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C1 - Teachers

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 Burnout Statistics Teachers who have quit have countlessly 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 cause**, 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, "Ivi," 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. Rachelle 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. Rachelle 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 Augustthis year alone, Statista reported that 51,000 teachers and other educational staff quit their jobsin 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 **improves** how **teaching** a profession by making the job easier. In a guest post by Matthew Rhoads, Ed.D., he wrote that**AI can improve teachers' workflow**, 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 **fast** 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 a** 3.4 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.

C2 - Workforce

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-wa g es/, //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: b**y 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.** 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 by 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.deepresearch.su/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.

C3: Vaccines/Med industry

AI is currently being taught and used in the medical field as well with major results Basu, Kaoudpriya, et al. "Artificial Intelligence: How Is It Changing Medical Sciences and Its Future?" *Indian Journal of Dermatology*, vol. 65, no. 5, Sept. 2**20**, pp. 365–370, https://doi.org/10.4103/ijd.IJD_421_20.

Most **global pharmaceutical companies** have **invested** their time and money on using **AI for drug development of major diseases,** such as cancer or cardiovascular disease. **Given the impact that AI and machine learning is having on our wider world, it is important for AI to be a part of the curriculum for** a range of domain **experts. This is particularly true for the medical profession,** where the cost of a wrong decision can be fatal.

This same AI used to help major diseases can prevent pandemics

"Using AI from Lab to Jab: How Did Artificial Intelligence Help Us Develop and Deliver COVID-19 Vaccines?" *Gavi*.org, 20**25,** www.gavi.org/vaccineswork/using-ai-lab-jab-how-did-artificial-intelligence-help-us-develop-and-deliver-covid.

When COVID-19 first swept across the globe, **researchers rushed to develop a vaccine that could save lives and end the pandemic as quickly as possible. Enter** artificial intelligence **(AI), which accelerated the process in a way that has never been done before in vaccine development.**

Not only did AI help slow the spread of COVID it could prevent the outbreak of new strains

Higgins, Matthew K. "Can We AlphaFold Our Way out of the next Pandemic?" *Journal of Molecular Biology*, June 2021, p. 167093. https://doi.org/10.1016/j.jmb.2021.167093.

With an infectious organism dominating the world stage, the developers of AlphafoldI 2 were keen to play their part, accurately predicting novel structures of two proteins from SARS-CoV-2.they highlighted this contribution, writing,"we've also seen signs that protein structure prediction could be useful in future pandemic response efforts". Knowledge of the structure of the SARS-CoV coronavirus spike protein allowed design of mutants which stabilise the spike in the pre-fusion conformation.' As this is the form of the spike found on virus particles, vaccine immunogens which elicit antibodies that target this conformation are likely to be most effective.' As the SARS-CoV-2 virus, which causes COVID-19, is closely related to SARS-CoV-2, it is this insight was transferable to the new pandemic strain.' As a result, the Pfizer/BioNTech and Moderna vaccines, amongst others, include spike-stabilising mutations in their effective designs.' This is just one example of a broader field of 'reverse vaccinology', in which rational insight into the structures of pathogen surface proteins, and their complexes with neutralising monoclonal antibodies, guide design of improved vaccine immunogens. The current strengths of AlphaFold 2 appear to be in the prediction of structures of single proteins, both in cases where there is a similar structure to act as a template, and where there is not. As soon in the case of PDB15, structures of single antigens can be used to guide design of improved vaccine immunogens
United Nations. "14.9 Million Excess Deaths Associated with the COVID-19 Pandemic in 2020 and 2021." *United Nations*, www.un.org/en/desa/149-million-excess-deaths-associated-covid-19-pandemic-2020-and-20 21

New estimates from the World Health Organization **(WHO) show** that the **full death toll** associated directly or indirectly **with the COVID-19** pandemic (described as "excess mortality") between 1 January 2020 and 31 December 2021 **was approximately 14.9 million (range** 13.3 million **to 16.6 million). "These sobering data not only point t**o the impact of the pandemic but also **to the need for all countries to invest in more resilient health systems** that can sustain essential health services during crises **including stronger health information systems,"** said Dr Tedros Adhanom Ghebreyesus, WHO Director-General.

We need these vaccinations not only in the event of another outbreak but to prevent death overall

Carter , Austin, et al. "Modeling the Impact of Vaccination for the Immunization Agenda 2030: Deaths Averted due to Vaccination against 14 Pathogens in 194 Countries from 2021-2030." *Papers.ssrn.com*, 20 Apr. 20**21,** papers.ssrn.com/sol3/papers.cfm?abstract_id=3830781.

Overall, an estimated 51.0 million (95% CI: 48.5 - 53.7) **deaths are expected to be averted due to vaccinations administered between the years 2021 and 2030. With immunization coverage projected to increase over 2021-2030 an average of 5.1 million per year** (4.9 – 5.4) **deaths will be averted annually**, with 4.4 million(3.6- 5.1) deaths be averted for the year 2021, **gradually rising to 5.8 million** (5.5-6.4) **deaths averted in 2030.**

Impact: AI used in medical fields are used to make vaccinations. These vaccinations helped stop the spread of covid, and potentially the next one. This shows how our youth needs to learn AI in schools.

C3.B

Medical training saves lives.

There is a glaring lack of surgeons

A 2021 report released by the American Association of Medical Colleges projects shortages of 15,800-30,200 in all surgical specialties by 2034.

Surgeons are woefully underprepared. Bosshardt'25

an alarming number of surgical residency graduates are unprepared for professional practice. The problem has only gotten worse. I recently worked with another young surgeon on a breast cancer patient, for example, and was shocked to discover that he had never performed an axillary node dissection—a common operation to remove lymph nodes from a cancer patient's armpit. How could a surgeon have completed five years of training without learning how to do this?

One of my colleagues heads a surgical residency at an elite medical institution and has served as his certifying board's examiner for nearly 20 years, overseeing the certification of young surgeons. He has noted two changes during this period. First, **many candidates for certification complete their surgeries slowly—taking, for example, seven hours to complete an operation that should take at most four.** The problem is so widespread that some insurers have put a cap on anesthesia reimbursement for cases that take too long, even though it is the surgeon, not the anesthesiologist, who determines the duration of the procedure.

Second, and relatedly, my colleague noted a rise in patients' post-operative complications.

NIH'23

AI provides an environment to practice surgery.

AI can provide a safe and controlled environment for trainees to practice surgical skills and can analyze large datasets of surgical procedures to identify areas for improvement[1-3]. However, as with any technology, hyes can be used to create simulated surgeries that allow trainees to gain hands-on experience without the risks associated with real-life procedures.

AI can be used to review procedures.

surgeons simply upload videos of their surgical procedures to receive AI-generated video skill assessments and rapid feedback This new technology provides high-quality learning opportunities for trainees regardless of their location, delivering best-in-class expertise and individualized insights.

Whiting 20 states

"…The lack of operations causes 17 million people dying from conditions needing surgical care every year.

The impact is saving lives.

Overall we can see that AI helps us prevent unemployment and millions of deaths annually therefore it is clear that the benefits of AI outweigh the harms and I trust you will vote in the affirmation