NEG

We negate the resolution resolved: In the United States, the benefits of the use of generative AI in education outweigh the harms.

Trigger WARNING: Contains cards about school violence and suicide

<u>Contention 1:</u> Student Safety

Cyberbullying is common <mark>Brightpath 25</mark>

"Teenage Cyberbullying Statistics 2024 - BrightPath." Bright Path Adolescent Mental Health, 20 Feb. 2025, www.brightpathbh.com/teenage-cyberbullying-statistics/#:~:text=In%202023%2C%2026.5%25%20of%20U.S.,%2C%20and%20 overall%20 well%Being. Accessed 24 Feb. 2025.//Brightpath is an educational platform designed for school districts and built on 50+ years of aptitude research to prepare students, empower educators, and inform administrators.//No author//

==In 2023, 26.5% of U.S. teens== reported being ==cyberbullied==, a number that has ==steadily increased over the past years.== The increase in cyberbullying highlights its growing impact on teens' mental health, school attendance, and overall well-being.

Generative AI creates more cyberbullying <mark>Pater 24</mark>

"Artificial Intelligence and Online Harassment | Parkview Health." *Parkview*, 2024, www.parkview.com/blog/artificial-intelligence-and-online-harassment. Accessed 19 Feb. 2025.
[<mark>Jessica Pater</mark>: Senior Research Scientist and Manager of Health Services and Informatics Research Lab at Parkview Research Center]

Over the last year, online harassment and ==cyberbullying using generative AI== has been ==on the rise.== This can include a variety of methods, such as creating false imagery or writing used to negatively impact someone else's life. **According to the Cyberbullying Research Center, AI-generated harassment ==can overwhelm victims more== than traditional versions of this digital abuse and lead to substantial psychological and emotional abuse. Just last year, the FBI released a public service announcement discussing the rise of using AI to create explicit content. These forms of manipulated media can be problematic, particularly since it can be very ==difficult for== the ==victim to prove== that they are indeed ==fake images, leading to== additional ==stress, fear and anxiety.==**
The specific risks of cyberbullying and harassment in the age of AI
As this technology and its capabilities continues to grow, here's some of what we know about the hazards of **AI-generated harassment: It ==spreads faster and farther== – Harassment via automated troll bots ==greatly increases how many== people are sent content ==and how quickly== content is ==shared.==** It's specific – AI-generated content can make attacks even more personal by learning from personal-level data that the victim shares through online platforms. It's smart – This technology can create content that successfully evades automated content moderation systems. It breeds bullying – **The use of AI-generated content for harassment ==increases how vulnerable== an ==individual is to hate speech and racist tropes== depending on the data that is used to train the systems.**

<mark>Hinduja 23</mark>

Sameer Hinduja. "Generative AI as a Vector for Harassment and Harm - Cyberbullying Research Center." Cyberbullying Research Center, 10 May 2023, cyberbullying.org/generative-ai-as-a-vector-for-harassment-and-harm. Accessed 20 Feb. 2025.//Dr. Sameer Hinduja is a Professor in the School of Criminology and Criminal Justice at Florida Atlantic University, Co-Director of the Cyberbullying Research Center, and Faculty Associate at the Berkman Klein Center at Harvard University. He is recognized internationally for his groundbreaking work on the subjects of cyberbullying and safe social media use, concerns that have paralleled the exponential growth in online communication by young people.//

Generative AI allows for both the **automatic creation of harassing or threatening messages**, **emails, posts, or comments on** a wide **variety of platforms** and interfaces, **and** its **rapid dissemination. Its impact historically may have been limited since it takes at least some time, creativity, and effort to do this manually, with one attack after another occurring incrementally. That is no longer a limitation, since the entire process can be automated.** Depending on the severity, these generated messages can then lead to significant harm to those targeted, who are left with little to no recourse to stem the voluminous tide of abuse, nor identify the person(s) behind it. **Reports indicate that harassment via automated troll bots is a significant problem, and it seems only a matter of time that real-time, autonomous conversational agents take over as a primary vehicle for, or driver of, harassment. At best, it is incredibly annoying and at worst, it can overwhelm victims, greatly amplify the impact of the harassment and cyberbullying, create a hostile online environment, and lead to substantial psychological and emotional harm.** AI-generated harassment and cyberbullying is incredibly annoying and at worst, it can overwhelm victims, greatly amplify the impact of the harassment and cyberbullying, create a hostile online environment, and lead to substantial psychological and emotional harm. **Furthermore, generative AI algorithms can take online attacks to a higher level by learning from granular-level data available about a person.** It can analyze a target's social media posts, online activities, or personal information to generate highly specific and threatening messages or content. It can create output that references specific locations, recent events, or private details about the target's life after learning as much as possible about them, making the harassment much more personal and intimidating. **Think about all that you (or your teenager) share(s) online, and how it might take a malicious individual days, or even weeks, to sort through all of the captions, comments, pictures, videos, and livestreams to build a complete dossier about them. Now, an aggressor can use generative AI to do it in minutes (or less).**

IMPACT: School violence CHOP 24

"Bullying in Schools." Center for Violence Prevention, 21 Mar. 2024, violence.chop.edu/bullying-schools. Accessed 20 Feb. 2025.//Children's Hospital of Philadelphia Pennsylvania ranked 2nd//

Between 21 and 49% of youth adolescents report being bullied in the past year 70.6% of youth are bystanders to bullying. In a 2010 study, 20% of girls and 25% of boys said they were bullied, bullied others, or both in the last month. In the same study, 90% of third to fifth grade students said they felt sorry for students who are bullied, but sympathy often does not translate into action. A 2009 study estimated that at least 20.8% of youth in the US were physically bullied, 53.6% were verbally bullied, 51.4% were socially bullied, and 13.6% were cyber bullied at least once over a two-month period. **Victims of cyber bullying often do not report their victimization and are eight times more likely to carry a weapon to school. A 2011 study showed that bullying at age 14 predicted violent convictions between ages 15 and 20, self-reported violence at age 15 to 18, low job status at age 18, and drug use at 27 to 32 years of age.**

National Archives 25

"The Cumulative Costs of Gun Violence on Students and Schools | CEA | the White House." *The White House*, 15 Jan. 2025, bidenwhitehouse.archives.gov/cea/written-materials/2025/01/15/the-cumulative-costs-of-gun-violence-on-students-and-schools/. Accessed 19 Feb. 2025.
[National Archives: government department that stores national historical information and records]

Children and adolescents are dying from gun violence at alarmingly high rates in the United States, with firearms now the leading cause of death among youth ages 1 to 19 (figure 1). **The threat of gun violence, the trauma it causes, and the horrific loss of these young lives to firearms all have profound consequences that extend across entire communities and our education system as a whole.** In this blog, the CEA reviews these cumulative costs, focusing on the lasting damage to the academic,

labor market, and mental health outcomes of youth exposed to gun violence in our classrooms and neighborhoods. **Gun violence** also **destabilizes schools** and **causes them to spend billions** of scarce dollars **on security** measures. These are resources that could be much **more productively applied to academic investments.** The Biden-Harris Administration has taken actions to reduce gun violence inside and outside of schools, including providing additional resources and information on evidence-based practices. It is essential that forthcoming administrations build on this progress. Columbine, Virginia Tech, Sandy Hook, Marjory Stoneman Douglas, Uvalde. **Mass shootings in K-12 schools and on college campuses have become part of the American lexicon.** Most recently, on December 16th, a 15-year-old student at Abundant Life Christian School in Wisconsin used a handgun to kill a student and a teacher and wound six others before taking her own life. According to the Washington Post, this was the 426th K-12 school shooting in the United States since the Columbine High School Massacre in 1999. These horrifying attacks represent only a small fraction of the gun-violence youth are exposed to in the United States. **Since 1999, over 80,000 U.S. children and adolescents** have **died from gun-violence** (figure 1). **High rates** of school shootings and firearm deaths among youth are a **uniquely American** phenomenon. Between 2009 and 2018, there were a combined total of five recorded school shootings in G-7 member countries Canada, France, Germany, Italy, Japan, and the United Kingdom. The United States averaged six school shootings every two and half months during the same ten-year period, a rate that has only increased since.[1] Furthermore, **firearm mortality rates among children and adolescents are** **at least 10 times higher in** the United States **compared to other high-income nations** (figure 2). This epidemic of gun violence affecting youth contributed to the **U.S. Surgeon General**'s decision to **declare firearm violence** in America a **public health crisis** on June 25th of last year.

IMPACT: Lives lost Reynolds 22

"Cyberbullying Linked with Suicidal Thoughts and Attempts in Young Adolescents." National Institutes of Health (NIH), 11 July 2022, www.nih.gov/news-events/nih-research-matters/cyberbullying-linked-suicidal-thoughts-attempts-young-adolescents?form=MG0AV3.//NIH is the largest source of funding for medical research in the world, creating hundreds of thousands of high-quality jobs.//

Suicide is the **second leading cause of death for adolescents and young adults in** the **United States.** In-person bullying is known to raise the risk of thoughts of suicide and attempts for both victims and perpetrators. **Cyberbullying—bullying that happens online—has been** **on the rise** in this age range. Increased use of the internet during the COVID-19 pandemic has further boosted this trend. But the links between cyberbullying and thoughts of suicide and attempts are less well understood than the effects of in-person bullying. To help fill in this gap, **NIH-funded researchers led by Dr. Ran Barzilay from the Children's Hospital of Philadelphia used data from more than 10,000 young adolescents with an average age of 12. The participants were enrolled in a long-term study tracking brain development and child health. As part of a survey for the study, adolescents reported if they'd experienced or perpetrated cyberbullying.** This was defined as "purposefully trying to harm another person or be mean to them online, in texts or group texts, or on social media (like Instagram or Snapchat)." The participants also answered questions about in-person bullying, including physical, relational (being left out or ostracized), or reputational (such as gossip) harm. **Another study questionnaire asked whether they had experienced thoughts of suicide or attempted suicide. The team explored the associations between the types of bullying and thoughts of suicide and attempts. Results were published on June 27, 2022, in JAMA Network Open. Almost 9% of the young adolescents reported being a target of cyberbullying.** Less than 1% reported perpetrating cyberbullying, but most of those who did also experienced cyberbullying. Female and Black participants were more likely to be bullied online. **The participants who experienced cyberbullying were** **more than 4 times as likely to report thoughts of suicide and attempts** as those who didn't. **This association diminished but remained significant when the researchers adjusted for other factors known to affect thoughts of suicide and attempts.** These include family conflict, racial discrimination, parental monitoring, and being supported at school. **The researchers also found that experiencing cyberbullying increased** the risk of **thoughts of suicide and attempts independent of in-person bullying.** Unlike the trends seen with in-person bullying, perpetrating cyberbullying wasn't linked with an increased risk of suicidal thoughts and attempts. The study was not designed to understand why this might be the case. The researchers suggest it may be due to the fact that cyberbullies often don't observe and understand the effects of their bullying on the victims. "At a time when young adolescents are spending more time online than ever before, this study underscores the negative impact that bullying in the virtual space can have on its targets," Barzilay says. "It may be prudent for primary care providers to

screen for cyberbullying routinely in the same way that they might screen for other suicide risk factors like depression. Parents and educators should also be aware of this risk factor."

Contention 2: Environment

Generative AI causes greenhouse emissions ==Zewe 25==

Zewe, Adam. "Explained: Generative AI's Environmental Impact." MIT News | Massachusetts Institute of Technology, Jan. 2025, news.mit.edu/2025/explained-generative-ai-environmental-impact-0117. //Adam Zewe is a writer for Massachusetts Institute of Technology, covering the electrical engineering and computer science beat in the MIT News Office.//

Scientists have estimated that the power requirements of data centers in North America increased from 2,688 megawatts at the end of 2022 to 5,341 megawatts at the end of 2023, partly driven by the demands of generative AI. Globally, the electricity consumption of data centers rose to 460 terawatts in 2022. This would have made data centers the 11th largest electricity consumer in the world, between the nations of Saudi Arabia (371 terawatts) and France (463 terawatts), according to the Organization for Economic Co-operation and Development. By 2026, the electricity consumption of data centers is expected to approach 1,050 terawatts (which would bump data centers up to fifth place on the global list, between Japan and Russia). **While not all data center computation involves ==generative AI==, the technology has been a major ==driver of increasing energy demands.== "The demand for new data centers ==cannot be met in== a ==sustainable== way. The pace at which companies are building new data centers means the bulk of the electricity to power them must come from fossil fuel-based power plants," says Bashir. The power needed to train and deploy a model like OpenAI's ==GPT-3== is difficult to ascertain. In a 2021 research paper, scientists from Google and the University of California at Berkeley estimated the ==training process alone consumed 1,287 megawatt hours== of electricity (==enough to power== about ==120 average U.S. homes for a year==), ==generating== about ==552 tons of carbon dioxide.==** While all machine-learning models must be trained, one issue unique to generative AI is the rapid fluctuations in energy use that occur over different phases of the training process, Bashir explains. Power grid operators must have a way to absorb those fluctuations to protect the grid, and they usually employ diesel-based generators for that task.

Increasing impacts from inference

Once a generative AI model is trained, the energy demands don't disappear. Each time a model is used, perhaps by an individual asking ChatGPT to summarize an email, the computing hardware that performs those operations consumes energy. **Researchers have estimated that a ==ChatGPT== query ==consumes== about ==five times more electricity than== a ==simple web search.== "But an everyday user doesn't think too much about that," says Bashir.** "The ease-of-use of generative AI interfaces and the lack of information about the environmental impacts of my actions means that, as a user, I don't have much incentive to cut back on my use of generative AI." With traditional AI, the energy usage is split fairly evenly between data processing, model training, and inference, which is the process of using a trained model to make predictions on new data. **However, Bashir expects the electricity ==demands== of generative AI inference to ==eventually dominate== since these models are ==becoming ubiquitous== in so many applications, ==and== the electricity needed for inference ==will increase as== future versions of the ==models become larger and more complex.==** Plus, generative AI models have an especially short shelf-life, driven by rising demand for new AI applications. **Companies release ==new models every few weeks==, so the ==energy used to train== prior versions ==goes to waste==, Bashir adds. ==New models== often ==consume more== energy for training, since they usually have more parameters than their predecessors.** While electricity demands of data centers may be getting the most attention in research literature, the amount of water consumed by these facilities has environmental impacts, as well. **Chilled water is used to cool a data center by absorbing heat from computing equipment. It has been estimated that, for each kilowatt hour of energy a data center consumes, it would need two liters of water for cooling, says Bashir.** "Just because this is called 'cloud computing' doesn't mean the hardware lives in the cloud. Data centers are present in our physical world, and because of their water usage they have direct and

indirect implications for biodiversity," he says. The computing hardware inside data centers brings its own, less direct environmental impacts. While it is difficult to estimate how much power is needed to manufacture a GPU, a type of powerful processor that can handle intensive generative AI workloads, it would be more than what is needed to produce a simpler CPU because the fabrication process is more complex. A GPU's carbon footprint is compounded by the emissions related to material and product transport. There are also environmental implications of obtaining the raw materials used to fabricate GPUs, which can involve dirty mining procedures and the use of toxic chemicals for processing.

UNEP 24

https://www.facebook.com/unep. "AI Has an Environmental Problem. Here's What the World Can Do about That." UNEP, 2024, www.unep.org/news-and-stories/story/ai-has-environmental-problem-heres-what-world-can-do-about?form=MG0AV3. //The global authority for the environment with programmes focusing on climate, nature, pollution, sustainable development and more.//

Most large-scale AI deployments are housed in data centres, including those operated by cloud service providers. **These data centres can take a heavy toll on the planet. The electronics they house rely on a staggering amount of grist: making a 2 kg computer requires 800 kg of raw materials. As well, the microchips that power AI need rare earth elements, which are often mined in environmentally destructive ways, noted Navigating New Horizons. The second problem is that data centres produce electronic waste, which often contains hazardous substances, like mercury and lead.** Third, data centres use water during construction and, once operational, to cool electrical components. **Globally, AI-related infrastructure may soon consume six times more water than Denmark, a country of 6 million, according to one estimate. That is a problem when a quarter of humanity already lacks access to clean water and sanitation.** Finally, to power their complex electronics, **data centres that host AI technology need a lot of energy, which in most places still comes from the burning of fossil fuels, producing planet-warming greenhouse gases. A request made through ChatGPT, an AI-based virtual assistant, consumes 10 times the electricity of a Google Search, reported the International Energy Agency.** While global data is sparse, the agency estimates that in the tech hub of Ireland, the rise of AI could see data centres account for nearly 35 per cent of the country's energy use by 2026. Driven in part by the explosion of AI, the number of data centres has surged to 8 million from 500,000 in 2012, and experts expect the technology's demands on the planet to keep growing.

This will only increase Kanungo 23

Alokya Kanungo. "The Real Environmental Impact of AI | Earth.org." Earth.org, 18 July 2023, earth.org/the-green-dilemma-can-ai-fulfil-its-potential-without-harming-the-environment/#:~:text=Behind%20the%20scenes%20of%20AI's,gas%20emissions%2C%20aggravating%20climate%20change. Accessed 20 Feb. 2025.
[Alokya Kanungo: writer and nature photographer with ongoing Ph.D. in "Scientific Correlation between the Impact of Climate Change on Soil Health and Sustainable Agriculture" from K.I.I.T. University and an M.Phil. in Geography; expert on environmental research and policymaking]

As datasets and models become more complex, the energy needed to train and run AI models becomes enormous. This increase in energy use directly affects greenhouse gas emissions, aggravating climate change. **According to OpenAI researchers, since 2012, the amount of computing power required to train cutting-edge AI models has doubled every 3.4 months. By 2040, it is expected that the emissions from the Information and Communications Technology (ICT) industry as a whole will reach 14% of the global emissions**, with the majority of those emissions coming from the ICT infrastructure, particularly data centres and communication networks. These data demonstrate the urgent need to address AI's carbon footprint and role in environmental deterioration. **Recently, a study was conducted by researchers at the University of Massachusetts to determine how much energy is used to train certain popular large AI models. According to the results, training can produce about 626,000 pounds of carbon dioxide, or the equivalent of around 300 round-trip flights between New York and San Francisco – nearly 5 times the lifetime emissions of the average car.**

Sorkin et. al 24 [Sorkin, Andrew Ross, Mattu, Ravi, Warner, Bernhard, Kessier, Sarah, de la Merced, Michael J, Hirsch, Lauren, Livni, Ephrat, 5-6-2024, "How Bad Is A.I. for the Climate?" New York Times,

Tech's energy needs are coming into focus as investors get to grips with how much of an "energy hog" generative A.I. is becoming. **Analysts** at Wells Fargo **see the <mark>A.I. boom helping to push</mark> up <mark>U.S. electricity demand by</mark> as much as <mark>20 percent by 2030</mark>**. Shares in Dominion Energy rose last week after the company said it expected to supply 15 new data centers this year, some requiring a gigawatt or more of electricity. (For perspective, a gigawatt powers about 750,000 homes.) And Microsoft announced a $10 billion green-energy deal with Brookfield Asset Management to supply electricity to some of its data centers. Reporting earnings on Tuesday is Duke Energy, another utility with a big data center business. **But the A.I. revolution will <mark>largely run on fossil fuels.</mark>** There's a push underway to ensure that this increased energy demand is met with lower-carbon sources — consider the Microsoft initiative, or Amazon's $650 million acquisition of a Pennsylvania center that sits next to one of the biggest U.S. nuclear power plants. However, <mark>A.I. power demands</mark> **are <mark>likely to be fulfilled largely by natural gas this decade</mark>**, according to the Wells Fargo analysts. That could throw the climate pledges of utilities and tech giants alike into disarray. Surya Hendry, an analyst at Rystad Energy, wrote in a research note last month that "rising data center demand creates a tough problem for utility companies, technology companies and policymakers who want clean energy."

IMPACT: Climate Change <mark>WHO 23</mark>

World. "Climate Change." Who.int, World Health Organization: WHO, 12 Oct. 2023, www.who.int/news-room/fact-sheets/detail/climate-change-and-health. Accessed 20 Feb. 2025.//The World Health Organization (WHO) is a specialized agency of the United Nations responsible for global public health.//

It further reveals that <mark>3.6 billion people</mark> already live <mark>in areas</mark> highly <mark>susceptible to climate change.</mark> Despite contributing minimally to global emissions, low-income countries and small island developing states (SIDS) endure the harshest health impacts. In vulnerable regions, the death rate from extreme weather events in the last decade was 15 times higher than in less vulnerable ones. Climate change is impacting health in a myriad of ways, including by <mark>leading to death and illness from</mark> increasingly frequent <mark>extreme weather</mark> events, such as heatwaves, storms and floods, the <mark>disruption of food</mark> systems, <mark>increases in</mark> zoonoses and food-, water- and vector-borne <mark>diseases, and mental health issues</mark>. Furthermore, climate change is undermining many of the social determinants for good health, such as livelihoods, equality and access to health care and social support structures. These climate-sensitive health <mark>risks</mark> are <mark>disproportionately felt by</mark> the most <mark>vulnerable and disadvantaged</mark>, including women, children, ethnic minorities, poor communities, migrants or displaced persons, older populations, and those with underlying health conditions. Although it is unequivocal that climate change affects human health, it remains challenging to accurately estimate the scale and impact of many climate-sensitive health risks. However, scientific advances progressively allow us to attribute an increase in morbidity and mortality to global warming, and more accurately determine the risks and scale of these health threats. **WHO data indicates 2 billion people lack safe drinking water and 600 million suffer from foodborne illnesses annually, with children under 5 bearing 30% of foodborne fatalities. Climate stressors heighten waterborne and foodborne disease risks. In 2020, 770 million faced hunger, predominantly in Africa and Asia. Climate change affects food availability, quality and diversity, exacerbating food and nutrition crises. Temperature and precipitation <mark>changes enhance</mark> the <mark>spread of vector-borne diseases.</mark> Without preventive actions, <mark>deaths from such</mark> diseases, currently over 700 000 annually, <mark>may rise.</mark>** Climate change induces both immediate mental health issues, like anxiety and post-traumatic stress, and long-term disorders due to factors like displacement and disrupted social cohesion. **Recent research attributes <mark>37% of heat-related deaths to</mark> human-induced <mark>climate change.</mark> Heat-related deaths among those over 65 have risen by 70% in two decades. <mark>In 2020, 98 million more experienced food insecurity compared to</mark> the 1981–<mark>2010 average.</mark> The WHO conservatively projects <mark>250 000 additional yearly deaths by</mark> the <mark>2030s due to climate change</mark> impacts on diseases like malaria and coastal flooding.** However, modelling challenges persist, especially around capturing risks like drought and migration pressures. **The climate crisis threatens to undo the last 50 years of progress in development, global health and poverty reduction, and to further widen existing health inequalities between and within populations.** It severely jeopardizes the realization of UHC in various ways, including by compounding the existing burden of disease and by exacerbating existing barriers to accessing health services, often at the times when they are most needed. **Over 930 million people – around 12% of the world's population – spend at least 10% of their household**

budget to pay for health care. With the poorest people largely uninsured, ==health shocks and stresses== already currently ==push== around ==100 million people into poverty every year==, with the impacts of climate change worsening this trend.

Gen-AI also uses a lot of water Dhanani 24

Dhanani, Roma. "Environmental Impact of Generative AI | Stats & Facts for 2025." The Sustainable Agency, 27 Sept. 2024, thesustainableagency.com/blog/environmental-impact-of-generative-ai/?form=MG0AV3. Accessed 20 Feb. 2025.

But another study already states that roughly ==25% of data center workloads== are ==related to machine learning.== (Nature Climate Change, 2022) ==By 2030, data centers== are predicted to ==emit triple== the amount of ==CO2 annually than== it would have ==without== the boom in ==AI development.== The amount of GHG emissions predicted, 2.5 billion tonnes, equates to roughly 40% of the U.S's current annual emissions. (Morgan Stanley, 2024) The computing power required for AI is doubling every 100 days and is projected to increase by more than a million times over the next 5 years. (SPJ, 2023) A short conversation of 20-50 questions and answers with ChatGPT (GPT-3) costs half a liter of fresh water. (arXiv, 2023) ==Training GPT-3== in Microsoft's U.S. data centers ==can== directly ==evaporate 700,000 liters of== clean fresh ==water.== That's ==enough== water ==to produce 370 BMW cars== or 320 Tesla electric vehicles. Although, the "when" and "where" of training a large AI model can significantly affect the water footprint. (arXiv, 2023) ==Google's data centers in The Dalles, Oregon consume more than a quarter of all== the ==water== used ==in the city.== (Oregon Live, 2023) ==All told, a mid-sized data center consumes== around ==300,000 gallons== of water ==a day==, or about as much as ==1,000 U.S. households==, says Shehabi of Lawrence Berkeley National Laboratory. Their direct, on-site consumption ranks ==data centers among== the ==top 10 water users in America=='s industrial and commercial sectors. (NPR, 2022) Although, some studies say the **proportion of data center water consumption (**==1.7 billion liters/day==) is small compared to total water consumption (1218 billion liters/day), at least in the U.S. (Nature, 2021)

We are already in a water crisis Rao 24

Rao, Devika. "The US Is Facing a Groundwater Crisis." Theweek, The Week, Feb. 2024, theweek.com/environment/groundwater-crisis-united-states. Accessed 20 Feb. 2025.//Devika Rao has worked as a staff writer at The Week since 2022, covering science, the environment, climate and business.//Dr. Rao received her medical degree from Baylor College of Medicine//

Much of the U.S.'s development over the last few centuries was thanks to the country's bountiful supply of groundwater aquifers. Unlike rivers and lakes, aquifers hold freshwater underground, and that freshwater is then pumped out of the aquifers for irrigation and drinking. **According to the U.S. Geological Survey (USGS)**, surface water can be "scarce or inaccessible," while **"**==groundwater supplies== many of the hydrologic needs of people everywhere," acting as a "source of drinking water for about ==half== the ==total population== and nearly all of the rural population," and "==providing over 50 billion gallons per day for agricultur==al needs."** Despite groundwater being an integral part of American life, access to groundwater is on borrowed time. **"Huge ==industrial farms and== sprawling ==cities== are ==draining aquifers== that could take ==centuries or millenniums to replenish== themselves if they recover at all," according to an analysis by The New York Times.** Many regions of the country are experiencing groundwater depletion because the aquifers are being pumped faster than they can be replenished. **Approximately ==45% of== the ==water wells== examined in the Times analysis "showed a statistically ==significant decline in== water ==levels since 1980==," with ==40% reaching== "==record-low== water ==levels== during the past decade."** Warigia Bowman, a law professor and water expert at the University of Tulsa, called the depletion a "crisis" to the Times, adding that **"there will be ==parts of== the ==U.S. that== ==run out of drinking water.==" Groundwater depletion can lead to a number of environmental consequences. Water wells can dry up over time; the level of water in streams and lakes can be reduced; land subsidence, which is when the soil collapses, compacts and drops because water is removed, can become more common; and water quality can deteriorate, according to the USGS.** There could also be several social repercussions including, **"lower property values, higher water bills,**

limits on development, failing farms and giant sinkholes opening up in the ground we live on," John Sabo, director of the ByWater Institute at Tulane University, wrote for Forbes.

IMPACT: Water crisis <mark style="background:#00FF00">US Mission to UN 23</mark>

States, United. "FACT SHEET: United States Announces $49 Billion in Commitments to Global Water Security and Sanitation." United States Mission to the United Nations, 22 Mar. 2023, usun.usmission.gov/fact-sheet-united-states-announces-49-billion-in-commitments-to-global-water-security-and-sanitation/#:~:text=Today%2C%20more%20than%20two%20million,compared%20to%20non%2DNative%20households. Accessed 20 Feb. 2025.//The U.S. Mission to the United Nations (USUN) serves as the United States' delegation to the United Nations.//

Today, ==more than two million Americans lack access to clean drinking water== at home, and ==more than one million== Americans ==don't have== the ==plumbing== required ==to flush a toilet.== Native American households are 19 times more likely to lack indoor plumbing, compared to non-Native households. Nearly ==a quarter== of ==U.S. households on private wells have contaminants in== their ==water==, like arsenic or e. coli, that pose a risk to household and community health. Worldwide, one in four people lack access to safe water in their homes. Nearly half of the world's population do not have a hygienic toilet at home, and one third of people globally can't wash their hands with soap and water at home. This burden is disproportionately felt by women and children, whose educational and economic opportunities suffer as a result, creating a cycle of poverty. **Stressors such as ==climate change==, coupled with poor governance and management of water resources overall, ==hasten== both the frequency and intensity of water crises within the United States and globally. The significance of water security in U.S. foreign policy and national security goals is coming into sharper focus. The United States recognizes that ==global water security is essential to== our ==national security==**, and President Biden has laid out an innovative, whole-of-government approach to address the full scope of global water issues and mobilize U.S. departments and agencies around concrete actions to achieve our vision of a water-secure world. **Investments in water and sanitation safeguard our public health and economic growth, enable us to respond to climate change and natural disasters, prevent conflicts, reduce the risk of famine and hunger, and create jobs at home and abroad.**

Rebuttal Blocks:

<mark style="background:#00FF00">Linewize 24</mark>

"The Use of AI Deepfakes in Cyberbullying." Linewize.com, 2024, https://doi.org/10551943129/1705566587263/module_10551943129_module_families_blog_heromenu_edu. Accessed 17 Mar. 2025.
[<mark style="background:#00FF00">Linewize</mark>: provides the world's most comprehensive suite of child cyber safety and wellbeing solutions]

Research shows that ==generative AI== is ==being used to produce== Child Sexual Abuse Material (==CSAM==) ==at alarming rates. In 2023==, the National Center for Missing and Exploited Children (==NCMEC==) ==received 4,700 reports of CSAM that involved gen==erative ==AI.== Serious risks arise when children are featured in sexually explicit imagery or videos. Content of this nature has the same harmful effects, and is no less illegal, whether it's 'real' or AI-generated. Students are more likely to employ AI for academics
When we ask youth directly about how they and their peers use generative AI, some hopeful findings emerge. In a recent Thorn report, 80% of teen respondents said they don't have friends or classmates who have ever used AI tools to generate nudes of other children.

For the majority (53%) of teens and tweens, getting help with homework is the primary reason they have used AI in 2024, according to a Common Sense report. However, students are worried about deepfakes and cyberbullying

Despite the hopeful picture painted by these numbers, the same report revealed that ==most students (62%)== are ==worried about== the ==potential for gen==erative AI ==to be used for bullying—as== are ==parents.== While there have 'only' been a handful of high-profile incidents where deepfake technology was used for harassment, **even a handful is too many. These ==incidents== are deeply unsettling, and ==highlight== just ==how accessible== this ==tech==nology ==is for young people.==** Deepfake technology is becoming more accessible

==**In 2024, AI**==**-supported ==search engines and chatbots== were the ==most-often used tools by youth== aged ==13-18== (==followed by image and video generators== in third and fourth place, respectively). It's not difficult for young people to find generative AI tools.** Many of them are advertised on social media platforms, despite violating those platforms' Terms of Use. It only takes a simple browser search to encounter posts from platforms like Reddit, which name (and even rank in 'quality') these nudify tools. **In a recent lawsuit, the office of the San Francisco City Attorney revealed that a list of 16 "nudify" websites were visited more than 200 million times between January and June 2024. Without ==regulations== in place, the ==number of students flocking to gen==erative ==AI will== continue to ==grow.== After all, it took ChatGPT only two months to amass a monthly active user base of 100 million** (a milestone that took TikTok nine months and Instagram 2.5 years to reach).

The majority of Gen AI usage is already education

Nagelhout 24 [Nagelhout, Ryan, 9-10-2024, "Students Are Using AI Already. Here's What They Think Adults Should Know," Harvard Graduate School of Education, https://www.gse.harvard.edu/ideas/usable-knowledge/24/09/students-are-using-ai-already-heres-what-they-think-adults-should-know, accessed 3-3-2025] // CW

In the report's quantitative study, **half** (51%) **of young people** ages 14–22 **reported using gen**erative **AI** at some point, but only 4% claimed to be daily users. **The most commonly reported use** for AI **was getting information (53%) and brainstorming (51%).** The study also noted that Black and Latinx young people were "significantly more likely" to use AI than others surveyed. Many noted generative AI can help teens get answers to questions they may be too afraid to ask adults, or for guidance on what to say in conversations. While hallucinations and the risk of incorrect information dissemination remains a serious concern of generative AI models, many study participants said they use generative AI platforms and get answers for important questions they may be afraid to ask the adults in their lives. "Parents should know that AI gives teens advice on any subject that it is asked, appropriate or not," warned one teen surveyed.

==**Sorkin**== **et. al** ==24== [Sorkin, Andrew Ross, Mattu, Ravi, Warner, Bernhard, Kessier, Sarah, de la Merced, Michael J, Hirsch, Lauren, Livni, Ephrat, 5-6-2024, "How Bad Is A.I. for the Climate?" New York Times, https://www.nytimes.com/2024/05/06/business/dealbook/ai-power-energy-climate.html, accessed 3-3-2025] // CW

Tech's energy needs are coming into focus as investors get to grips with how much of an "energy hog" generative A.I. is becoming. **Analysts** at Wells Fargo **see the ==A.I. boom helping to push== up ==U.S. electricity demand by== as much as ==20 percent by 2030==**. Shares in Dominion Energy rose last week after the company said it expected to supply 15 new data centers this year, some requiring a gigawatt or more of electricity. (For perspective, a gigawatt powers about 750,000 homes.) And Microsoft announced a $10 billion green-energy deal with Brookfield Asset Management to supply electricity to some of its data centers. Reporting earnings on Tuesday is Duke Energy, another utility with a big data center business. **But the A.I. revolution will ==largely run on fossil fuels.==** There's a push underway to ensure that this increased energy demand is met with lower-carbon sources — consider the Microsoft initiative, or Amazon's $650 million acquisition of a Pennsylvania center that sits next to one of the biggest U.S. nuclear power plants. However, ==**A.I. power demands**== **are ==likely to be fulfilled largely by natural gas this decade==**, according to the Wells Fargo analysts. That could throw the climate pledges of utilities and tech giants alike into disarray. Surya Hendry, an analyst at Rystad Energy, wrote in a research note last month that "rising data center demand creates a tough problem for utility companies, technology companies and policymakers who want clean energy."

Answer: Administration is banning AIs like deepseek ==Reuters 25==

Reuters. "US Mulling a Ban on Chinese App DeepSeek from Government Devices, Source Says." Reuters, 7 Mar. 2025, www.reuters.com/technology/us-likely-ban-chinese-app-deepseek-government-devices-wsj-reports-2025-03-07/.//No Author//Anderson

WASHINGTON, March 7 (Reuters) - **The Trump administration is weighing a ban on Chinese AI chatbot DeepSeek from U.S. government devices over national-security concerns**, a person familiar with the matter said on Friday.

U.S. officials are worried about DeepSeek's handling of user data, which the company says it stores in servers located in China, according to the Wall Street Journal, which first reported the news.

Administration officials are also considering banning the chatbot from app stores and putting limits on how U.S.-based cloud service providers could offer DeepSeek's AI models to their customers, the Journal said, addingb that those discussions are still at an early stage.

Answer: Only rich schools will be able to afford this AI ==Klopfer 11 months ago==

Klopfer, Eric, et al. Generative AI and K-12 Education: An MIT Perspective. Mar. 2024, https://doi.org/10.21428/e4baedd9.81164b06. Accessed 3 Mar. 2025.
[==Eric Klopfer==: Professor and Director of the Scheller Teacher Education Program and The Education Arcade at MIT. He is also a co-faculty director for MIT's J-WEL World Education Lab. His work uses a Design Based Research methodology to span the educational technology ecosystem, from design and development of new technologies to professional development and implementation.]

Schools will not be able to move forward effectively without systematic support. **History tells us that the ==schools with== the ==most resources==—with reasonable classroom sizes, with enough substitutes, with clean and safe buildings, with technologists and instructional coaches, with professional development budgets—will ==adapt to disruptive technologies most effectively.==** Some teachers and schools in less-resourced districts will do brilliant work, but on the whole, wealthier schools in ==wealthier communities== will ==have== the ==greater advantage== when it comes to ==realizing== the ==benefits of generative AI.== **Without additional support and investment, ==less-resourced schools in poorer neighborhoods== are ==more likely to encounter== the ==detrimental aspects of AI without== the ==same benefits== realized by wealthier schools, thus ==widening== the ==disparity in education==al experiences.** School districts have some resources to deploy, but many are strained. They will need curricula, guidelines, and advice but also financial resources to support professional development, new devices, technical support, adequate staffing, and an adequate substitute pool. (Many teachers' planning periods are routinely "stolen" as they are compelled to substitute for sick or absent colleagues). Teachers will need more planning time to thoughtfully adapt. We need to make sure access, training, and curriculum is made available to increase equity. Who can pitch in? Education technology companies? AI companies? Governments? NGOs? This requires a team effort.

Schools buy Gen AI not for education, but to stay ahead ==Watkins 25==

Watkins, Marc. "The Costs of AI in Education." Substack.com, Rhetorica, 21 Feb. 2025, marcwatkins.substack.com/p/the-costs-of-ai-in-education. Accessed 28 Mar. 2025.
[==Marc Watkins==: Assistant Director of Academic Innovation, Director of the Mississippi AI Institute, Lecturer of Writing and Rhetoric at the University of Mississippi]

So what exactly are ==universities purchasing== when they invest in AI? More administrative oversight. Far more expensive infrastructure that ==only the wealthiest R1 and private universities can afford.== Meanwhile, ==smaller universities and community colleges==—already stretched thin—are ==left scrambling to keep pace== in a race that **has no finish line. What's so sad about all of this is the ==decisions to adopt AI aren't about== improving ==education.==** It's all about optics. We don't have the long-term research to suggest AI helps learning to make these kinds of moves. ==Universities==

simply **don't want to be seen as lagging behind.** **Every institution that can want to claim they're on the cutting edge, coherent strategy for AI integration be damned. And that's a huge cost—untold resources funneled into AI contracts instead of actual student learning, faculty support, or meaningful research.** Generative AI doesn't have to be sold as the future of education to be a useful tool. That sort of hype is just the latest tech industry hollow sales pitch, using the familiar language of equity and innovation. **If universities don't start asking harder questions about AI's real value, they'll keep spending money they don't have on tools their students don't need—while real educational challenges go unresolved.**

T-AI has implicit biases against people with disabilities.

Fetzer 23 [Fetzer, Mary. "Trained AI Models Exhibit Learned Disability Bias, IST Researchers Say | Penn State University." Psu.edu, Penn State University, 30 Nov. 2023, www.psu.edu/news/information-sciences-and-technology/story/trained-ai-models-exhibit-learned-disability-bias-ist. Accessed 1 Mar. 2025.] UNIVERSITY PARK, Pa. — A growing number of organizations are using sentiment analysis tools from third-party artificial intelligence (AI)

services to categorize large amounts of text into negative, neutral or positive sentences for social applications ranging from health care to policymaking. These tools, however, are driven by learned associations that often contain biases against persons with disabilities, according to researchers from the Penn State College of Information Sciences and Technology (IST). In the paper "Automated Ableism: An Exploration of Explicit Disability Biases in Artificial Intelligence as a Service (AIaaS) Sentiment and Toxicity Analysis Models," researchers detailed an analysis of biases against people with disabilities contained in the natural language processing (NLP) algorithms and models they tested. The work, led by Shomir Wilson, assistant professor in IST and director of the Human Language Technologies Lab, received the Best Short Paper Award from the 2023 Workshop on Trustworthy Natural Language Processing at the 61st Annual Meeting of the Association for Computation Linguistics, held July 9-14 in Toronto, Canada. "We wanted to examine whether the nature of a discussion or an NLP model's learned associations contributed to disability bias," said Pranav Narayanan Venkit, a doctoral student in the College of IST and first author on the paper. "This is important because real-world organizations that outsource their AI needs may unknowingly deploy biased models." "Organizations that outsource their AI needs may unknowingly deploy biased models." Pranav Narayanan Venkit, doctoral student in the College of IST The researchers defined disability bias as treating a person with a disability less favorably than someone without a disability in similar circumstances and explicit bias as the intentional association of stereotypes toward a specific population. A growing number of organizations are using AIaaS, or Artificial Intelligence as a Service, for easy-to-use NLP tools that involve little investment or risk for the organization, according to the researchers. Among these tools are sentiment and toxicity analyses that enable an organization to categorize and score large volumes of textual data into negative, neutral or positive sentences. Sentiment analysis is the NLP technique for extracting subjective information — thoughts, attitudes, emotions and sentiments — from social media posts, product reviews, political analyses or market research surveys. Toxicity detection models look for inflammatory or content — such as hate speech or offensive language — that can undermine a civil exchange or conversation. The researchers conducted a two-stage study of disability bias in NLP tools. They first studied social media conversations related to people with disabilities, specifically on Twitter and Reddit, to gain insight into how bias is disseminated in real-world social settings. They crawled blog posts and comments from a one-year period that specifically addressed perspectives on people with disabilities or contained the terms or hashtags "disability" or "disabled." The results were filtered and categorized and then statistically analyzed with popular sentiment and toxicity analysis models to quantify any disability bias and harm present in the conversations. "Statements referring to people with disabilities versus other control categories received significantly more negative and toxic scores than statements from other control categories," said contributing author Mukund Srinath, a doctoral student in the College of IST. "We wanted to test whether these biases arise from discussions surrounding conversations regarding people with disabilities or from associations made within trained sentiment and toxicity analysis models and found that the main source of bias disseminated from the models rather than the actual context of the conversation." The researchers then created the Bias Identification Test in Sentiment (BITS) corpus to help anyone identify explicit disability bias in in any AIaaS sentiment analysis and toxicity detection models, according to Venkit. They used the corpus to show how popular sentiment and toxicity analysis tools contain explicit disability bias. "All of the public models we studied exhibited significant bias against disability," Venkit said. "There was a problematic tendency to classify sentences as negative and toxic based solely on the presence of disability-related terms, such as 'blind,' without regard for contextual meaning, showcasing explicit bias against terms associated with disability."

Answer: Ai weakens skills

Fan, Leanne. "AI Reduces Critical Thinking." *The Nexus*, 2015, wvnexus.org/opinions/ai-reduces-critical-thinking/. Accessed 19 Feb. 2025.

==A study== by **Dr. Ahmed, assistant professor in engineering management** ==collected survey data from 285 students and found that 68.9% of laziness and 27.7% of the loss of decision-making skills were the result of artificial intelligence use==. A sampling technique was used that gathered survey data from students who either used or didn't use AI. Most students used AI for collecting and analyzing data, answering questions, and task automation. The results were found to be convergently valid and reliable, with multiple pieces of evidence supporting the fact that using AI negatively affects the development of critical thinking skills.

Turn: GenAI usage kills critical thinking

Fonkam et al. 24 [Mathias Fonkam, PhD in computer science and Associate Teaching Professor @ Penn State University with over 20 years of experience in computer science education, xx-xx-2024, Risks of AI-Assisted Learning on Student Critical Thinking: A Case Study of Albania, International Journal of Risk and Contingency Management, https://www.igi-global.com/article/risks-of-ai-assisted-learning-on-student-critical-thinking/350185] BZ

INTRODUCTION

Artificial Intelligence (AI) has increasingly become a transformative force in the education sector, offering unprecedented opportunities to enhance learning experiences and outcomes (Bates et al., 2020; Çela et al., 2024). AI-assisted learning systems promise to revolutionize traditional educational paradigms including offering personalized learning pathways and real-time feedback mechanisms (Bates et al., 2020). However, alongside these advancements, there are growing concerns about the potential adverse effects of AI on critical cognitive skills, particularly critical thinking (Essel et al., 2024; Iqbal & Iqbal, 2024; Parsakia, 2023). This study examines these concerns through a focused examination of AI-assisted learning's impact on student critical thinking within the context of Albania's educational landscape. **Critical thinking is a fundamental skill, essential for problem-solving, decision-making, and the ability to analyze and synthesize information effectively** (Dwyer et al., 2014). Critical thinking is vital for students to develop these skills to navigate an increasingly complex and information-rich world (Kitsantas et al., 2019). However, there is a growing body of literature suggesting that AI-assisted learning, while beneficial in many aspects, may inadvertently **undermine the development of critical thinking skills**. This issue arises from the tendency of AI systems to provide readily available solutions and information, potentially discouraging students from engaging deeply with the learning material and developing their analytical abilities.

Education **is** a fundamental pillar of society, shap**ing** the actions of new gen**erations** and preparing them to confront future challenges. An educated populace facilitates national development and accelerates improvements across various sectors. In a dynamic society, the acquisition of new knowledge and tools is essential, particularly in the field of education. The integration of AI within the educational system has revolutionized numerous aspects of teaching and learning. AI has introduced novel methods for enhancing personalized learning, improving assessments, and reducing administrative burdens for educators (Ayala-Pazmiño, 2023). The adoption of AI tools in both preuniversity and university education is inevitable, as they provide efficient means for students to meet assignment deadlines and enable professors to generate tailored tasks that address specific student needs. Ayala-Pazmiño (2023) highlights the efficacy of AI in analyzing student data, thereby enabling the customization of learning experiences to individual requirements. The implementation of AI in education promises a more personalized and responsive approach to teaching, ultimately benefiting the educational process.

Despite the numerous benefits associated with AI in education, many educators recognize the potential risks related to data privacy and security. While students may not be fully aware of these risks, educators can discern the potential dangers associated with AI, particularly concerning the automated generation of outputs that may lack appropriate context or accuracy (Cardona, Rodríguez, & Ishmael, 2023). Consequently, AI tools are seen as critical instruments for redefining classroom dynamics and enhancing student engagement in the teaching-learning process (Pavlenko & Syzenko, 2024). However, the extent to which AI tools represent an advantage or a drawback for educational systems remains unclear. Instructors and administrators grapple with determining whether the use of AI tools by students in their assignments might undermine their problem-solving skills and reduce their capacity to independently address complex issues. Conversely, students, who are the primary users of these tools, often perceive AI as significantly aiding their comprehension of complex concepts, irrespective of their field of study. This study aims to investigate the impact of AI tools on students' problem-solving skills and to assess the extent to which these tools assist students in understanding and completing assignments. Through this study, a comprehensive analysis of the benefits and drawbacks of AI usage in education, with a focus on its implications for student learning outcomes and problem-solving abilities.

This study employs a quantitative methodology to explore the risks associated with AI-assisted learning on critical thinking. A survey of 53 students was conducted in an educational institution in Albania to gather data on their experiences and perceptions regarding AI-assisted learning and its impact on their critical thinking skills. This approach allowed us to systematically measure and analyze the influence of AI tools on the cognitive development of students. The Albanian educational system presents a unique context for this investigation. As a country in the midst of educational reforms (Çela, 2022; Fetahu & Cela, 2022) and technological integration, Albania offers a valuable case study to examine the broader implications of AI in education. This research seeks to identify specific challenges and opportunities within this context, contributing to an understanding of AI's role in shaping critical thinking skills. Through this study, the complex relationship between AI-assisted learning and student critical thinking was examined, providing insights that can inform educators, policymakers, and technology developers. Ultimately, the goal is to ensure that the integration of AI in education enhances rather than hinders the development of essential cognitive skills, promoting a generation of learners who are both technologically adept and critically proficient.

BACKGROUND

In recent years, society has encountered significant challenges in adapting to continuous technological advancements, largely due to the **absence of comprehensive guidelines** for their implementation. The **educational** sector, inherently linked to the development of future generations, is profoundly affected by these changes. In Albania, legislative efforts have aimed to address these challenges (Fetahu & Cela, 2022). In 2012, Albania introduced a new law on the pre-university education system, designed to enhance the teaching-learning process by aligning it with the needs of students and the broader society (Fetahu & Cela, 2022). This was followed by a 2015 law on higher education, which intended to improve students' professional and soft skills (Çela, 2022). Since the enactment of

these laws, numerous bylaws have been implemented annually to facilitate their application. Notably, the pre-university education law emphasizes the integration of technological tools into curricula from an early age. While this aims to familiarize students with technology, there is a growing concern that the <u>misuse of</u> these tools <u>for tasks, assignments, or projects may erode students' critical thinking skills</u>. <u>Critical thinking is essential in higher education, where students must integrate theoretical and practical knowledge to succeed in their careers</u>. Therefore, interventions are necessary to ensure students use technological tools appropriately without compromising their foundational knowledge and critical thinking development.

In response to these concerns, Albania has initiated various programs to enhance technological skills in pre-university education. The "21st Century Schools" program, a partnership between the UK government and Albanian educational institutions, aims to boost the critical thinking and problem-solving skills of students aged 10-15 through programming (Çela et al., 2024). This program provides schools with micro-bit devices, which are small, programmable computers that enable students to solve problems innovatively and engagingly. Similarly, the Albanian-American Development Foundation (AADF) has funded programs to enhance students' programming and technology skills (Fetahu & Cela, 2022). The vision of the Ministry of Education and educational institutions emphasizes that learning to code in pre-university education prepares students for a rapidly evolving technological world (Fetahu & Cela, 2022). While programming skills are directly applicable in many professions and advantageous in numerous others, an exclusive focus on programming can limit students' career paths, directing them towards specific skill sets. This is evident in the increasing number of students opting to study computer science or software engineering in university, driven by their early exposure to these fields.

Despite the benefits of technological tools in education, their improper use can lead to a decline in critical thinking skills in other areas. The rapid introduction of new technological tools often lacks accompanying guidelines, as seen with the implementation of AI. Though AI has the potential to offer significant educational benefits, its misuse can adversely affect the development of critical thinking skills. This study aims to explore the impact of AI tools on students' problem-solving abilities and assess their effectiveness in helping students understand and complete assignments. By providing a comprehensive analysis of the advantages and drawbacks of AI in education, this research seeks to inform strategies for integrating technology into the educational system without undermining essential cognitive skills.

REVIEW OF LITERATURE

AI, a subset of computer science, focuses on understanding the nature of intelligence and creating intelligent machines that simulate, extend, and enhance human capabilities (Huang & Qiao, 2024; Saheed et al., 2021). The benefits of technology are undeniable however, its extensive and unguided use has introduced significant challenges in the teaching and learning process, particularly in nontechnical study programs. Additionally, the pervasive use of AI tools has been linked to the erosion of students' soft skills, including critical thinking. One of the most prominent AI tools used by students is ChatGPT. Given the educational system's experiences with technological tools, it is acknowledged that these tools have facilitated learning processes and aligned closely with student and societal needs. However, their impact on critical thinking skills has been problematic, often resulting in student complacency and reduced motivation to engage deeply with assignments.

Machine learning systems, such as ChatGPT, can be particularly effective for problems where the rules for generating outcomes are unknown and must be inferred from data. Conversely, rule-based AI approaches manipulate data based on predefined logical propositions, which can be advantageous for problems where the rules are known but their application is cumbersome (Gillani et al., 2023). ChatGPT allows students to pose questions and receive text-based answers, simulating human-like participation in discussions and task completion. The model's reliability stems from its training to recognize patterns and relationships in data without explicit human guidance. <u>However, reliance on AI-generated content can lead to superficial learning, where students memorize information for graduation rather than understanding it for future application. Moreover, ChatGPT's capacity to present preexisting biases or forms of discrimination can discourage students from developing **their own judgments** or statements, leading to biased learning experiences.</u> Well-explained AI responses may appear more credible to students, causing them to neglect their ideas, resulting in reduced critical thinking and increased laziness.

Pickell and Doak (2023) argue that rather than banning AI tools like ChatGPT, educators should guide students in using them beneficially. This involves leveraging AI to enhance critical thinking by analyzing real-life implications, ethical usage (Huang & Qiao, 2024), and improving assignments without taking AI-generated information at face value. Educators must provide well-structured guidelines to help students achieve educational goals through AI use. AI education aims to develop learners' mindsets and skills concerning AI, facilitating its understanding and application (Huang & Qiao, 2024). Practical training and manuals from technology experts are essential to prevent the decline of critical thinking skills among students. Such guidelines will help students grasp AI principles, experience AI's achievements, and implement AI applications effectively (Xiaodong & Chengche, 2022). By understanding AI's influence, educators can adapt their curricula and teaching methods to remain relevant in an AI-driven future (Vashista et al., 2023). Properly informed students and instructors can use ChatGPT to select appropriate information, adapt it to given instructions, provide reasonable arguments, and define limitations, thus enhancing critical thinking rather than diminishing it. Pusey-Reid and Ciesielski (2024) emphasize that AI usage in education enables the creation of complex and engaging simulations, providing students with immersive and interactive learning experiences. Interactive activities, such as writing responses to case scenarios and critically evaluating AI-generated outputs, promote critical thinking and enhance engagement and communication skills.

Another significant advantage of AI is its ability to aid in comprehending complex concepts (Vajjhala et al., 2021). When students use AI tools to explore study content and answer high-level cognitive questions, they provide rationales for their responses, deepening their understanding. It is crucial to teach students that AI is a tool to supplement, not replace, the in-depth study required for mastering essential concepts. Faculty members can also use AI to summarize class content and create accessible materials, promoting equitable access to education. Pavlenko and Syzenko (2024) note that the frequency of ChatGPT usage varies across disciplines, with higher usage among Information Technology (IT), Business, and Engineering students. These students rely on ChatGPT for information retrieval, brainstorming ideas, and improving grammar and punctuation. Ramirez and Esparrell (2024) highlight that AI tools can personalize learning by identifying student needs and tracking their progress, thereby developing problem-solving skills rather than merely generating information. Holmes and Tuomi (2022) believe that AI tools, combined with other technologies, can help create adaptive learning experiences tailored to individual student needs. This interaction enables students to identify and select appropriate information, thereby enhancing their learning experience. <u>The **i**mpact of AI on education</u> is significant and **will c**ontinue to grow (Alshahrani et al., 2024). Clear objectives and specific usage guidelines are essential to ensure that AI facilitates the development of problem-solving skills and critical thinking in students.

<u>**AI has become an** integral part of modern education, influencing teaching methodologies and learning outcomes. AI tools, such as intelligent tutoring systems, adaptive learning platforms, and automated feedback systems, have been credited with enhancing personalized learning experiences and improving academic performance.</u> Studies have demonstrated that AI can provide customized instruction tailored to individual learning needs, allowing students to progress at their own pace and receive immediate feedback on their performance (Holmes et al., 2019). <u>The development of critical thinking skills is crucial for students to navigate the complexities of the modern world.</u> Several researchers have explored

the relationship between AI-assisted learning and critical thinking development. AI-supported learning environments could promote critical thinking by engaging students in problem-solving activities and providing them with opportunities to reflect on their learning processes (Cope et al., 2021). However, there are concerns that AI tools might inadvertently hinder the development of critical thinking. Selwyn (2019) argues that the convenience and efficiency of AI systems might lead to passive learning, where students rely heavily on AI for solutions rather than actively engaging in critical analysis. This perspective is supported by empirical studies, such as that of Ouyang et al. (2022), which suggest that while AI tools can enhance learning efficiency, they may also reduce opportunities for deep cognitive engagement.

The analysis of the data also revealed several key findings regarding the impact of reliance on AI tools for assignments on students' problem-solving skills. The descriptive statistics as shown in Table 8 demonstrate that the mean reliance on AI tools for assignments was 2.17, with a standard deviation of 1.25. In comparison, the mean score for problem-solving skills was 3.06, with a standard deviation of 1.39. These statistics indicate a moderate level of reliance on AI tools and a slightly above-average self-assessment of problem-solving abilities among students. The Pearson correlation analysis revealed a correlation coefficient of -0.712 between reliance on AI tools and problem-solving skills, with a p-value of less than 0.000000001. This indicates a statistically significant negative relationship, suggesting that as students rely more on AI tools for their assignments, their problem-solving skills tend to decrease.

Further examination through linear regression analysis showed that the model explained 50.7% of the variance in problem-solving skills, with an R-squared value of 0.507. The regression coefficient for reliance on AI tools was -0.7918, with a p-value of less than 0.001. This coefficient indicates that for each unit increase in reliance on AI tools, there is an associated decrease of approximately 0.7918 units in problem-solving skills. The significant negative coefficient supports the hypothesis that increased reliance on AI tools negatively impacts problem-solving skills. The scatter plot shown in Figure 3 shows the correlation between reliance on AI tools for assignments and problem-solving skills. The scatter plot shows individual data points, and the black regression line indicates the negative correlation between the two variables. As reliance on AI tools increases, problem-solving skills tend to decrease, supporting the hypothesis (H3). Hypothesis testing using a t-test compared the levels of problem-solving skills among different levels of reliance on AI tools. The t-statistic was -2.618, with a p-value of 0.011, which is below the conventional threshold of 0.05. This result allows us to reject the null hypothesis and accept the alternative hypothesis (H3), confirming that reliance on AI tools for assignments significantly negatively impacts students' problem-solving abilities. The significant negative correlation and regression results underscore the importance of addressing the balance between using AI tools for efficiency and maintaining the development of independent problem-solving capabilities. These insights are critical for educators and policymakers aiming to integrate AI tools into educational practices without compromising essential cognitive skills.