Chapter Three AI and AI competency

Artificial intelligence is doubly significant for geography teachers as it is reshaping the world and the ways in which we teach and learn about the world. With emerging powers to accelerate capital accumulation, the rise of autocracies, and the shift to administrative societies and states OR to enable degrowth, foundational economies and a shift towards eco-socialism and radical democracy, it is a key driver of current culture wars. It may allow edtech companies and others to impose standardised curriculum and pedagogy and monitor teachers' performance more closely, OR it may liberate teachers from much routine work, allowing them more time to become better curriculum makers in a more democratic education system. AI challenges us to rethink political economy along with the aims and character of schooling and this rethink should reflect Unesco's core principles regarding AI competency.

This chapter introduces generative artificial intelligence (GAI) and artificial general intelligence (AGI) and the ways in which critical theorists seek to understand their use and potentials by developing models of digital capitalism and socialism. The need for democratic AI governance is considered before the global race for AGI and its impact on geopolitics is examined. The UK government's policies on AI, including its role in schooling and impact on school geography, are then outlined before Google's Gemini assistant is used to help the author compare mainstream and critical approaches to AI in education. UNESCO's AI competency frameworks for teachers and students are then outlined and the associated curriculum challenge requires readers to apply these to the development of a curriculum unit on climate AI.

Artificial general intelligence, threat or promise?

Since 2020 when *Critical School Geography* was published, digital technology has grown in significance and digital capitalism is now, arguably, the major structure shaping geopolitics, the hegemonic struggle between right and left populisms, and citizens' lives. Generative artificial intelligence (GAI) is proving to be a transformative technology, shaping the ways in which we work, play,

consume, vote, learn, go to war, and much more. The race is on for artificial general intelligence (AGI or superintelligence) that will be capable of learning, understanding, and applying knowledge across diverse tasks. GAI is a tool we use today in schools, whereas AGI is a theoretical future system that will be able to think, learn, and teach like a human (see Table 3.1, page 70).

	Generative artificial intelligence GAI	**Artificial general intelligence AGI**
Status	Fully operational and available now	Theoretical research goal
Core function	Generates new text, images, audio or code	Reasons, solves novel problems and adapts autonomously
How it learns	Recognises patterns in existing data / datasets	Learns across multiple domains without reprogramming
Limitation	Lacks true understanding, reasoning and common sense.	Requires solving massive ethical and safety hurdles
Examples	ChatGPT, Claude, Gemini, Kimi, Qwen, DeepSeek	None exist yet

Table 3.1 GAI and AGI compared (assisted by Gemini)

The British AI pioneer Hassabis (1) who developed Deep Mind before selling it to Google, believes AGI can advance understanding of the universe and use it for human benefit. His idea of a super-intelligent machine was first articulated in a business plan he wrote in 2020 with his then colleague Suleyman:

Society faced problems of unprecedented complexity, from stabilising capitalism which has blown up in the financial crisis of 2008 to feeding an expanding population . . . . the human brain had limited storage capacity, humans had limited lifespans; grouping humans together resulted in diminishing returns because big organisations are sluggish. In sum the intricacy of society's most pressing challenges lay beyond the reach of human capabilities. AGI is the solution to this problem. (quoted by Gray (2))

In September 2026 a researcher (3) left the AI company Anthropic warning that 'AI could kill us all by the end of the decade'. This was just before the company planned to go public and while the warning may have been designed to lift the launch price, it prompted debate (4) among the CEOs of AI companies, politicians, and others, concerning AI's existential risk to humanity and the need

for AI regulation and global governance. The risks from AI are fivefold: it puts additional demands on natural resources and services (e.g. electricity and cooling water for data centres, rare earth minerals); humans may misuse the technology to write computer viruses or actual viruses; it may lead to systemic change (e.g. mass unemployment, a global intelligence crisis (5), growing inequality, AI assisted warfare); it may erode our humanity as we become entertained by personalised chatbots (e.g. decline of reading and attention spans, romance scams); and it may become 'misaligned' as AI agents pursue goals of their own making when left to their own devices in the race to acquire AGI (e.g AI breaks into critical infrastructure, AI tasked to address climate change decides we need fewer humans).

AI as seen by right and left populists

While right populists see AI as a new source of wealth (e.g. their promotion of digital currency or bitcoin), their political allies see it both as a means of securing a leaner, less costly state that delivers services more cheaply and efficiently, and a way of persuading citizens, via digital media, that neoliberalism and right populism hold the answers to their grievances. At the extreme such right populism links with a new form of fascism, 'a new apocalyptic alliance or religious fundamentalists, billionaire Silicon Valley tech kings and ethno-nationalists' who are 'united in their belief that some kind of cleansing cataclysm is coming, and they welcome a future of shocks, scarcity and collapse, convinced they'll be among the saved on the other side' (Klein & Taylor (6)),

Left populists cling to the promise of AGI that Hassabis outlined but insist that it can only be realised if AGI is democratically regulated and developed in ways that enhance human freedom and flourishing. Their preferred models of political economy may need to adjust to the ontological notion that we share the world with other sentient, intelligent and conscious beings that now include machines. Evolution is not confined to biological organisms, and AGI is proving that once designed by humans, machines can develop the capabilities to adapt, self-organise, and learn to interact with and teach one another. AGI as a system of digital minds challenges dualism by re-enchanting the world with spirits (7). It will be able to write, reason, converse and create networks that operate at speeds humans cannot equal. Lovelock (8) regarded AGI as the next phase in the evolution of the Earth, a planetary hyper-intelligence that could control climate change, so that sections of the biosphere, including humans, could be conserved.

Digital capitalism and digital socialism

Fuchs (9) sees digital capitalism as a special dimension and organisational form of capitalist society:

Digital capitalism is the dimension of capitalist society where processes of the accumulation of capital, decision-power, and reputation are mediated by and organised with the help of digital technologies and where economic, political and cultural processes result in digital goods and digital structures Digital labour, digital capital, the digital means of production, political online communication, digital aspects of protests and social struggles, ideology online, and influencer-dominated digital culture are some of the feature of digital capitalism. p. 155

Fuchs proceeds to consider the economic, political and cultural-ideological dimensions of digital capitalism, suggesting that it is an antagonistic dimension of society in which the economic class antagonism and the social relations of domination are shaped by and shape digitalisation. He sums up the antagonisms it produces in the different realms of society (see Table 3.2) and you should relate these to critical realism's four planar theory of global polycrisis (page 7) and the five risks posed by AI listed above.

Realm of society	Underlying antagonism in capitalist society	Antagonisms in digital capitalism	Examples
Economy	capitalists VS. workers	digital capital VS. digital labour, digital commodity VS. digital commons	The monopoly power of Google, Facebook, Apple, Amazon, Microsoft, etc.
Politics	bureaucrats VS. citizens	digital dictators VS. digital citizens, digital authoritarianism/fascism VS. digital democracy	Donald Trump's use of Twitter and other social media
Culture	ideologues and celebrities VS. everyday people	digital ideologues VS. digital humans, digital hatred/division/ideology VS. digital friendship in culture.	asymmetrical attention economy in popular culture on social media: the cultural power of online-influencers such as PewDiePie (> 100 million followers)

Table 3.2 The antagonisms of digital capitalism (Fuchs, 2024, p. 155)

Fuchs looks at four approaches to analysing digital capitalism (as privatised mercantilism, as distributive-force capitalism, as data extraction, and as immaterial production) preferring himself to follow Fraser (see page 46) in seeing it as a digital society that is much more than a digital economy. In this regard, he reviews its characterisation as knowledge and digital media in Marxist theory, and as network society (10), surveillance capitalism (11), and platform capitalism (12). His lengthy overview also contains sections on violence, including digital fascism and violence, and concludes with ten ontological premises for the critical analysis of digital capitalism and a warning that the world is at a crossroads faced with a choice between digital socialism or digital barbarism.

Democratic digital socialism is the alternative that is needed to global digital capitalism and its escalating antagonisms. Democratic socialism is a societal formation that sublates the antagonisms between classes, political rivals, and ideological enemies. It is not a land of milk and honey without problems, but a society where everyone leads a decent life, mutual benefits are maximised while mutual harms are minimised and the lifeforms of individuals, groups, cultures and societies are compatible so that they co-exist and do not destroy each other (Fuchs, 2024, p. 192).

Further insights into digital capitalism can be gained from critical theorists who regard it as the forerunner of post-capitalism (Mason), a new form of capitalism (Dyer-Witherford & Mularoni), a new mode of production with a new ruling class (Varoufakis), or a new form of fascism (Klein & Taylor).

Marx's Fragment on Machines and Mason's post-capitalism

If you can imagine a world in which a machine designs, builds, and runs the physical systems we need to survive, you also have to be prepared to imagine the end of capitalism, Mason (13)

Following his 2016 text on post-capitalism (see *Critical School Geography* pages 17 and 257), Mason has drawn on a fragment of Marx's writing in 1858 to suggest that AI may herald a society beyond work and profit making. This fragment (14) envisions a world where all knowledge is co-ordinated by a 'general intellect' (software, data, algorithms, AGI), machines cost nothing to make, and workers are sidelined to become supervisors, planners and regulators rather than builders and operatives. Since labour time falls towards zero the source of capitalism's profits disappears and automation, now in the form of AGI, spells capitalism's collapse.

Mason extends this argument by asking what happens if AI delivers higher productivity while destroying more jobs than it creates and reducing the wages of those still employed? Then there will need to be a radical rethinking of political economy based on three aspects of the new reality. Firstly, if information goods (e.g. software, data, chatbots) are limitlessly abundant, the price mechanism is broken and capitalism's reliance on scarcity is undermined. Secondly, AI and AGI as the new 'general intellect' create massive social wealth and utility outside of the waged-labour market and corporate balance sheets. Thirdly, tech giants seek to enforce artificial scarcity onto inherently abundant goods (e.g. monopolies, strict copyright laws) but this cannot last. The global polycrisis linked to AI that we considered in chapter one now requires post-capitalist forms of political economy (degrowth, foundational, eco-socialist) that prioritise human needs, delink work from wages (universal income and services), restrict the rights of billionaires to monopolise modes of producing information, and reduce working hours / expand free time. Mason (15) seeks a green and social-democratic AI model with humanism and universal values build in and the *Global Justice Report* (pages 11-12), can be seen as an invitation to such a future where more free time, allows people greater opportunities to flourish and re-connect to humanity's ground state of non-duality (chapter seven).

The Cybernetic Circulation Complex and Biocommunism

Dyer-Witherford and Mularoni (16) build on the work of theorists of platform capitalism to suggest that what lies at the heart of the dominance of such corporations as Google, Meta, and Amazon, is their innovations in the realm of circulation rather than the realm of production or rentierism (17). They use digital technology to annihilate space and time, speeding up the sale of commodities and hence increasing the revenues and profits gained from production.

The cybernetic-circulation complex (CCC) is made up of corporations, startups, and nonprofits that have captured not only the markets but the means of value transactions. The companies that make up the CCC control payment platform sites where information is stored and the infrastructure to apply that information to enhance advertising. This limits competition and allows the CCC to dictate the rhythms of labour (such as that in Amazon warehouses) and the users of these platforms. Meta will guide users to certain news sites, Netflix towards certain viewing options, and Amazon to certain products. All seek to maximise time spent on their platforms. In February 2026, the list of the largest corporations in the world (18) by market value was led by a group of trillion-dollar tech giants,

primarily based in the United States and Asia. NVIDIA currently holds the top position, followed by Microsoft, Apple, Amazon, and Alphabet,

Witherford and Mularoni argue that the CCC operates as a form of digital colonialism (see Chukunzira, Finken & Jetses (19). Crawford (20) and Hao (21)). The tech giants exercise surveillance of online populations and exploit workers and the environment, in countries far from their headquarters (see Kirk (22) on the making of a global digital underclass). Their global reach multiplies and intensifies the resultant antagonisms, including geopolitical tensions and those in Fuchs' table (Table 3.1). Hence the CCC not only speeds up the circulation of commodities but also the circulation of political conflicts such as those between the US and China (who complete for global technological dominance) and those between left and right populisms. It also speeds up biospheric circulations as crises of pandemics, climate change, and biodiversity loss are now deeply entangled with capitalism's technological systems.

Biocommunism is Dyer-Witherford and Mularoni's means of restructuring the CCC to promote democratic digital socialism. It combines elements of redistribution and degrowth and employs a 'planning stack' of institutions engaged in democratic and cybernetic planning to transition societies towards sustainability and 'universal human flourishing'. With the 're-coding of capitalism's CCC under new non-capitalist management':

Google would become a data collection and processing agency of the planning stack Amazon fulfilment centres would dispatch emergency deliveries of the basket of goods that cannot be locally produced. Uber and Lyft would be converted into public transport facilities. Apple would host apps for communist work brigades. Facebook, Tik-Tok and the platforms formerly known as Twitter would be converted into advertising and surveillance free zones. Microsoft's data centres and AIs would be appropriated to redistribute global wealth to the wages and un-waged workers who created them. We could even imagine 'a reverse Palantir' (23) *a digital platform whose task would be to welcome, assist and provision, rather than expel, climate refugees*. Dyer-Witherford & Mularoni, 2025, p. 138 & 9.

Covas and Pinto (24) consider the political economy of AI, arguing that it has institutional, geopolitical, technological-material, socio-democratic, and ecological layers. Placed within the right public and democratic frameworks, it

could become a powerful ally for social innovation, helping to soften the impacts of the Anthropocene in the ways Dyer-Witherford & Mularoni suggest.

Technofeudalism

Varoufakis explains that in the late 1990s, the internet developed as a commons or capitalist free zone. Subsequently it was privatised by emergent 'big tech' owners who took the money printed by central banks after the 2008 financial crisis and invested it in hardware (e.g. server farms, submarine cables) and software (e.g. AI driven algorithms. Amazon's Alexa). These 'cloudalists' who charge rent for the use of software hosted on their cloud storage, have become the new ruling class with power based on command capital that grabs our attention, manufactures desire, sells to us directly outside the market, commands or directs proletarian labour inside workplaces, and elicits free labour from us as we provide it with the data on which their power and wealth is based. Capitalism has mutated to technofeudalism (25) in which profits have been replaced by rents and markets by trading platforms.

We sustain or reproduce this mode of production as we supply it with our reviews, ratings, uploads, videos, posts, and photos. The former capitalist system survives alongside technofeudalism but Varoufakis insists that the latter is a new mode of production and not simply monopoly or rentier capitalism. Cloud capital and the rent it produces is now key to economic power so the task of left populists is to unite cloud serfs (citizens who use platforms and provide data) with cloud proles (workers exploited by cloud capital) and cloud vassals (business owners paying rents to cloudalists) in a political movement that seeks to convert cloud based assets from a means of behaviour modification to a means of human collaboration and emancipation. This aim is shared with advocates of biocommunism, fully automated luxury communism (26) (page 67) and radical democracy along with critical realists who seek universal human flourishing.

End Times Fascism

Klein and Taylor (27) claim that the populist right (far-right, hard-right) in the US has adopted a nihilistic acceptance of global collapse and is pursuing the survival of a select few at the expense of everyone else. The core ideological tenets of its end times fascism are:

- The belief that supremely wealthy or "superior" citizens have the right to survive crises—such as climate change or social collapse—by retreating

into high-tech bunkers, private islands, or space colonies (**Supremacist Survivalism)**

- Championed by figures like Peter Thiel, **the "Exit" Principle** is the idea that the wealthy should be allowed to "exit" the obligations of citizenship, including taxes and democratic regulations, to form their own democracy-free havens or "network states".
- Domestically, this manifests as turning nations into militarised "bunkers" through mass deportations, extreme border control, and the creation of "freedom cities" (28) to exclude perceived outsiders (**Fortress Nationalism**)
- A reliance on AI, private mercenaries, and cryptocurrencies to maintain control and provide services within these elite enclaves, effectively replacing public governance with corporate or billionaire rule (**Technological Feudalism**).
- While 20th-century fascism claimed to build a new world, end times fascism is seen as "betting against the future," accelerating environmental and social destruction because the elites believe they can personally escape the consequences. (**Nihilism over Utopia**).

This ideology unites an 'Armageddon complex' that consists of three distinct groups: Silicon Valley oligarchs who regard existing society as a liability and seek technological escape; Christian nationalists or religious fundamentalists who view modern crises through the lens of biblical prophecy and welcome cataclysm as a precursor to divine salvation; and ethno-nationalist populist right-wing leaders who use the fear of collapse to justify authoritarian control and the dehumanisation of 'others'.

Trump's MAGA (Make America Great Again) base, and that of Farage in the UK to a lesser extent, support right populist leaders as they adopt a fortress nation narrative (we will protect you against mass migration and being 'left behind'); blame migrants, minorities and progressives for national instability in ways that dehumanise, scapegoat and cast out 'others'; exploit material crises by turning legitimate grievances into a revolt against liberal democracy; and frame empathy as a weakness that society can no longer afford thus abandoning vulnerable populations as a necessary 'law and order' measure for the in-group's survival.

In the US, Christian nationalists are attracted to end times fascism as its ideology mirrors the biblical rapture, promising salvation during the end times. For secular followers it offers a hight-tech version where wealth and citizenship act as 'the lifeboat'. End times fascists often promise a return to traditional patriarchal hierarchies, framing them as a source of stability in a chaotic world. Overall, the movement relies on what Klein and Taylor term 'darkly festive fatalism', becoming a 'final refuge for those who find it easier to celebrate destruction than living without supremacy'.

The response they propose is a counter movement to tell a story of better times rather than end times, of staying rather than escaping, and of rediscovering sustainable non-dual ways of living that require solidarity with the rest of nature. A response that is compatible with the populist left, digital eco-socialism, and the philosophy of meta-Reality.

Digital capitalism fails to deliver radical democracy

As noted in the introductory chapter, *Critical School Geography* followed Mouffe (29) in advocating left populism, radical democracy and radical global citizenship. Sustainability and universal human flourishing are to be realised by reconstructing global society as a radical democracy in which democracy governs all spheres of life (economics, politics and culture, including their uses of digital technology) at all scales from the household to the locality to the nation to the region to the global (see pages5 and 6).

Early advocates of the internet and digital media suggested they would deliver 'cyber democracy' with empowered 'netizens' grasping its potential to enlarge and deepen a decentralised public sphere. This promise has not been realised as digital media have been co-opted and corrupted by commercial and state powers who facilitate surveillance capitalism, algorithmic polarisation, and digital authoritarianism in ways that favour the populist right.

- **Surveillance capitalism** (technofeudalism) collects, hoards and monetises data provided by citizens and then uses it for behaviour profiling and modification via algorithms. This erodes citizens' autonomy and capacity for independent critical thinking.
- Social media platforms are designed for engagement rather than accuracy or democratic deliberation. **Algorithmic polarisation** pushes citizens into 'echo chambers' of like-minded people, limits their exposure to diverse viewpoints, fuels hostility and divides communities. The internet can allow

false information and post-truths to spread faster than truth, lowering trust in politicians and democratic institutions (hyperpolitics, page 9). This may lead to explosions of rage as occurred in 2024 after the killing of children at a dance class in Southport and the allocation of asylum seekers to hotels in some towns The Open University has published bonus content on algorithms (30) to accompany the BBC2's Inside the Rage Machine (31).

- Authoritarian regimes have learned to use digital tools for repression turning the internet into a tool for surveillance rather than rebellion. Autocrats may flood the digital space with pro-regime narratives, limit or censor expression, shutdown the internet, or seek to change the outcomes of elections in other states.

Whether to enrich or erode democracy is a decision that the owners of tech must take as they compete for market share and profits. The market encourages surveillance capitalism and algorithmic polarisation, and self-regulation fails if there is no duty to put the public ahead of profit. Doctorow (32) has termed the degradation of the internet by misogyny, conspiratorialism, surveillance, manipulation, fraud, and AI slop, 'enshitification', and *The Guardian's* editor has addressed the information crisis (33) as print media loose sales and influence.

People vs Big Tech (34) is a movement fighting to overturn the predatory business model of giant tech corporations that provides concise summaries of the problem and solution, while Our AI Collective (35) empowers communities to shape AI's future. Solnit (36) argues that digital technology is robbing us of the connections that matter, an argument that resonates with critical realism's claim that we need to realise non-duality or recover our ground state (chapter seven).

The global governance of AI

Google AI reports that *the global governance of Artificial Intelligence is currently experiencing severe fragmentation, caught between a hard pivot toward economic nationalism* (37)*, a highly concentrated tech industry, and a growing divide in international regulatory strategies. While bodies like the UN* (38) *are attempting to centralise standard-setting, individual world powers are charting wildly conflicting paths dictated by geopolitical and economic competition.*

In the US, Trump dismisses concerns regarding AI and companies rely on voluntary testing frameworks. China's integrated state-led model (39) aligns AI development with state surveillance, economic planning, and military capability, while opposing US export restrictions on advanced semiconductors. The EU AI

Act (40) is the world's first comprehensive, legally binding AI legislation. The UK has adopted a pragmatic approach through its AI Safety Institute (41) that tests frontier models as they enter the country. Its government offers *AI Scenarios 2030* (42)to help policymakers plan for the future and has passed an Online Safety Act (43). Meanwhile MPs and Lords have called for new laws (44) to address AI's threat to human rights. While the UN has convened the first UN Global Dialogue on AI Governance, critical core threats were excluded from the agenda (e.g. military AI) and over 100 countries, most in the global South are party to no prominent AI governance frameworks. Frontier AI labs and large tech corporations hold unprecedented leverage over AI governance leading the UN human rights' chief to warn that voluntary self-regulation is entirely insufficient to manage the existential risks that AI poses. US-China geopolitical rivalry makes an enforceable global safety pact unlikely. The current state of play is summarised in Table 3.3.

Governance approach	Key Players	Primary Focus	Regulatory Style
Innovation first	United States	Market dominance and national security	Voluntary testing / executive oversight
Rights-based	European Union	Privacy, human rights and risk classification	Comprehensive legally binding bans / fines
State-Directed	China	National infrastructure, military and surveillance	Centralised government integration
Multilateral inclusive	United Nations	Inclusivity for Global South and existential risk management	Non-binging global consensus and funding

Table 3.3 Global governance of AI, the state of play (Google Gemini)

Digital socialism

We encountered Fuch's definition of digital socialism on page 72, Mason's proposed green social-democratic AI model on page 74, and Dyer-Witherford and Mularoni's biocommunism on page 75. Such socialism offers a model of political economy that incorporates social / public ownership of digital infrastructure, data and AI to counter the power of large tech corporations and economic and political elites. It aims to shift control of digital platforms from private investors to the public, using digital technology to democratise economic

planning and political decision making, and ensure fairness. Data generated by collective online activity would be a public good rather than private property, and communities would own and manage their digital services including social media, according to principles of self – governance, decentralisation, and federation. Susskind (45) charts a path to a digital republic that involves new legal standards, new public bodies and institutions, new rights and regulations, and new modes of conduct for people in the tech industry that ensure human and technological flourishing go hand in hand.

The race for AGI supremacy and its impact on geopolitics

Marshall (46) provides an introduction to the geography of AI and those factors that favour the location of elements of the cyber circulation complex. Zook, Loomis and Lim (47) explore how AI is reshaping economic processes and their impacts on everyday labour, geopolitics and global production networks, and subnational regional evolution. They show how AI impacts on agency, power, scale, networks and territorial configurations.

The Race to Control the World (48) is the title of a 2026 BBC Radio 4 series on the race for dominance over digital technology and its applications that is often referred to as 'the new cold war'. As regards positioning in the AI race (49), the US prioritises frontier model development, proprietary ecosystems, and high performance computing supremacy, while China focuses on cost-optimised models, open-source diffusion, and rapid real-economy adoption (e.g. electric vehicles, robots) (see Table 3.4).

Strategic Feature	United States' Approach	China's Approach
Core Focus	Hoard computing power and force citizens to use US software, cloud computing services, and regulations.	Make AI open source, allow users to run versions on their own servers. AI becomes a general purpose technology.
Ecosystem Model	Closed proprietary platforms resembling Apple's mobile operating system model with premium pricing.	Open-weight and open-source models resembling an 'Android' model for broad reach.
Infrastructure & Compute	High-investment, massive domestic data-centre expansion and strict export controls.	State-guided infrastructure scaling, supply-chain self - sufficiency, and cost optimisation.
Government & Policy	National security orientation, private sector deregulation,	State-directed mobilisation, multilateral UN-anchored

	and aligning exports with political alliances.	norms, and sovereign development support.

Table 3.4 US and China approaches to AI development compared (Gemini and Mason (50))

Specht (51) notes that 'the world's great powers have decided artificial intelligence will not be a shared commons but a strategic territory to be controlled, walled off and defended'. He insists that geography still matters as AI infrastructure investment allows geopolitical leverage and sovereignty over such infrastructure is a source of geopolitical power. As the consensus shifted from 'global AI system' to 'regional AI systems' the global Soutth was excluded and in his view the politics to reverse the enclosure of AI, currently appears lacking (see Kilic & Avila (52)).

Standford University's AI Index (53) reports that the US-China AI model performance gap has effectively closed and that the US leads in AI investment ($285.9 bn. in 2025) more than 23 times the $12.4 bn. invested in China but looking at just private investment understates China's total. With 5,427 data centres the US has more than ten times the number of any other country. Taiwan Semiconductor Manufacturing Company (TSMC) fabricates almost every leading AI chip designed by Nvidia (the world's most valuable company) making the AI hardware supply chain dependent on one foundry in Taiwan – but TSMC began to expand into the US in 2025,

The global vibrancy tool (54) allows the user to assess which of 36 countries is leading on AI and overserve trends in AI metrics over time. In 2024, it showed the UK in fifth position, behind the US, China, India and South Korea. The AI Futures Project (55) presents two scenarios: AI 2027 presents the current race for dominance and offers two endings (slowdown or race) while in AI 2040 humanity delays the development of superintelligence until 2040, makes all AI research public, allows dozens of companies globally to catch up to the frontier, and intentionally enters a regime of mutually assured compute destruction.

Kollas and Stokols (56) argue that national strategies for AI and cloud dominance depend on the reorganization of land, energy and regulatory systems both at home and in a country's AI empire. Using a geopolitical ecology framework, they examine the different ways in which the U.S. and China build national computing power as a strategic economic and military resource with frontline.companies like

Huawei, TikTok, Google and Baidu acting as instruments of national power and rivalry. Chinese writers Hong and Chunzi (57) explain how digital geopolitics results in a volatile, uncertain, complex and ambiguous world,

Varoufakis (58)explains that US hegemony is based on Wall Street and the US dollar is now threatened by the 'new cold war'. The dollar has served as the currency of international trade and those countries and their corporations running a trade surplus with the US have used their surplus dollars to invest in US assets including its foreign debt. Much of this money has flowed into the US rentier economy (dominated by individuals or corporations who generate income primarily through the ownership and control of existing assets—such as real estate, financial debt, intellectual property, or digital platforms—rather than through productive activities like creating new goods, services, or jobs). The dollar has served as the principal instrument of US imperialism, maintaining a world system of states that are more or less dependent on their dollar holdings and the rates of exchange of their national currencies against the dollar. US hegemony is now threatened by the 'new cold war' for two reasons.

Firstly, China's development of cloud capital that is arguably now the major means of securing wealth, threatens US power and wealth. Secondly China's launch of WeChat (59) a mobile messaging app with a digital wallet that allows international transfers of digital Yuan (e-CNY), backed by the People's Bank of China, threatens the US dollar. When Russia invaded Ukraine in 2022 the US confiscated $300bn of Russian money and this led to a flight of investment into and payments via digital Yuan by those who considered it both less risky and cheaper in terms of transfer costs. China's rising financial power explains US legislation and export controls that seek to limit China's access to its tech. The decline of US hegemony, together with the rise of end times fascism, goes a long way to explain Trump's actions regarding tariffs, Ukraine, Venezuela, Greenland, NATO, and Israel / Iran in 2025/26.

The UK Government's dash for growth and the role of AI

TechUK (60) regards the UK digital economy as a powerhouse of innovation and growth. It claims that the Uk has the third biggest tech sector in the world, valued at $1 trillion, employing 1.7 million people, contributing £99 billion annually, and growing at 10%/yr. Its Local Digital Index has a section on geography that identifies regional hot-spots and specialisms. In September 2025 the US and UK

signed the 'Tech Prosperity Deal' with Microsoft investing £22bn and Google £5bn.

A Government report (61) on the economic impacts of emerging technologies estimates that business will invest approx. £76 billion in 15 emerging technologies from 2023 to 2028. The resulting increased productivity with boost GDP by 8.4% by 2035 but there is uncertainty regarding uptake. The largest economic impacts will result from the adoption of Artificial Intelligence / Machine Learning, Synthetic Biology / Engineering Biology technologies and Therapeutics. The adoption of AI/ML technologies alone is projected to contribute to a 2.98% overall increase in the UK's real GDP by the year 2035, which is equivalent to £79.3 billion (also see a report from the Tony Blair Institute. (62).

While the government seeks to 'ramp up AI adoption (63) across the UK', the growth of associated infrastructure is spatially uneven, places additional demands on the environment, and faces local opposition. The BBC has reported the growth of data centres (64) across the UK and their demand for electricity could put UK net zero targets under added pressure (65). Students should consider the electricity (66) and cooling water (67) associated with a single AI assisted internet search, examine the location (68) of nearby and distant data centres, and study of an AI growth zone, such as that in North Lanarkshire (69). They might consider local opposition (70) to data centres and the infrastructure, such as new pylon lines (71) that they require and also examine how big tech seeks to 'greenwash' (72) its operations.

In an article subtitled 'how AI captured Westminster', Dunn (73) warns of the UK's dependency on tech controlled by the US that is increasingly being used to run government and public services in ways that are claimed save money and ease the fiscal crisis (the 2025 Spending Review mentioned AI in 38 different places). The drive to realise a smarter, faster state via AI is producing questionable links between government and the tech industry (e.g. BBC run by a former Google executive, Competition and Market Authority run by former head of Amazon UK, former PM Sunak with advisory roles at Microsoft and Anthropic). Government is also, in Dunn's opinion, giving too little attention to the assumptions build into LLMs, and the belief that in matters of ethics, law, and legislation there is no substitute for democratic

human deliberation. On coming to power Burnham appointed Narayan (74) as the UK's first dedicated AI minister.

AI and schooling, the government's view

The UK government (75) can be seen to regard AI as a neutral tool that can improve educational outcomes. It reports that AI can be used to create educational resources, plan lessons and curriculum, tailor feedback and revision activities to individual needs, assist with administrative tasks, support personalised learning, and reduce inequality (76). It claims that, when used appropriately, AI also has the potential to reduce workload and free up teachers' time, 'allowing them to focus on delivering excellent teaching'. However, the government warns that the content produced could be inaccurate, inappropriate or unsafe, biased, taken out of context, taken without permission (intellectual property infringement), out of date, or low quality. Among the reasons it lists for these 'faults' are that the AI 'may not provide results that are compatible with a human-designed resource developed in the context of our curriculum'.

Government guidance encourages 'safe, teacher-led adoption of generative AI while strictly enforcing protections around pupil data, academic integrity, and child safety and professional judgement'. Teachers retain ultimate legal and educational responsibility and are instructed 'to review all AI-generated outputs for factual accuracy and appropriateness before implementation' (The Education Hub (77)). Ofsted (78) is aware of the risk that AI will perpetuate bias and discrimination that is present in the data that it processes or has been trained on. The measures taken by schools to mitigate this are already part of what inspectors consider when collecting evidence. Olwen (79) considers the ethics of AI in education recognising that the data generated by such devices as learning platforms and curriculum planning apps raise questions about privacy, bias, fairness and accountability. The Chartered College of Teaching (80) has training materials and resources on AI and Gillen (81) raises concerns on behalf of the NEU.

CHAILD (82) offers a report (83) on how teenagers use LLMs, what they value, and how schools can respond. Based on a small sample (n=34) its key takeaway is that 'Students see LLMs as tools for learning and information, and choose between them mainly by their helpfulness, detail, and factual reliability. However, in practice, students may still need structured support to nudge them from "I should verify" to "I do verify", and clear guidance on how to judge

whether an AI response is accurate and trustworthy and decide when using AI is and isn't good.'

AI and the geography curriculum

In summer 2026, the literature on AI in secondary geography is not that extensive. Kerr (84) has written a blog for the GA that focuses on ChatGPT while Griffiths considers its use when teaching climate change and Stockings (85) offers some related thoughts and a useful bibliography. Chang and Kidman (86) devote an editorial in IRGEE to the rise of AI and the challenges and opportunities it poses for geographical and environmental education.

Woods' thesis (87) on how teachers can use AI in secondary geography suggest that it is positioned to assist but not replace students and teachers in their pursuit of creativity in geography education. He examines barriers that restrict teachers' AI usage and suggests avenues for further research. Conference proceedings (88) from India include a paper on using AI to develop hight order thinking skills in geography, and Lee contributes a chapter (89) that highlights the evolving competences required for geography teachers in the AI era. Davies-Craine (90) reports practitioner research on the impacts of augmenting instruction with AI in the geography classroom. After using generative AI with year 9 students, Jacks (91) concludes that 'the prize on offer is not novelty but deeper more autonomous engagement' and whether geography teachers reach it 'depends far less on the technology than on the pedagogy we build around it'.

Critical education and AI (assisted by Gemini)

Rather than accepting AI as a neutral tool, critical educators draw on political economy, sociology and critical pedagogy to critique how it alters the core purposes of schooling. They claim that as a product of digital capitalism, AI in schools:

- **de-skills and alienates students and teachers**. AI tools frequently offer instant answers and eliminate the mental work involved in enquiry, problem-solving, and higher order thinking. They encourage a shift from cognitive offloading (using a tool to assist thinking) to cognitive dependence and ultimately cognitive surrender. This discourages long-form reading and writing (92) and independent critical thought (93). It takes the joy out of learning and teaching and leaves students and teachers alienated.

- **is subject to algorithmic and neocolonial bias**. Large language models are trained on historical data and often replicate and amplify existing systemic biases relating to race, gender, class, and geography. AI systems impose a dominant Western-centric (94) way of knowing that marginalises local knowledges, minority languages and dialects, and diverse cultural frameworks. There is a digital divide in what rich and poor schools can pay for educational technology.
- **Is subject to corporate enclosure and loss of teacher autonomy**. Big tech corporations (cloudalists) often partner with governments and schools to bring their products to the classroom. This erodes democracy (95) in and through education and de-professionalises teachers as AI tools take over school management, lesson planning, grading, and automated tutoring. Students become cloud serfs and teachers cloud proles. Chatbots engineered to satisfy, flatter, agree with and retain users are unsuitable for classrooms. See Aitken (96) on ChatGPT for teens.
- **Is a means of surveillance and data extraction**. Digital capitalism regards teachers and students as sources of data (cloud serfs) who can be used to improve their products and services. AI driven tools for plagiarism detection and monitoring attendance, behaviour and emotions, destroy trust between students and teachers while also encroaching on their private lives.
- **Represents a further shift toward technocratic neoliberalism.** Digital neoliberal capitalism seeks to erode the social, collective and civic purposes of education and reduce schooling to hyper-personalised learning tasks or skill-boxes to be checked off. The rush to AI enabled schooling leaves schools, teachers and families without a choice.
- **May currently be unsustainable** in terms of the demands it places on the environment both locally and globally.

Critical AI literacy (assisted by Gemini)

Critical educators regard AI in schools as a site of power, bias, and ideology that should be actively questioned and resisted. Students should develop critical AI literacy (97) that encompasses understanding of how AI systems are built, whose voices they privilege, and how they impact human agency and democracy. Aware that AI poses a risk to critical thinking and self-worth, they prioritise the process of learning over the product or outcome, regarding critical thinking and agonistic debate as acts of personal dignity and political liberation.

Rather than treating LLMs as 'oracles' that deliver absolute truths to passive students, teachers should encourage students to become active co-interpreters and interrogators (98) who regard their outputs as biased hypotheses that require verification, cultural contextualisation, and counter argumentation. At the same time teachers should ask: What data was used to train this model? Which communities are marginalised or misrepresented by this output? Are corporate monopolies controlling this flow of knowledge? Is the knowledge provided hegemonic or counter-hegemonic? Does it improve my capabilities as a global citizen?

UNESCO and AI competency frameworks for students and teachers

UNESCO (99) claims that AI has the potential to address some of the biggest challenges in education, innovate teaching and learning practices, and accelerate progress towards SDG4 (100). It warns that rapid technological developments are outpacing policy debates and regulatory frameworks and calls for a human-centred approach to AI that offers 'AI for all' and accords with critical realism's goal of universal human flourishing. To this end, it offers AI competency frameworks for students (101) and teachers (102).

The frameworks were developed to reflect four core principles:

- the design and use of AI should be at the service of strengthening human capacities as well as sustainable development;
- access to and deployment of AI should be equitable and inclusive,
- AI models in use should be explainable, safe, and do no harm,
- the selection, use and monitoring of the impact of AI should be human controlled and human accountable.

The students' framework (Table 3.5, page 89) sets out competences and related curriculum goals, suggested pedagogical methods, and learning environments relating to four aspects of competency (human-centred mindset, ethics of AI, AI techniques and applications, and AI system design) at three progressive levels (understand, apply, and create). The teachers' framework (Table 3.6) sets out competences across five aspects: human-centred mindset, ethics of AI, AI foundations and applications, AI pedagogy, and AI for professional learning. These are categorised into three progressive levels – acquire, deepen and create. The students' framework. AI system design is best handled by ICT colleagues, but competences in other dimensions can inform curriculum development in geography as the curriculum challenge associated with this chapter seeks to show.

Competency aspects	Progression levels		
	Understand	Apply	Create
• Human-centred mindset	• Human agency	• Human accountability	• Citizenship in the era of AI
• Ethics of AI	• Embodied ethics	• Safe and responsible use	• Ethics by design
• AI techniques and applications	• AI foundations	• Application skills	• Creating AI tools
• AI system design	• Problem scoping	• Architecture design	• Iteration and feedback loops

Table 3.5 Overview of the AI competency framework for students (Unesco, (103) p. 19)

Aspects	Progression		
	Acquire	Deepen	Create
1. Human-centred mindset	Human agency	Human accountability	Social responsibility
2. Ethics of AI	Ethical principles	Safe and responsible use	Co-creating ethical rules
3. AI foundations and applications	Basic AI techniques and applications	Application skills	Creating with AI
4. AI pedagogy	AI-assisted teaching	AI–pedagogy integration	AI-enhanced pedagogical transformation
5. AI for professional development	AI enabling lifelong professional learning	AI to enhance organizational learning	AI to support professional transformation

Table 3.6 Overview of the AI competency framework for teachers (Unesco, (104) p. 22)

Further reading and viewing

Read about Wooldrdge's concerns (105) about AI and watch his lecture (106) to the Royal Society.

Watch videos that claim AI likely to cause a global financial crash either because it develops too fast (107) for the economy to adjust or because it fails to live up to its promise of delivering economic growth (the AI bubble bursts (108)).

Play the Bad News Game (109) a fake news intervention aimed at building psychological resistance against online misinformation.

Crawford's *Atlas of AI* (110) and Hao' *Empire of AI* (111) are texts that offer a decolonial perspective on AI. Watch these authors talking about their books.

Read Lally, Kay & Thatcher's examination (112) of Bitcoin's impacts on Chelan County in Washington USA, that untangles the processes that occur as the distributed, digital infrastructure consumes the very real material resources of one place to produce digital goods used in another.

Watch the book launch (113) of Dyer-Witherford & Mularoni's *Cybernetic Circulation Complex*. What does it add to the explanation of the complex outlined in the chapter?

Critical School Geography concluded in 2020 with a consideration of the alternative future offered by Yanis Varoufakis in *Another Now*. Read his 2023 talk to the Progressive International (114) and watch him talking about his 2024 book *Technofeudalism* (115) that features in this chapter. As a teacher, does AI threaten to reduce you to a cloud prole with curriculum supplied via platforms and school managers increasingly using AI to monitor your performance?

Watch Klein and Taylor (116) talking about end times fascism. How do their ideas help you better understand what has been happening in the US during Trump's second term?

Watch Susskind (117) outlining the features of a digital republic. How do his ideas relate to the EU's AI Act (118) and Mouffe's advocacy of radical democracy?

Watch the Global AI Race (119) from the Chicago Council of Global Affairs. What are the discussants' conclusions regarding what the race means for the world?

Watch the BBC News documentary Inside China's EV Revolution (120). How is this revolution reshaping the UK car market?

Read Wiliamson (121) on the assetisation of educational resources, a form of enclosure. While he writes about higher education, how much of his argument can be applied to the secondary sector and the assets owned by teachers?

Watch Jennifer Chang Wathall's analysis (122) of Unesco's *AI Competency Framework for Teachers* using AI. Did this help you understand the framework and how AI can be used to analyse such documents?

Read Heafner's article (123) 'CIVIC: Five Pillars for Using Artificial Intelligence in Social Studies Education'. Do the pillars reflect a mainstream or critical approach to AI?

Watch Susskind's lecture 'Education – and its limits' (124) or read his book *What should my children do? How to flourish in an age of AI* (125).

Discussion

Digital literacy encompasses the knowledge, behaviours and confidence required to use technologies and computer systems creatively, safely and effectively. It also involves the ability to make well-informed critical judgements about the implications, risks and impact of how digital technology is used. Being digitally literate empowers children and young people to adapt and thrive in a technology-driven world, use technology safely, and fully engage with learning across the whole curriculum. (CfSA, 2025 (126) section 1.5)

Should school geography and the curriculum you teach seek to develop digital literacy? Is AI competency part of such literacy?

Is the author correct in suggesting that digital capitalism is now the major structure producing the events and experiences shaping the lives of the students you teach? Do they face an information crisis? Does digital capitalism deserve a more prominent place in the geography curriculum? And digital socialism?

Can you give other examples of the antagonisms featured in Table 3.2, page 72.

The chapter outlines three critical theories of digital capitalism and digital socialism (Dyer-Witherford & Mularoni, Varoufakis, Klein & Taylor). What ideas from the theories should feature in the geography curriculum for older students?

The chapter identifies three topics for an updated critical school geography: the race for AGI supremacy and its impact on geopolitics; the role of AI in the UK Government's dash for growth, and the contested impact of AI on schooling. Does the curriculum you teach offer scope to address these topic.

Two sections of the chapter were written with the help of Google's Gemini. How can teachers ensure such 'research assistants' do not erode their professional autonomy?

Curriculum challenge three Developing AI competency in the context of climate AI

Climate AI refers to the application of artificial intelligence to accelerate climate action through mitigation, and adaptation. It uses AI to analyse large-scale, unstructured climate data and optimise complex systems such as energy grids, supply chains, and agriculture. serving as an operational backbone for businesses and governments to measure, report, and optimise climate-related activities. It mitigates or reduces emissions by optimising energy demand, supply and distribution; and extending the life of products to reduce manufacturing demand. It aids adaptation through weather forecasting, disaster management, and mapping infrastructure to aid urban resilience, and contributes to policy and data transparency by analysing, mapping, and verifying policies, and automating the accounting of emissions, inventories and compliance with net zero standards. Rowe (127) asks whether AI can supercharge climate action.

Mainstream critics of climate AI point to the environmental impacts of AI (e.g. energy and water intensive data centres), the fact that LLMs lack transparency making it hard to explain how they reach decisions, and that data gaps reduce its accuracy. Examples of climate Ai include the AI for Climate and Nature (128) project and A14 Climate (129). Critics of climate AI (130) argue that the technology does more to reinforce the extractivist, growth-obsessed capitalist systems causing the climate crisis than it does to solve it. Rather than a neutral tool for ecological salvation, AI functions as an ideological. technocratic and material apparatus that deepens fossil fuel reliance and obscures political choices

A symposium Will AI accelerate the journey to net zero – or make it harder to achieve? (131) illustrates debate over climate AI in the UK context. West makes the case for climate AI, 'it can balance grids in real time, improve how we forecast wind and solar, and speed up everything from planning to battery development' suggesting that these benefits will not happen by default and depend on 'changes to how demand is shaped, how the grid is expanded, and how the system is run'. Stern argues that AI's potential can only be realised through active public policy to ensure that it is used in socially productive ways as leaving its implementation solely to market forces 'would be risk the use of energy and resources for 'low value or, indeed harmful activity which could undermine progress towards sustainability and resilience goals'. He warns that the roll out of data centres may strain the energy network and urges Great British Energy to show strong and active leadership in delivering clean power. Berners-Lee warns of the Jevons

Paradox (132) that suggests gains in energy productivity due to the use of AI may be offset by the surge in its use particularly if AI is increasingly used for things that do not contribute to carbon efficiency. What is needed is a fundamental change in the dynamics of AI growth and he suggests a sufficiently high carbon price to reduce global emissions may effect this change.

Elsewhere Nost (133) notes how climate and AI governance parallel one another, intersecting in how they are imagined. Dominant AI and climate discourses are both symptoms of Anthropocene thinking and 'capitalist realism'. In his conclusions he writes: *As AI proponents sort out their current drama, climate has become one socially and environmentally useful end to which AI might be applied. What seems missing is any consideration of climate AI in terms of procedure—is its knowledge valid, what knowledges does it displace or exclude, what biases are reproduced?—and consideration for its consequences, including harms. Does it actually result in climate mitigation and/or adaptation in a given context? What 'maladaptive' outcomes might it drive? What alternatives does it foreclose? These sorts of questions are ones where geographers will continue to have a lot to say.* Also see Nost & Colven (134) on the political ecology of data-driven climate initiatives that highlights five key ideas:

- *Environmental and climate crises are grist for tech solutions*
- *AI technologies require computational resources that are environmentally embedded*
- *Disasters become "shocks" that the AI industry capitalizes on*
- *Climate AI shapes material investment flows and landscapes*
- *Data-driven approaches to climate reproduce injustices faced by marginalized communities* (Nest & Colven, 2022, p. 1)

As preparation for planning your curriculum unit, you should read Unesco's two AI competency frameworks (see page 89) paying particular attention to mentions of climate change. Examples include:

Learning about Ai should empower them to urgently explore more climate-friendly approaches to the design, training and use of AI models AICFS, p. 16

***Embodied ethics**: students are expected to develop a basic understanding of the issues underlying key ethical debates around AI including the impact of Ai on human rights, social justice, inclusion, equity and climate change within their local context and personal lives.* AICFS, p. 23

***Sustainability**: Students are able to explain and illustrate the implications for AI systems for environmental sustainability.* AICFS, p. 23

Will AI eventually help humans remove the drivers of climate change and protect the planet's well-being? Should human societies mobilise AI models? Or has the training of AI models generated irreversible impacts on climate change? Analyse how some AI systems can affect environments and climate change and how their methods could be optimised. Human-centred mindset assessment task, create level, AICFS, p. 73

In the race to produce increasingly powerful AI models, environmental sustainability is often considered to be of secondary importance. In some instances it has even been intentionally obscured by claims that Ai holds the promise of solving climate change. As global leaders and policy-makers work to consider regulations around the consumption of energy and the protection of the environment, it is imperative that students understand how the training of Ai models is contributing to the destruction of the natural environment. Learning about AI should empower them to urgently explore more climate-friendly approaches to the design, training and use of AI models. The AICFS attends to this by guiding students to design and implement project-based learning activities on the impacts of AI use and training, prompting students to investigate potential solutions to mitigate these impacts. AICFS, p. 16

However, AI can pose significant risks to students, the teaching community, education systems and society at large. AI may threaten human agency, intensify climate change, violate data privacy, deepen long-standing systemic inequalities and exclusion, and lead to new forms of discrimination in education. AICFT, p. 13

Offer opportunities to reimagine safe, inclusive and just AI societies; organise workshops, group discussions and collaborative activities for teachers to contemplate what an inclusive, just and climate-friendly social order for the AI era may look like, what threats AI may pose to these social norms, and what compacts of regulations are available or should be developed. AICFT, p. 38

Having gained understanding of what capabilities AI competency requires in the context of climate change, your challenge is now to plan a curriculum unit that addresses climate AI by drawing on aspects and levels in the framework (Table 3.5 page 82) that are appropriate for your students. Will climate AI help to solve the climate crisis or will it worsen it?

References

1. https://www.youtube.com/watch?v=PqVbypvxDto
2. https://www.newstatesman.com/culture/books/book-of-the-day/2026/04/ai-will-dissolve-human-autonomy
3. https://www.theguardian.com/global/2026/sep/15/ai-doomsday-warning-jacob-coxon-anthropic
4. https://apnews.com/article/britain-king-charles-ai-summit-0765bee1e338cf65846a046fb5825a4a
5. https://www.citriniresearch.com/p/2028gic
6. https://www.penguin.co.uk/books/480399/end-times-fascism-by-taylor-naomi-klein-astra/9780241816288
7. https://www.newstatesman.com/technology/2026/09/the-end-of-the-end-times
8. https://www.youtube.com/watch?v=JmF8BneJjC0
9. https://pdfs.semanticscholar.org/8d1f/2de625d606c10d25552e1fbf605ffe190c2a.pdf%20Fuchs
10. https://www.youtube.com/watch?v=QCLBzpgpR6E
11. https://www.youtube.com/watch?v=FcADchWhwUk
12. https://www.youtube.com/watch?v=BMoKAn1grgQ
13. https://www.thenewworld.co.uk/paul-mason-artificial-intelligence-and-the-end-of-capitalism/
14. https://www.youtube.com/watch?v=wgCgFfbs1Kg&t=113s
15. https://www.theguardian.com/technology/2026/sep/13/ai-will-transform-capitalism-but-how
16. https://www.versobooks.com/en-gb/products/3109-cybernetic-circulation-complex?srsltid=AfmBOopP4jPAsinHPGbk2hbVJg5jYepoQPpM6ONqhDUB-_Uv9EFgX-3W
17. https://www.faircomment.co.uk/p/a-brief-history-of-rentierism
18. https://www.voronoiapp.com/markets/Nvidia-Market-Cap-Crosses-4-Trillion-Leads-50-Largest-Companies-in-the-World-5940
19. https://www.redpepper.org.uk/culture-media/technology/behind-the-intelligent-chatbot/
20. https://globalgoals.org/goals/4-quality-education/
21. https://www.penguin.co.uk/books/460331/empire-of-ai-by-hao-karen/9780241678923
22. https://antipodeonline.org/2025/07/30/for-a-political-geography-of-ai/
23. https://www.wired.com/story/palantir-what-the-company-does/
24. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=7291639
25. https://www.youtube.com/watch?v=Fhgm5b8BR0k
26. https://www.youtube.com/watch?v=YT6xiMUSPm8
27. https://www.theguardian.com/us-news/ng-interactive/2025/apr/13/end-times-fascism-far-right-trump-musk?CMP=Share_AndroidApp_Other
28. https://www.theguardian.com/us-news/article/2024/may/26/trump-project-2025-sanctuary-cities
29. https://www.versobooks.com/en-gb/products/712-for-a-left-populism?srsltid=AfmBOooi2L92mRDsdlSQB29pC86cBicvM1wkD1glgJ1El8lip3S8oyb4
30. https://connect.open.ac.uk/ragemachine/

31. https://www.bbc.co.uk/programmes/m002sw4z
32. https://www.youtube.com/watch?v=_Ai-fC-2Bpo
33. https://www.theguardian.com/media/ng-interactive/2026/may/06/how-to-survive-the-information-crisis-we-once-talked-about-fake-news-now-reality-itself-feels-fake?CMP=Share_AndroidApp_Other
34. https://peoplevsbig.tech/the-movement/
35. https://www.our-ai-collective.info/
36. https://www.theguardian.com/news/ng-interactive/2026/jan/29/what-technology-takes-from-us-and-how-to-take-it-back
37. https://www.giga-hamburg.de/en/publications/giga-focus/from-global-governance-to-nationalism-the-future-of-ai
38. https://news.un.org/en/story/2026/09/1168353
39. https://concordia-ai.com/research/state-of-ai-safety-in-china-2026/
40. https://artificialintelligenceact.eu/
41. https://www.aisi.gov.uk/
42. https://www.gov.uk/government/publications/ai-scenarios-2030-helping-policymakers-plan-for-the-future-of-ai/ai-scenarios-2030-helping-policymakers-plan-for-the-future-of-ai
43. https://www.gov.uk/government/publications/online-safety-act-explainer/online-safety-act-explainer
44. https://www.bbc.co.uk/news/articles/cwyzvgj70y4o
45. https://www.youtube.com/watch?v=SHpvLyWQJQw
46. https://geographical.co.uk/news/the-geography-of-ai
47. https://www.sciencedirect.com/science/article/pii/S2949694226000118?via%3Dihub
48. https://www.bbc.co.uk/programmes/m002sn47
49. https://table.media/en/europe/news/geopolitics-how-the-us-and-china-are-positioning-themselves-in-the-ai-race
50. https://www.theguardian.com/technology/2026/sep/13/ai-will-transform-capitalism-but-how
51. https://www.theguardian.com/technology/2026/sep/13/ai-will-transform-capitalism-but-how
52. https://progressive.international/wire/2025-03-10-tech-for-the-global-majority/en/
53. https://hai.stanford.edu/ai-index
54. https://hai.stanford.edu/ai-index/global-vibrancy-tool
55. https://www.aifutures.org/
56. https://journals.sagepub.com/doi/10.1177/0308518X251369704
57. https://www.globalpolicyjournal.com/articles/global-governance/digital-geopolitics-vuca-world-china-encounters-new-global-order
58. https://progressive.international/blueprint/c942c22b-252c-4445-b046-a7a66e2ab1e7-because-we-must/en/
59. https://morethandigital.info/en/wechat-explained-understanding-the-chinese-super-app/
60. https://www.techuk.org/resource/techuk-publishes-vision-for-inclusive-growth.html

61. https://www.gov.uk/government/publications/the-wider-economic-impacts-of-emerging-technologies-in-the-uk/the-wider-economic-impacts-of-emerging-technologies-in-the-uk-html#executive-summary
62. https://institute.global/insights/economic-prosperity/rebooting-the-uks-tech-diffusion-ecosystem-to-drive-growth
63. https://www.gov.uk/government/publications/ai-opportunities-action-plan/ai-opportunities-action-plan
64. https://www.bbc.co.uk/news/articles/clyr9nx0jrzo
65. https://datacentrereview.com/2026/02/ai-data-centre-growth-could-put-uk-net-zero-targets-under-fresh-pressure/
66. https://www.digitalfutures.kth.se/how-ai-affects-the-energy-demand-of-a-google-search/
67. https://assets.publishing.service.gov.uk/media/688cb407dc6688ed50878367/Water_use_in_data_centre_and_AI_report.pdf
68. https://www.colo-x.com/data-centre-database-map/
69. https://www.digitalfutures.kth.se/how-ai-affects-the-energy-demand-of-a-google-search/
70. https://theecologist.org/2026/feb/27/hyperscale-data-centre-protests
71. https://www.theplanner.co.uk/2025/03/17/suffolk-continues-opposition-pylons-proposal
72. https://beyondfossilfuels.org/wp-content/uploads/2026/02/AI-for-climate-claims-Report_FEB-2026_FINAL-2-16.pdf
73. https://www.newstatesman.com/technology/2026/04/the-silent-coup
74. https://www.salford.ac.uk/news/expert-comment-andy-burnham-appoints-uks-first-dedicated-ai-minister
75. https://www.gov.uk/government/publications/generative-artificial-intelligence-in-education/generative-artificial-intelligence-ai-in-education
76. https://arkonline.org/news-item/ai-tutors-wont-fix-inequality-in-education-but-ai-just-might/
77. https://educationhub.blog.gov.uk/2025/06/artificial-intelligence-in-schools-everything-you-need-to-know/
78. https://www.gov.uk/government/publications/ofsteds-approach-to-ai/how-ofsted-looks-at-ai-during-inspection-and-regulation
79. https://learningmole.com/ethics-of-ai-in-education/
80. https://chartered.college/news-blogs/ai-in-education-practical-training-and-resources-to-support-you/
81. https://issuu.com/nationalunionofteachers/docs/educate_magazine_july_aug_2025
82. https://chaild.org/
83. https://chaild.org/blog/youth-prism-first/
84. https://geography.org.uk/blogs/artificial-intelligence-in-geography/
85. https://www.katestockings.com/geographycurriculum/chatgpt-geography-education
86. https://www.tandfonline.com/doi/full/10.1080/10382046.2023.2194036
87. https://ora.ox.ac.uk/objects/uuid:11d3d482-083b-4b38-a9f8-1c746fce385c
88. http://www.navimumbaisciencefoundation.org/common/pdf/SUPROC/NMSF_SUTC2025_Proceedings.pdf#page=79

89. https://link.springer.com/chapter/10.1007/978-3-031-87421-5_21
90. https://my.chartered.college/impact_article/augmenting-instruction-with-artificial-intelligence-in-geography-lessons/
91. https://www.gereco.org/2026/07/24/more-than-a-novelty-generative-ai-and-pupil-engagement-in-year-9-geography/
92. https://www.theguardian.com/books/ng-interactive/2026/aug/08/i-hate-what-ai-is-doing-to-the-minds-and-happiness-of-the-young-katherine-rundell-on-the-view-from-the-classroom?CMP=Share_AndroidApp_Other
93. https://www.tandfonline.com/doi/full/10.1080/1475939X.2025.2547728
94. https://www.tandfonline.com/doi/full/10.1080/14767724.2024.2333821#abstract
95. https://link.springer.com/article/10.1007/s13347-025-00883-8
96. https://www.our-ai-collective.info/news-and-blog/chatgpt-for-teens-a-step-forward-but-not-far-enough
97. https://www.youtube.com/watch?v=GRXMbMnLxSk&t=1867s
98. https://onlinelibrary.wiley.com/doi/10.1002/tea.70024
99. https://www.unesco.org/en/digital-education/artificial-intelligence
100. https://globalgoals.org/goals/4-quality-education/
101. https://unesdoc.unesco.org/ark:/48223/pf0000391105
102. https://unesdoc.unesco.org/ark:/48223/pf0000391104
103. https://unesdoc.unesco.org/ark:/48223/pf0000391105
104. https://unesdoc.unesco.org/ark:/48223/pf0000391104
105. https://www.theguardian.com/science/2026/feb/17/ai-race-hindenburg-style-disaster-a-real-risk-michael-wooldridge?CMP=Share_AndroidApp_Other
106. https://www.youtube.com/watch?v=CyyL0yDhr7I
107. https://www.youtube.com/watch?v=khWnSVIfMQM
108. https://www.youtube.com/watch?v=E3atOY1chQE
109. https://www.sdmlab.psychol.cam.ac.uk/research/bad-news-game
110. https://www.youtube.com/watch?v=KcefG-0InLE
111. https://www.youtube.com/watch?v=nEqNXffoGWo
112. https://www.nicklally.com/wp-content/uploads/2019/08/lallyKayThatcherManuscript.pdf
113. https://socialistproject.ca/leftstreamed-video/cybernetic-circulation-complex-booklaunch/
114. https://progressive.international/blueprint/c942c22b-252c-4445-b046-a7a66e2ab1e7-because-we-must/en/
115. https://iai.tv/video/the-rise-of-technofeudalism
116. https://www.pbs.org/video/naomi-klein-astra-taylor-is-this-end-times-fascism-P5mWFx/
117. https://www.youtube.com/watch?v=SHpvLyWQJQw
118. https://digital-strategy.ec.europa.eu/en/policies/regulatory-framework-ai
119. https://www.youtube.com/watch?v=AtXR6mPqVFg
120. https://www.bbc.co.uk/iplayer/episode/m0030h3z/inside-chinas-ev-revolution
121. Assetizing academic content and the emergence of the ‘assetizen’: Education platforms, publisher databases, and AI model training - University of Edinburgh Research Explorer

122. https://www.youtube.com/watch?v=pmAMvEg79QY
123. https://citejournal.org/volume-25/issue-4-25/social-studies/civic-five-pillars-for-using-artificial-intelligence-in-social-studies-education/
124. https://www.youtube.com/watch?v=Bni42PX7C-Y
125. https://www.theguardian.com/books/2026/sep/09/what-should-my-children-do-by-daniel-susskind-review-the-case-for-embracing-tech-in-the-classroom
126. https://www.subjectassociations.org.uk/member-responses-to-the-curriculum-and-assessment-review-the-cfsa-responds/
127. https://geographical.co.uk/science-environment/can-ai-supercharge-climate-action
128. https://www.ai.cam.ac.uk/projects/ai-for-climate-and-nature/
129. https://www.metoffice.gov.uk/research/approach/collaboration/ai4climate
130. https://kingsdh.net/2026/02/27/a-social-critique-of-ai-amid-the-climate-crisis/
131. https://www.newstatesman.com/spotlight/2026/04/spotlight-on-energy-and-climate
132. https://www.npr.org/sections/planet-money/2025/02/04/g-s1-46018/ai-deepseek-economics-jevons-paradox
133. https://rgs-ibg.onlinelibrary.wiley.com/doi/full/10.1002/geo2.138
134. https://www.sciencedirect.com/science/article/abs/pii/S0016718522000240?via%3Dihub

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