know from our research that cheating is generally a symptom of a deeper, systemic problem.

When students feel respected and valued, they’re more likely to engage in learning and act with integrity. They’re less likely to cheat when they feel a sense of belonging and connection at school, and when they find purpose and meaning in their classes. **Strategies to help**

students feel more engaged and valued are likely to be more effective than taking a hard line on AI, especially since we know AI is here to stay and can actually be a great tool to promote deeper engagement with learning.

What would you suggest to school leaders who are concerned about students using AI chatbots?

Pope: Even before ChatGPT, we could never be sure whether kids were getting help from a parent or tutor or another source on their assignments, and this was not considered cheating. Kids in our focus groups are wondering why they can't use ChatGPT as another resource to help them write their papers — not to write the whole thing word for word, but to get the kind of help a parent or tutor would offer. We need to help students and educators find ways to discuss the ethics of using this technology and when it is and isn't useful for student learning.

Lee: There's a lot of fear about students using this technology. Schools have considered putting significant amounts of money in AI-detection software, which studies show can be highly unreliable. Some districts have tried blocking AI chatbots from school wifi and devices, then repealed those bans because they were ineffective.

AI is not going away. Along with addressing the deeper reasons why students cheat, we need to teach students how to understand and think critically about this technology. For starters, at Stanford we've begun developing free resources to help teachers bring these topics into the classroom as it relates to different subject areas. We know that teachers don't have time to introduce a whole new class, but we have been working with teachers to make sure these are activities and lessons that can fit with what they're already covering in the time they have available.

I think of AI literacy as being akin to driver's ed: We've got a powerful tool that can be a great asset, but it can also be dangerous. We want students to learn how to use it responsibly.

Kathryn **Hulick 23**, 4-12-2023, [Kathryn Hulick is a freelance science journalist and author.] "How ChatGPT and similar AI will disrupt education," Science News,
<https://www.sciencenews.org/article/chatgpt-ai-artificial-intelligence-education-cheating-accuracy>,
accessed 2-21-2025 //rqli

When it's unclear whether ChatGPT wrote something or not, other AI tools may help. These tools typically train on AI-generated text and sometimes human-generated text as well. They can tell you how likely it is that text was composed by an AI. Many of the existing tools were trained on older language models, but developers are working quickly to put out new, improved tools.

A company called Originality.ai sells access to a tool that trained on GPT-3. Founder Jon Gillham says that in a test of 10,000 samples of texts composed by models based on GPT-3, the tool tagged 94 percent of them correctly as AI-generated. When ChatGPT came out, his team tested a smaller set of 20 samples. Each only 500 words in length, these had been created by ChatGPT and other models based on GPT-3 and GPT-3.5. Here, Gillham says, the tool "tagged all of them as AI-generated. And it was 99 percent confident, on average."