Impact and Implications of AI in Education for Every (Language) Teacher

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While the discussion on artificial intelligence (AI) has been on an uptrend in the field of computer science (and in popular culture, e.g. films, and fictions) since the 1940s-1950s (Allen et al., 2019), the widespread applications of AI have only begun in the early 2010s (Selwyn, 2022). Currently, there is no lack of reports and stories promoting AI as the silver bullet that can solve every problem imaginable. In fact, AI is attracting increasing attention in academia, and many institutions (including my university) are actively exploring opportunities to incorporate AI in education. However, instead of further 'hyping up' its prospect of educational success, *The future of AI and education: Some cautionary notes* by Neil Selwyn (2022) is a journal article that asks educators to take a step back and ponder five "areas of contention" before hastily jumping onto the educational AI bandwagon (p. 620). This open-access article has a length of 5920 words (excluding references) and comprises seven sections.

Section 1 sets the tone for the article, signalling the intention to generate discussions on the future of AI and education, while introducing "five broad areas of contention that might foster more rigorous discussion and decision-making": 1) hyperbole, 2) limitations, 3) social harms, 4) ideology, and 5) environmental sustainability (p. 621).

Section 2 elaborates on 1) hyperbole – the "heightened rhetoric and extravagant promotion" – and the over-selling of AI to the field of education (p. 621). Citing a 2019 report on around 2800 AI start-ups in Europe, Selwyn warns that an estimated 40% of these audited companies actually do not produce any useful AI products. He suggests that professionals ask fundamental questions, such as whether a specific educational AI product is actually AI, and what it is truly capable of, while also staying vigilant about the latest development in AI technologies.

Section 3 extends earlier discussions to the 2) limitations of AI applied in education. Citing a Princeton University study, Selwyn argues that because AI depends heavily on quantifiable data and not all important aspects of student's learning (including social behaviour, emotions, cognitive activities) can be captured in numbers, predictions made by AI are far from reliable. Therefore, the author summarises this section by advising the education community to "to develop more nuanced

understandings within education of the absolute limitations of AI technology, and to reset prevailing ambitions and actions accordingly" (p. 623).

Selwyn bluntly begins section 4 on 3) social harm by pointing out that "[t]he educational use of AI has already manifested in examples of social harm that systematically disadvantage and oppress minoritized groups" (p. 624). Due to bias in the collected data, calculations performed by AI discriminate against students of colour, accents, and gender identity, while unjustly awarding those who fit the biased training data or models which are developed based on faulty assumptions. All told, Selwyn is quick to remind educators that such discrimination may not be evened out by feeding AI more inclusive data, because the AI programs that generate such 'engineered inequality' is, in the first place, manufactured by societies "that are tightly structured by interlocking forms of domination" (p. 624). He ends the section by suggesting that the education community should reconsider the argument of "AI for good" due to the "inadvertent (if not outright) dishonest way of silencing more complex discussions around racism, ableism and other forms of social discrimination" (p. 624).

Section 5 further elaborates on 4) the ideology of debates about AI in education which leads to social harm. Selwyn draws the attention to a number of ideological tensions where the framing of AI lies at the centre of discussion. He elucidates the topic via two examples: i) how the professional technicists' "problem-solving mindset" (such as AI researchers and computer scientists who strive for improvement in performance and innovations) is conflicting with the growing concerns of social injustice brought by the application of AI products (p. 625); and ii) the conflict between the IT industry's actions and rhetoric that are influencing societies' understanding of AI and education, and the opposing view that education is non-quantifiable and social-constructive by nature. To summarise, Selwyn argues that "the topic of AI in education needs to be approached in contestable terms—as a site of struggle and politics, rather than a neutral benign addition to classrooms" (p. 626).

Section 6 describes the last area of contention, 5) environmental sustainability, which is the impact of AI and its continued development on our planet. Because AI techniques such as deep learning (i.e. a popular method researched in cryptocurrency trading) demand a tremendous amount

of energy to handle complex computations and in turn greatly increase carbon emissions, Selwyn urges stakeholders in education to take environmental sustainability, an issue rarely discussed, into serious consideration. While he posits that at present, "calling for the continued excessive application of AI technology in any context – education included – makes little sense in term of environmental sustainability" (p. 627), he does not rule out the advantages of looking into the more eco-friendly or energy-efficient educational AI. Nevertheless, it may be relatively more realistic to consider a future in education that is entirely without AI technology, simply because a long-term development of AI will not be ecologically sustainable.

The article concludes with Selwyn restating his intention to drive critical discussions among academics – particularly those with power to make decisions – on the topic of AI in education. These discussions, however, "need to be seen as profoundly political in nature, and entangled with broader issues of power, disadvantage and marginalisation", and taking a neutral stance "constitutes tacit support for maintaining the status quo and, therefore, the interests of dominant social groups and hegemonic political values" (p. 628). Additionally, discussions of AI and education should largely include "the people and groups who are most disadvantaged by the implementation of AI in education" in order to produce any meaningful and just outcomes (p. 628).

As someone who has a computer science degree and knows how AI works, I have always wanted to write a similar article to warn the education community about the danger of AI. I am glad that Selwyn has written this wonderful piece and helped red-flagging AI risks amidst the global marketing and public relations hype. I highly recommend this article to anyone working in education.

While I mostly agree with his arguments and appreciate his five broad areas of contention, I believe the situation may be much worse than what he has discussed. I refer to one of Selwyn's first points in Introduction, and I quote "there is little sense in speculating about the dehumanisation of classrooms, rise of robot teachers, and similar dystopian possibilities" (pp. 620-621). Many have thought that AI will never be able to replace humans because it is not capable of creativity, which is why we may sometimes see notifications or suggested reading on our smartphones with titles such as

"X jobs that will never/cannot be replaced by AI". Often, teachers are on this list, along with writers and content creators. The main argument is that these jobs require creativity to handle students from different backgrounds of different needs. This is no longer true for the latter two and I infer that the former will not be true for long.

Allow me to share a short personal story. In 2014, I began my PhD research on a computer-assisted extraction of linguistic creativity from a corpus of TV scripts with the help of statistical tools. In 2016, I found a method to determine statistical cut-off points that allows a computer program to efficiently locate patterns of linguistic creativity (Law, 2020). With this method, I imagine that an AI program can train itself using any textual data and be able to create at least, say, new jokes. Then, in 2017, I saw what one particular AI writer program was capable of, and I abandoned this horrific idea of a creative AI program.

On 20 June 2022, I posted a thread on my Twitter listing some examples of how AI is affecting education and creativity (Law, 2022). One of the examples is exactly the aforementioned AI writer program called *Shelley: Human-AI Collaborated Horror Stories* (or shelley.ai), an MIT project I followed closely on Twitter between October 2017 to November 2017 (MIT Media Lab, n.d.). At that time, anyone can type anything on any Twitter story threads and shelley.ai would write and tweet the next segment of the chain story. Looking at the quality of shelley.ai's stories today, I still feel the horror. The horror is not coming from the story content, but from realising how creativity, something that we take pride in and thus for granted, is gradually escaping from our grip.

Another example I shared in the same Twitter thread is a blog post on The London School of Economics and Political Science website by Mike Sharples, Emeritus Professor of Educational Technology at The Open University, UK, who notifies the education community that a website called openai.com/playground (OpenAI GPT-3 Playground, a sibling model of the popular ChatGPT) uses a Transformer AI program named Generative Pre-trained Transformer 3 (GPT-3) that has the capability to write an entire "student essay" in seconds, given that the user provides the essay question and around 1 US cent as the fee. The essay is by no means perfect, and its use of references may still

commit false attribution at times, but flaws simply make it more difficult for a human teacher to detect that it is AI-generated [for more information, see The Turing test (Stanford Encyclopedia of Philosophy, 2021)]. Then again, large language models (LLMs) are continuously trained with new data and input queries from users, so any existing limitations will likely disappear over time.

AI-human communication is not limited to text. In 2018, Google showcased its Google Duplex in a live demonstration of how the AI program was able to make restaurant reservations and haircut appointments on the phone with actual persons. The AI program made use of pauses and fillers of such realistic human-like quality and precision that the receivers failed to realise they were speaking to a computer program (Brownlee, 2018).

In recent months, AI art generators and their digitally-generated artworks took the world by storm. By providing simple keywords, users can use these AI programs to generate their very own Japanese-style manga for leisure and pleasure, or prize-winning artworks such as the one that won at the Colorado State Fair's fine arts competition (Roose, 2022). Want to experience this yourself? Try Google's Giga Manga (Google, n.d.).

These examples of AI creativity are strong evidence that AI teachers will soon be available online. But when? I believe this will happen when three conditions are met: 1) when Big Tech firms (Selwyn, 2022, p. 626) have incorporated sufficient teaching materials from websites and cloud storage, training videos from online video platforms, and users' comments on the quality and authenticity of these resources to train their machine learning models; 2) when these firms have consolidated various deep fake algorithms and models, images and videos of human faces and movements, as well as sound patterns of human voices; and 3) when the firms have decided that creating an AI teacher has financial benefits (or just plain fun). At the rate that the education community is feeding the internet with teaching resources, my prediction is, possibly in less than five years, we will be witnessing the launch of an AI teacher program in which learners can customise their own teachers: gender, ethnicity, face, voice, hairstyle, body shape, gesture, clothing, personality,

subject focus, teaching pace, reward system, to list a few. The bigger question is: is the education community prepared for this (or any of the AI technologies discussed in this review)?

Facing the imminent challenge of AI, language educators could consider increasing the proportion of multimodal production in course assessments. For instance, teachers may ask students to present their research on a topic in a 10-min video assignment in which students are required to argue for a critical stance, source and quote in both written texts and videos from authentic materials, and display the cited sources on the screen. This video assignment in the style of *Last Week Tonight with John Oliver* (LastWeekTonight, 2014) challenges students' ability to construct and support their arguments, manage overall organisation and cohesion, create their own content, present in front of cameras, and promote creativity and digital literacy. The bottom line is that AI can only play a small role in this assignment, if any, and each assignment is unique. Students may also incorporate this assignment into their learning portfolio or curriculum vitae for future job applications as a means of realising learning transfer.

In terms of language use, language teachers may want to place more emphasis on semantics, which is an aspect that is still computationally demanding for AI to analyse quickly, reproduce accurately, and disseminate widely. For instance, the word **development** (e.g. AI development, and data-driven technology development in Selwyn's article) carries an intrinsic meaning of growth and improvement, and therefore language educators need to be fully aware of the positive connotation, and consequently, the reality and ideology they are shaping when using a related nominal group/noun phrase (see Halliday, 1990; Law & Matthiessen, 2022 on how language shapes reality). With this in mind, it can be observed that Selwyn is carefully construing the meaning of **AI development**, and negating the seemingly positive connotation using various lexicogrammatical strategies, such as "the **excessive environmental burden** of current data-driven technology development", "the **cost** of continued AI development" (p. 626), and "**whether it is desirable (or even possible) to continue to sanction** the development and use of AI technologies over the medium to long term" (p. 627). These examples are intelligently constructed to construe a morally and ecologically responsible reality with

an aim to trigger readers' critical thinking. Examples such as these are difficult for AI programs to make a precise and in-depth description or explanation with the current technology. Therefore, language teachers may explore these kinds of topics in terms of meaning making (e.g. connotation, and speech act).

In conclusion, it is my hope that my review of Selwyn's article has sufficiently summarised his key concepts and has offered some thought-provoking examples for language educators. When accessing and experiencing these counterexamples, which I think all readers of my review should, I sincerely hope that one does not get carried away by the seemingly 'magical power' that these AI programs can deliver. Although we have not reached the point of an 'AI apocalypse' which Prof. Stephen Hawking (2014) and Elon Musk (Gomez, 2021) have warned about, there is every sign that education is about to undergo yet another paradigm shift.

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