

# Putting AI to work in education

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Despite its prevalence in films, novels, political debate and computer science for over 50 years, the impact of artificial intelligence (AI) on almost all aspects of our lives has taken many of us by surprise. Perhaps what we should be puzzled by, rather than its immense influence, is that it took so long to reach this point. As long ago as 1956, John McCarthy, the self-styled ‘father of artificial intelligence’, argued that the challenge of creating AI would be wrapped up during an intensive summer workshop,<sup>1</sup> known as the Dartmouth Conference.

Like all new technologies, AI has been met with both giddy enthusiasm and dystopian nihilism. Both can be justified. Among many unanswered questions that the unstoppable rise of AI suggests are: ‘will it destroy our work?’<sup>2</sup> ‘will it erode our personal relationships?’<sup>3</sup> ‘will it contaminate democracy and government?’<sup>4</sup> and ‘will it compromise academic research?’<sup>5</sup> Regarding the last question, while people (and AI systems) are producing analyses at a breathtaking pace, we are not yet in a position to predict or understand the impact of AI on education at higher education or school levels.

For the current generation of students, whether in school, university or graduate studies, AI is as familiar and natural as using the Internet was for the previous student cohort now looking on in alarm. Their comfort with using AI does not mean that the danger it poses to teaching and learning is not real. The rapidly expanding reach of AI technology, however, makes it difficult to grasp the strength, scope and longevity of its impact on education.

For example, should we be most concerned about students delivering AI-generated assignments,<sup>6</sup> about fake citations and articles,<sup>7</sup> about losing the quaint joy of finding something surprising in a book or journal, or even about whether the struggle and celebration of writing has become obsolete? Perhaps none of these may turn out to be real threats after all, just as the 19th-century crisis<sup>8</sup> caused by rising levels of horse manure in city streets disappeared once cars took over the roads.

While we should not underestimate the impact of ChatGPT-written essays submitted by students who hope that their professors will not notice, it is unlikely that AI will cause the demise of authentic student work.

The way educators frame, assess and discuss student assignments<sup>9</sup> is rapidly changing — originally in response to cheating by some students, but more recently to expand the assessment toolbox in ways that improve the learning experience. Rather than setting essays that a chatbot could quite happily cobble together, educators are creating more engaging and imaginative assignments that AI cannot (yet) replicate. These range from field trips and debates to archival work, placements in industry, and analysis of both human and AI-generated writing. As Peter Greene,<sup>10</sup> a high school English teacher, argued:

‘If [ChatGPT] can come up with an essay that you would consider a good piece of work, then that prompt should be refined, reworked, or simply scrapped ... if you have come up with an assignment that can be satisfactorily completed by computer software, why bother assigning it to a human being?’

Rose Luckin,<sup>11</sup> a professor of learner-centred design at the UCL Knowledge Lab in London, observes that AI forces educators to develop their students’ more nuanced abilities and, by critically responding to artificial text, images and arguments, expand their ‘AI literacy’.

‘Rather than teaching students only how to collate and memorise information, we should prize their ability to interpret facts and weigh up the evidence to make an original argument.’

Educators have understood for some time that AI needs to be harnessed in the classroom, rather than denied entry. For example, Rens van der Vorst,<sup>12</sup> a professor in the Netherlands, uses AI to teach the ethical and social consequences of technology. His classes include ‘teaching [students] to design and create advanced technology, such as artificial intelligence, data solutions and smart hardware’, to explore who defines the ethical

codes that we apply to new technologies. Van der Vorst created a board game that prompts students to confront the challenges driven by new technologies. The Moral Design Game<sup>13</sup> enables students to discover the impact of different technologies on human life and to reflect on the ethical and moral reverberations.

The Moral Design Game is just one of a myriad ways in which professors are incorporating AI into their teaching and assessment. Over the past few years multiple systems have been developed to support educators, including Carnegie Learning,<sup>14</sup> which offers AI services to help teachers customise learning for school-age students. Aleks<sup>15</sup> offers adaptive material to meet each student’s learning needs. TeachFX<sup>16</sup> and Edthena<sup>17</sup> provide constructive feedback to teachers based on video and assessments of their classroom impact.

As well as developing creative strategies to keep the negative forces of AI at bay, universities are manipulating its positive elements to broaden their students’ educational horizons. Just as the Moral Design Game teaches students the ethical ramifications of technology, AI itself can be used in the classroom<sup>18</sup> to encourage reflection and analytical thinking, for example by having AI write the opening statement of an essay with students completing the rest, or by using AI to help assess appropriate coursework.

In the business education environment, an AI language model could prepare case studies that push the boundaries of traditional case studies, perhaps by exploring exceptions to conventional rules. Students would then discuss or present possible responses to the case, either as a group project, in class or individually. As follow-up, the AI system could then suggest alternative solutions to the case. Together with their teacher, the students could analyse those suggestions and compare them to their own.

M’hammed Abdous,<sup>19</sup> Assistant Vice President, Teaching and Learning, at Old

Dominion University, USA, suggests that AI applications and competencies should be integrated in a cross-disciplinary way across universities:

'AI competencies should be transdisciplinary, reflecting the various areas of expertise involved in AI development: mathematics, machine learning, deep learning, programming, data science, writing, ethics, business management, etc. This transdisciplinary approach would allow universities to lay the groundwork for a holistic and integrated approach to AI education, while fostering collaboration and partnership between faculty from different disciplines.'

As AI becomes unexceptional, students (and everyone else) will gain from learning how to identify and critique computer-created solutions compared to their own. Critically, an in-person dialogue between the students themselves, as well as between students and educators, reduces the potential for negative AI influence on either production of work or assessment.

From the late Stephen Hawking to Yuval Noah Harari, public figures have warned that AI might threaten our fundamental safety, democratic freedoms, livelihoods and privacy. In 2015 dozens of AI experts wrote an open letter<sup>20</sup> describing the risks and uncertainties ahead. Among its signatories were executives from Google's DeepMind AI research company, Stephen Hawking and Geoffrey Hinton, a pioneer of AI development at Google who has now resigned to enable him to speak freely. They wrote:

'The potential benefits are huge, since everything that civilization has to offer is a product of human intelligence; we cannot predict what we might achieve when this intelligence is magnified by the tools AI may provide, but the eradication of disease and poverty are not unfathomable.'

Because of the great potential of AI, it is important to research how to reap its benefits while avoiding potential pitfalls.'

The Nobel laureate economist, Daniel Kahneman, worries that society will not be able to adapt as rapidly to the omnipresence of AI, as AI can learn to outwit human systems. In a 2021 interview<sup>21</sup> he described the different pace of adjustment between ourselves and computers:

'There is going to be massive disruption. The technology is developing very rapidly, possibly exponentially. But people are linear. When linear people are faced with exponential change, they're not going to be able to adapt to that very easily. So clearly, something is coming ... And clearly AI is going to win.'

Written before the advent of language model AI, Kahneman shows his uncanny ability to perceive threats to human decision making even before they exist. The mismatch he predicted is manifest in the diverse fields in which human ingenuity is racing to keep up with expanding AI capabilities, such as the arms race between essay-writing software and tools to suppress or indeed harness AI<sup>22</sup> for education. As in the old saying, 'if you can't beat them ...' educators are indeed choosing to make AI work on their behalf.

The historian Yuval Noah Harari envisages a rising threat to democracy and civil society from AI. Having already influenced unknown numbers of elections, non-human agents could, he argues,<sup>23</sup> create radical political movements, influence people to reject democratic norms and whip up hatred against minorities. While most people agree that students need to learn how to identify and filter fake information or actors, how can we know whether the content they read for research has not itself been contaminated by AI-generated responses? As Harari writes:

‘What will happen to the course of history when AI takes over culture, and begins producing stories, melodies, laws and religions? Previous tools like the printing press and radio helped spread the cultural ideas of humans, but they never created new cultural ideas of their own. AI is fundamentally different. AI can create completely new ideas, completely new culture.’

Although no one is currently calling for AI development to be banned, in March 2023 thousands of scientists unsuccessfully demanded a six-month moratorium<sup>24</sup> on commercial development of AI systems more powerful than GPT4. How do these warnings affect the potential for creative or destructive use of AI in education?

Controlling and redirecting fear is difficult and demands energy. The threat of AI is often compared to the post-war fear of nuclear weapons expansion.<sup>25</sup> The argument goes that AI, like nuclear weapons, is being developed incredibly fast, with little regulation, as part of an arms race between geopolitical powers and with the potential for vast human suffering. I hope the comparison turns out to be inaccurate, not only because it invokes a scenario of AI-powered mutual destruction, but because, unlike nuclear weapons, AI itself does not have an intrinsic purpose. It is up to humanity to determine how we apply AI to society, education, politics and business. As Vox contributor Dylan Matthews writes, ‘The best way to handle a new, powerful, dangerous technology is through broad international cooperation’. Global regulation and standards could transform our fear into curiosity.

In this light, the work being done by academics, scientists and teachers to channel the power of AI for positive outcomes is admirable and should inspire others to expand and deepen that work. In the education domain, the challenge for innovators is to make AI an ally rather

than a foe. Among the tech titans warning of the risks of AI, Bill Gates has the most optimistic outlook. He has argued<sup>26</sup> that its potential as a technology outweighs its threat to academic integrity, such as through AI-written assignments. AI enables teachers to create resources and projects that would not have been possible in the past. As a result, he believes AI will stimulate the exercise of critical thinking and challenge ingrained biases:

‘There’s another way that AI can help with writing and critical thinking. Especially in these early days, when hallucinations and biases are still a problem, educators can have AI generate articles and then work with their students to check the facts. Education nonprofits like Khan Academy<sup>27</sup> and OER Project,<sup>28</sup> which I fund, offer teachers and students free online tools that put a big emphasis on testing assertions. Few skills are more important than knowing how to distinguish what’s true from what’s false.’

The concerns of those worried about anti-democratic manipulation, loss of work opportunities and the potential for an AI arms race are valid and require coherent action from governments and global organisations. In the domain of education, it is not yet clear whether AI is more of a threat or an opportunity. The struggle between those who seek to undermine honesty and effort, and those who harness new technology to benefit teaching and learning will continue. In the near term, teachers should be determined to spot and weed out ChatGPT-written essays, without rigidly banning AI from the educational experience.

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