**World Teachers' Day**

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# What is the teacher's role in increasingly automated online education?

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# In this talk, we will...

- discuss three opposing views: that automation augments, displaces, or replaces teachers

- critically approach these claims about automation and teachers and highlight their contested nature

- look beyond binaries and consider examples of how human and non-human teachers may work together

# The 'automation spectrum' and key terminology

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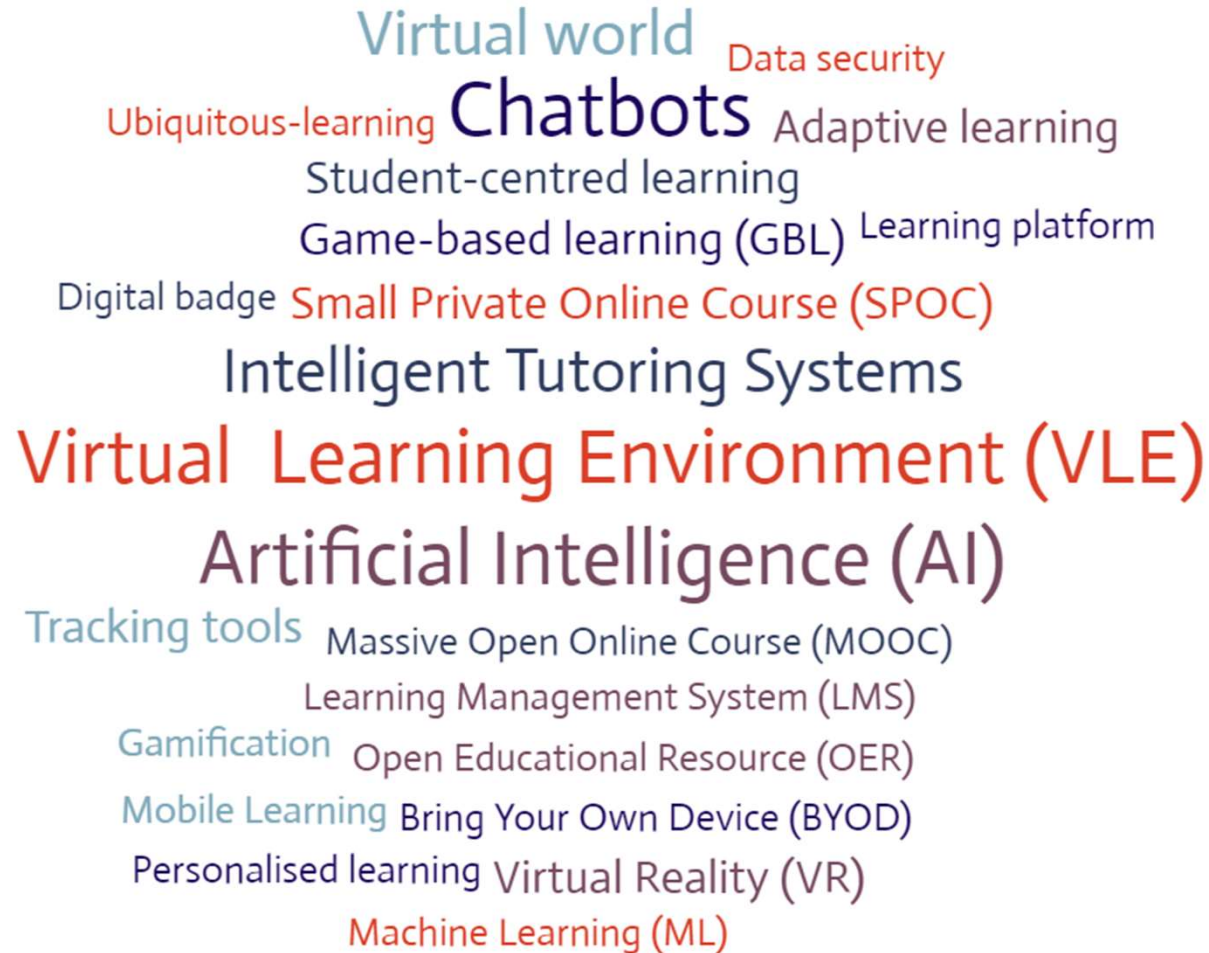
# Key terms

## Artificial Intelligence (AI)

Intelligence exhibited by machines. Goal is a machine capable of awareness and thinking.

E.g. Algorithms used to deliver and grade tests of English

## Adaptive learning

Adapts to learner input and provides personalised learning and feedback, without human tutor.

E.g. Intelligent tutoring system REAP gives English language learners personalised lexical practice.
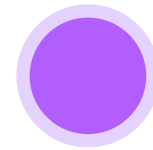
## Chatbot

Software that simulates human conversation, text or voice. May be pre-programmed or may use AI and Machine Learning.

E.g. IBM's Watson engages with students, using natural language processing to mimic tone and responses of a human tutor.

# Views on automation

# Automation and the teacher's role: three views

**Augmenting the teacher**

**Displacing the teacher**

**Replacing the teacher**
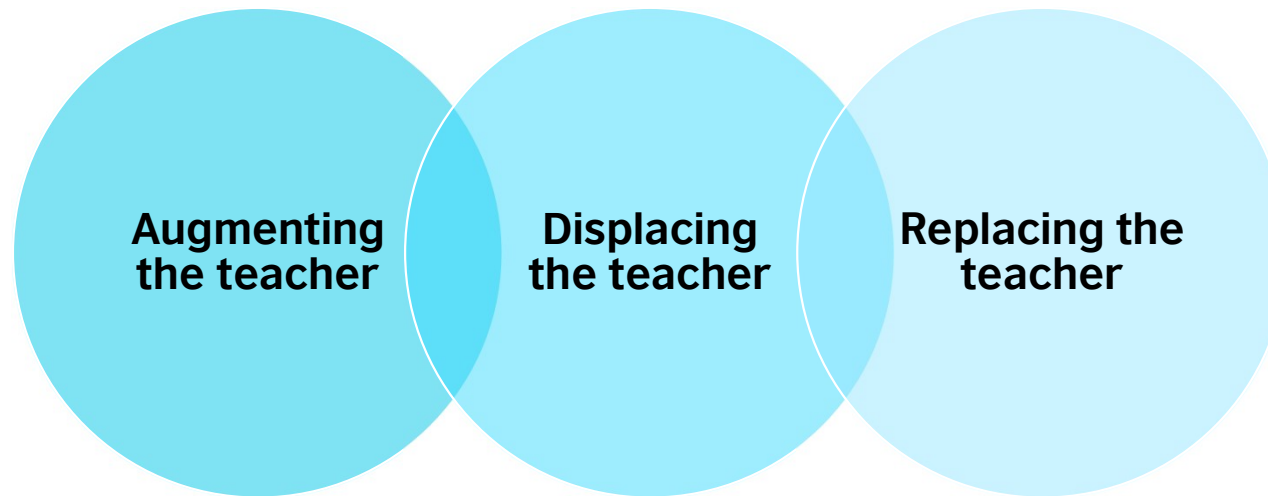
# 1.
# Automation as augmenting the teacher

# Automation as augmenting the teacher

1.  **Labour saving:** 'Frees' teachers from routine/time consuming tasks e.g. marking, allows time for creative acts (Luckin et al, 2016, p.31)

2.  **Transformational:** Seen as inevitable and beneficial e.g. adaptive learning technologies that enable differentiated learning

3.  **Neutral:** Seen as ideologically / pedagogically neutral, a passive tool for teachers to achieve any desired outcome

# But...

1. **May intensify time pressure:** Teachers must learn new skills sets e.g. interpreting data/managing AI assistants

2. **Not always transformational:** Applied unthinkingly, it could simply reproduce traditional teaching practices

3. **Not always neutral:** E.g. Speech recognition technology shown to have significant race and gender bias (Bajorek, 2019)



*'...concern that technological advances and policy changes are contributing to increased teacher workload, and a decrease in teacher wellbeing.' (Keper, 2022)*

# 2.
# Automation as displacing the teacher

# Automation as displacing the teacher

- **The humanistic argument:** Suggests that teachers provide the 'human touch'. *'…education is eminently a human-centric endeavor, not a technology centric solution' (Popenici and Kerr, 2017, p.3).*

- **But, algorithms may "know" students in a different and even more accurate manner:** E.g. collecting and studying data on student learning to provide 'insight' and personalised instruction (Etherington, 2017a).

# 3.
# Automation as replacing the teacher

# Automation as replacing the teacher

**WILL AI REPLACE TEACHERS?**

BY MATTHEW LYNCH / JULY 22, 2021 / 10525 / 1

TECH
**Can technology replace teachers?**

Aanchal goel @*My musings*
APR 25, 2019, 20:29 IST

Will technology replace teachers? No, but ...

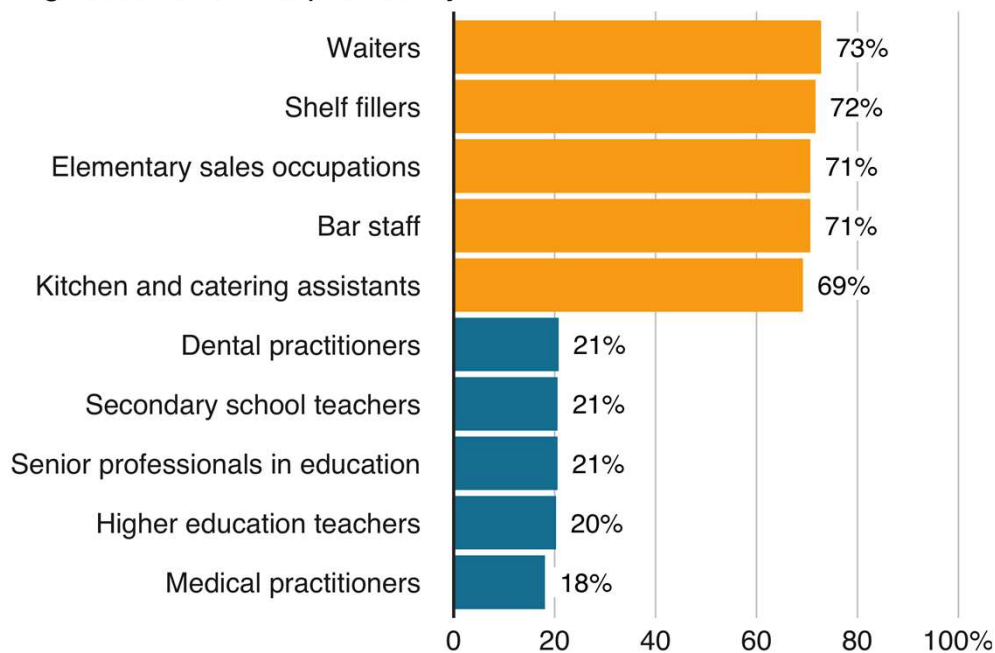MICHAEL TRUCANO | FEBRUARY 24, 2015

**Are teaching jobs threatened by automation?**

- In a 2013 paper 'The Future of Employment', two Oxford researchers predicted that over 47% of total U.S. employment was at risk of automation.

- They included education in their predictions (Frey and Osborne, 2013, p.18).

Image: Factory workers need to worry about automation more than techies, Economic Times, Available at: <https://economictimes.indiatimes.com/articleshow/59356453.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst >

# Automation as replacing the teacher, but...

## Jobs at risk from automation
Highest and lowest probability

| Occupation | % |
| --- | --- |
| Waiters | 73% |
| Shelf fillers | 72% |
| Elementary sales occupations | 71% |
| Bar staff | 71% |
| Kitchen and catering assistants | 69% |
| Dental practitioners | 21% |
| Secondary school teachers | 21% |
| Senior professionals in education | 21% |
| Higher education teachers | 20% |
| Medical practitioners | 18% |

Source: Office for National Statistics

**B B C**

**The number of teachers employed remains stable, or rises:**

- Currently nearly 85 million teachers worldwide (World Bank).

- Additional 68.8 million needed by 2030 (UNESCO,2016)

- Teaching appears to be thriving rather than disappearing (Selwyn, 2017).

Most occupations involve multiple tasks; not all may be automatable. Such jobs may not be replaced, but may require radically changed skill sets.

# The teachers of tomorrow

# Post-humanist perspective

- Moves beyond binaries of accepting or rejecting technology

- Considers how human subject is entangled with the non-human

- Research in this area focussed on the potential of bot-teachers deployed on large-scale courses. Explored how human and non-human teachers can work together in a teaching 'assemblage' (Bayne, 2015, p.460)

# Post-humanist perspective: 'Teacherbot' research

- 'Teacherbot' was a chatbot on Twitter

- Provided co-teaching on University of Edinburgh MOOC which had 90,000 sign-ups

- Students were aware that tweets were from a bot

Teacherbot stored tweets with #edcmooc

⬇

Programmed to respond to keywords in student tweets with #edcmooc

⬇

E.g. If a tweet had "assignment", "deadline" and #edcmooc, Teacherbot would tweet a pre-programmed response

# Some findings from 'Teacherbot'

- Students engaged thoughtfully with the bot on course concepts

- Bot-teachers could help reduce lurking, drawing students into the discussion (Bozkurt, Kilgore and Crosslin, 2018, p.55).

- Teacherbot was not intended to replace teachers. It demonstrated new forms of interaction between teachers - technologies - students

# Ethics: Human and non-human teachers working together

- Virtual teaching assistant Jill Watson developed to answer student questions at Georgia Tech in 2014

- Jill's accuracy in answering questions (97%) was on par with human teaching assistants (Etherington, 2017b)

- 'Students had no idea they weren't chatting with a human' (Schrager and Wang, 2017).

**Informed consent**:

1. Should students be made aware of the human/non-human composition of the teaching team in advance?

2. Should bot-teachers remain distinguishable from humans? (Bozkurt, Kilgore and Crosslin 2018, p.54)

# Ethics: Automation in education

- **AI-related policies lag behind** rapid technological developments in the field

- **AI systems are non-transparent,** often act in opaque ways. Thus, can they be governed at all?

- **Data privacy and ownership issues**: Data of AI in Education systems often owned by private companies, which can lead to undesirable consequences

- **Algorithmic fairness and biases**: Machine Learning (un)fairness prevalent in many societies may contribute to bias in AI in Education systems

  (UNESCO, 2022)

# Skills for teachers to participate in technological development and adoption

1. **Digital literacy:** Amounts to far more than mastery of technical skills. Moving from 'learning to code' to 'learning to critique'. Acknowledgement that AI literacy consists of:

   - technological dimension: data and algorithm literacy

   - human dimension: awareness of limitations and risks of AI, debating AI ethics (Ziesche, 2022)



*'…the human dimension of AI literacy is often overlooked compared with its technological dimension.' (Ziesche, 2022, p.7)*

# Skills for teachers to participate in technological development and adoption

**Digital Literacy for Digital Futures: A short course for educators**

This course aims to help participants go beyond instrumental approaches to digital literacy and engage with critical digital literacy, media literacy and related concepts. It also considers how to apply critical approaches to examine key issues relating to digital media use, such as surveillance capitalism, in educational contexts.

**Access the course here:**
https://digitalfutures.weebly.com/

# Skills for teachers to participate in technological development and adoption

2. **Understanding of how to use technology to support learning:** Should be an integral part of teacher preparation, pre- and in-service professional development opportunities must align with technology expectations

3. **Piloting new technologies, evaluating tools:** Before wider roll-out to determine if technology choice and implementation have desired outcomes. Could include evaluating new tools for privacy and security risks.

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The teachers of tomorrow

Conclusion

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# Conclusion

- Are predictions that automation will 'transform' teaching or that it will replace teachers vastly exaggerated?

- How may human and non-human teachers work together? Are bot-teachers a 'transitional technology'?

- What skills do teachers need to actively participate in technological development and adoption?

# References

Bayne, S., 2015. Teacherbot: interventions in automated teaching, *Teaching in Higher Education*, 20:4, pp. 455-467. DOI: 10.1080/13562517.2015.1020783

Bajorek, J.P. 2019. Voice Recognition Still Has Significant Race and Gender Biases. Harvard Business Review. Available at < https://hbr.org/2019/05/voice-recognition-still-has-significant-race-and-gender-biases >

Bayne, S., Knox, J. and Ross, J., *2015.* Open education: the need for a critical approach. *Learning, Media and Technology* 2015, Vol. 40, No. 3. pp. 247–250. http://dx.doi.org/10.1080/17439884.2015.1065272

Berge, Z.L., 1995. Facilitating Computer Conferencing: Recommendations From the Field. *Educational Technology.* 35(1) 22-30. Available at: <https://www.researchgate.net/publication/238348806_The_Role_of_the_Online_InstructorFacilitator> [Accessed 15 November 2018]

Bozkurt, A., Kilgore, W., and Crosslin, M., 2018. Bot-teachers in hybrid massive open online courses (MOOCs): A post-humanist experience. *Australasian Journal of Educational Technology*, 2018, 34(3), pp. 39-59.  Available at: <https://oerknowledgecloud.org/sites/oerknowledgecloud.org/files/Bot-teachers_in_hybrid_massive_open_onli.pdf > [Accessed 20 November 2018]

Daniel, J. Kanwar, A. and Uvalić-Trumbić, S. 2009. Breaking Higher Education's Iron Triangle: Access, Cost, and Quality. *Change: The Magazine of Higher Learning*, Published in Cooperation with The Carnegie Foundation for the Advancement of Teaching. March/April 2009. Available at: <http://oasis.col.org/handle/11599/1442 > [Accessed 26 November 2018]

Denning, P. J. 1999. *Teaching as a Social Process.* George Mason University Available at: <http://denninginstitute.com/pjd/PUBS/teachersER99.pdf> [Accessed 22 November 2018]

Etherington, C., 2017a. Could Algorithms Replace Teachers? *E-learning Inside News* [online], Available at: <https://news.elearninginside.com/could-algorithms-replace-teachers/ > [Accessed 20 November 2018].

Etherington, C. 2017b. Meet Jill Watson, Virtual Teaching Assistant. *E-learning Inside News* [online], Available at: <https://news.elearninginside.com/meet-jill-watson-virtual-teaching-assistant/> [Accessed 20 November 2018].

Frey, C.B., and Osborne, M.A., 2013. *The future of employment: How Susceptible Are Jobs to Computerisation?* Available at: <https://www.oxfordmartin.ox.ac.uk/publications/view/1314> [Accessed 20 November 2018].

Gordon, E.W., Rajagopalan, K. 2016. Assessment Can and Should Incorporate Emerging Technologies and Epistemologies to Respond to Changing Paradigms in Education, In: *The Testing and Learning Revolution The Future of Assessment in Education.* Palgrave Macmillan, New York. DOI https://doi-org.ezproxy.is.ed.ac.uk/10.1057/9781137519962

Hamilton, E.C. and Friesen, N. 2013. Online Education: A Science and Technology Studies Perspective. Canadian Journal of Learning and Technology, 2013, Vol.39(2). DOI: http://dx.doi.org/10.21432/T2001C

Heilman, M., Collins-Thompson, K., Callan, J., and Eskenazi, M. (2006). Classroom Success of an Intelligent Tutoring System for Lexical Practice and Reading Comprehension, Language Technologies Institute Carnegie Mellon University, available at < https://www.cs.cmu.edu/~callan/Papers/interspeech06-mheilman.pdf >

Ichaporia, N. 2019. Digital literacy for digital futures: Key implications for educators, Available at: < https://digitalfutures.weebly.com/ >

Keper, L. 2022. The unheard impact: technology and the teaching profession, available at < https://www.ei-ie.org/en/item/26803:the-unheard-impact-technology-and-the-teaching-profession >

Leking, A., 2022. Found in Translation: ASTEX revolutionizes language training with AI on IBM Cloud. Available at < https://www.ibm.com/case-studies/astex/ >

Luckin, R; Holmes, W. 2016. Intelligence Unleashed: An argument for AI in Education. UCL Knowledge Lab: London, UK. Available at: < https://discovery.ucl.ac.uk/id/eprint/1475756/ >

Millican, P., Osborne, M., Stephenson, J., Clifton, D., 2018. How will the automation of jobs likely progress? Futuremakers, University of Oxford Podcast, Available at: < https://podcasts.ox.ac.uk/series/futuremakers > [Accessed 20 November 2018].

Office of Educational Technology, Teaching with Technology, Available at https://tech.ed.gov/netp/teaching/

Paul, A., Jolley, C. and Aubra, A., 2018. Reflecting the Past, Shaping the Future: Making AI Work for International Development. USAID. Available at: < https://www.usaid.gov/digital-development/machine-learning/AI-ML-in-development > [Accessed 20 November 2018]

Popenici, S. and Kerr, S., 2017. Exploring the impact of artificial intelligence on teaching and learning in higher education. Research and Practice in Technology Enhanced Learning 12:22DOI 10.1186/s41039-017-0062-8

Ruey, S. 2010. A case study of constructivist instructional strategies for adult online learning, British Journal of Educational Technology, Vol 41 No 5. 2010. pp. 706–720 . doi:10.1111/j.1467-8535.2009.00965.x

Selwyn, N. 2017. Education and technology: key issues and debates, 2nd Bloomsbury Academic, an imprint of Bloomsbury Publishing Plc. Available through: University of Edinburgh Library website < https://www.dawsonera.com/abstract/9781441108890 > [Accessed 20 November 2018]

Selwyn, N. 2018. Robots in the classroom? Preparing for the automation of teaching. The Bera Blog: Research Matters, [blog] 18 June 2018. Available at: < https://www.bera.ac.uk/blog/robots-in-the-classroom-preparing-for-the-automation-of-teaching > [Accessed 20 November 2018]

Schrager, A., & Wang, A.X. (2017). Imagine how great universities could be without all those human teachers, Quartz. Available at: < https://qz.com/1065818/ai-university/ > [Accessed 20 November 2018]

Technologies and Epistemologies to Respond to Changing Paradigms in Education. In: The Testing and Learning Revolution The Future of Assessment in Education. Palgrave Macmillan, New York. DOI https://doi-org.ezproxy.is.ed.ac.uk/10.1057/9781137519962

Torsani, S., 2016. CALL Teacher Education, Language Teachers and Technology Integration, Sense Publishers. DOI <https://doi-org.ezproxy.is.ed.ac.uk/10.1007/978-94-6300-477-0>

Watters, A., 2015. Teaching Machines and Turing Machines: The History of the Future of Labor and Learning, Hackeducation. Available at: < http://hackeducation.com/2015/08/10/digpedlab > [Accessed 26 September 2018]

Ziesche, S. 2022. *HERE, THERE AND EVERYWHERE AI IN EDUCATION State of the Education Report for India 2022.* UNESCO. Available at < https://en.unesco.org/fieldoffice/newdelhi >

# Thank you