

Redefining education to prepare for an AI driven future



Introduction

Automation and artificial intelligence (AI) are transforming the nature of work and the workplace itself. Machines will be able to carry out more of the labour-intensive jobs, complement and go beyond the work that humans can do. Society will need to adjust as some occupations decline, while others grow, but none remain the same. According to a report from McKinsey in 2017, about 15% of work activities are likely to be displaced by 2030. Equipping populations with AI skills will be the key to overcoming two major hurdles to the potential benefits of AI: the risk of widespread job losses and the talent gap that businesses will face as their processes increasingly rely on AI-based systems. Workers will need to acquire new skills and may have to move from declining sectors to emerging fields. Reforms in the education system and lifelong learning are key facets of education policy that can effectively address both worker displacement and talent gap.

Government and private sector measures to prepare for the future of work

Primary and secondary school levels

China, Japan, South Korea, Singapore, India and Australia have recently started reforming their education systems, with the aim of nurturing the next generation with digital skills. In all these countries, automation is clearly boosting the importance of skills related to STEM (science, technology, engineering, and mathematics).

Government-led programmes are leading the way in China, Japan, South Korea and Singapore. The Ministries of Education (MoE) in these countries have all introduced mandatory or introductory coding classes at the primary, middle school, and some up to the secondary-school levels. In China, coding skills will become a college entrance requirement. Infrastructure appears to be sufficient in these countries too. In Japan, the Ministry of Education, Culture, Sports,

Science and Technology (MEXT) revised the 'National Curriculum Standards' for public schools that financially support a variety of pilot projects, such as providing cutting-edge ICT infrastructure in schools. Singapore will be ramping up cyber wellness education under the enhanced Character and Citizenship Education (CCE) that will be introduced in 2021 and will launch a National Digital Literacy Programme (infosheet on Strengthening Digital Literacy) to help students strengthen their digital AI and competencies upto tertiary levels. Due to the pandemic and the subsequent home-based learning, personal learning devices (PLDs) were extended to all secondary school students, which has accelerated IT literacy across all Gen Z Singaporeans.

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new plans for digitalisation. In December 2019, South Korean President Moon Jae-in announced a national strategy for Artificial Intelligence, whereby new teachers are trained in AI-related content courses and coding.¹ On the other hand, although Chinese students took the top spot in STEM subjects in the latest PISA ranking, China still lacks qualified teachers in programming and coding, which slows down the progress of the overall reform. This reflects in Australia too.²

We find India and Australia's strategic education plans to be less vigorous. India is about to unveil its new National Education Policy, which currently focuses on essential learning and increasing critical thinking.³ The Central Board of Secondary Education has recently included AI as a subject for students of grade 8, 9 and 10, where they will have a grasp on advanced concepts such as Robotics, Internet of Things (IoT)

and Big Data.⁴ The major challenge in India is the access and availability to infrastructure, which varies drastically between publicly or privately funded schools. Because Australia's education system is already largely focused on humanities and the development of students' critical thinking skills, the added focus of the public discussion is now directed towards improving the caliber of STEM subjects and digital literacy. Extensive funding on this has been granted by the Australian government and a National STEM School Education Strategy for 2016–2026 was launched in 2015.⁵ While science, research and innovation are clearly perceived as long-term drivers of economic prosperity in Australia, the implementation is not always successfully carried out. In spite of schools and students having high quality digital technology at their disposal, its use by teachers in the classrooms is still limited compared to other OECD countries.⁶

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Higher and tertiary education level

The number of Chinese students graduating from Science and Engineering programs have risen exponentially. Since 2000, the numbers have risen by 450%.⁷ In 2017, about 8 million students have graduated in STEM programs. In Japan, universities are encouraged to implement data literacy across all programs. An initiative on AI expert education will

account for training about 2000 data scientists annually. In addition, the government will promote a new certification system for programs of excellence in mathematics, data science and AI education. These certifications will be accorded to those who are entering and graduating from universities.

¹ South Korea National Strategy for AI <http://www.inews24.com/view/1229784>

² Financial Review – Australian schools tech ready, but not teachers <https://www.afr.com/work-and-careers/education/australian-schools-tech-ready-but-not-teachers-20200416-p54kd4>

³ Draft National Education Policy 2019 https://www.mhrd.gov.in/sites/upload_files/mhrd/files/Draft_NEP_2019_EN_Revised.pdf

⁴ The Hindustan Times – CBSE to introduce artificial intelligence courses in classes 8,9,10 <https://www.hindustantimes.com/education/cbse-to-introduce-artificial-intelligence-courses-in-classes-8-9-10/story-cDUJJS5g1GipKbhcMpZzxH.html>

⁵ Australian National Stem School Education Strategy 2016-2026 <http://www.educationcouncil.edu.au/site/DefaultSite/filesystem/documents/National%20STEM%20School%20Education%20Strategy.pdf>

⁶ Financial Review – Australian schools tech ready, but not teachers

⁷ Is China Ready for Intelligence Operation <https://chinapower.csis.org/china-intelligent-automation/>

The Korean government went a step further by designating AI-specialised graduate schools. In 2019 five universities were selected (KAIST, Korea University, SKKU, GIST and POSTECH), and it will be extended to seven additional ones by the end of 2020.⁸ These universities are expanding their scope from AI education to application for smart campuses, such as AI chatbots and VR labs, by integrating Internet of Things (IoT), Blockchain and AI technologies.

In Singapore, baseline digital competencies

like computational thinking and data competencies will be enhanced by 2021 across all Institutions of Higher Learning. Those gearing towards a career in sectors such as Finance, Manufacturing, Logistics and Cybersecurity, will be equipped with an even higher proficiency in AI competencies. Similarly in Australia, universities are updating their curricula to ensure that their graduates are employable in the current job market and increasingly developing micro-credentials in disciplines such as Cybersecurity, Software Development, Machine Learning, etc.⁹

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Skilling and reskilling programmes and participation of the private sector

The need to build a lifelong education system is in line with the transition into the digital age. The Chinese Prime Minister, Li Keqiang, announced in May 2019 that 100 billion yuan (approx. \$14.8 billion) would be invested in up- and re-skilling the workforce. Currently, the government relies heavily on the private sector to equip employees with AI skills. The government in Japan partners with the private sector too, however the MEXT has plans for approximately 1 million professionals to take courses in acquiring basic proficiency in Data Science, Programming and AI.¹⁰

The most comprehensive initiative in

this regard is the SkillsFuture Singapore programme, under the Ministry of Education. It offers subsidies of S\$500-\$1500 to all citizens over the age of 25 for a pre-approved list of courses (and even higher subsidies for mid-career professionals or those intending to switch careers).¹¹ One such programme, led by AI Singapore, aims to target around 12,000 industry professionals and young students specifically providing skillsets in AI to boost productivity.¹² Additionally, the government collaborated with Google for the Skills Ignition SG programme to provide training to entry and mid-career job seekers in expertise like Digital Marketing and Cloud Computing.¹³

⁸ AI Education for All http://news.chosun.com/site/data/html_dir/2020/03/30/2020033002341.html

⁹ Australian Government Department of Education, Skills and Employment – STEM <https://www.education.gov.au/support-science-technology-engineering-and-mathematics>

¹⁰ National Institute of Informatics – MEXT scholarship Priority Graduate Program <https://www.nii.ac.jp/graduate/en/entrance/mext-pgp/>

¹¹ SkillsFuture Singapore <https://www.skillsfuture.sg/>

¹² Techwire Asia – Singapore driving smart nation development through AI education <https://techwireasia.com/2018/08/singapore-ai-initiative-help-improve-population-proficiency/>

¹³ Grow with Google – Skills Ignition SG https://grow.google/intl/ALL_sg/skillsignitionsg/#?career--ready-with-google_activeEl=career--learning-plans

On a similar path is South Korea. The matchup online program, run by the National Institute for Lifelong Education, will offer TO professionals in the workforce courses in specific fields such as AR/VR, smart city, 3D printing and IoT.¹⁴ By the end of 2022, AI training programs will be provided to all military officers and civil servants.¹⁵ The private sector also plays a big role in the re- and up-skilling of the workforce. For example, KT (Korea Telecom) announced its training plan for 1000 AI professional employees in 2019 and its support for AI coding education for about 5000 under privileged teenagers.¹⁶ CJ Olive networks directly offers AI training to all employees via the newly established Digital Transformation Academy.¹⁷ From 2020, Samsung Electronics together with Seoul National University and KAIST, will provide AI specialised training programs to three vocational high schools as a pilot program.¹⁸

Australia has a network of Technical and

Further Education (TAFE) institutions which provide further training for professionals.¹⁹ However, the upskilling is usually left to the initiative of the individuals or businesses. This role of the private sector is most notable in India. The IT conglomerate Infosys, for instance, has built one of the largest corporate training centres in the world, (re-) training 4000 new hires and graduates in a four-month program, which adds up to 12,000 future employees being trained per year in Mysore alone. In March 2020, Dell Technologies partnered with the governmental Think Tank NITI Aayog to launch its first 'Atal Tinkering Lab' in Mumbai under the Atal Innovation Mission, to help foster an innovation and entrepreneurial mindset in students from a young age.²⁰ Consequently, India's EdTech sector has also been booming with new offers to cover the heightened demand. The online reskilling market, estimated to be close to USD100 million currently, is expected to grow at a rate of 30% – 40%.²¹

¹⁴ Matchup Online Program South Korea <https://matchup.kr/main/secureCheck.do>

¹⁵ Education for All <https://www.hankookilbo.com/News/Read/201912171743713886?did=NA&dtype=&dtypecode=&prnewsid>

¹⁶ KT plan to train 1000 AI experts <http://sports.chosun.com/news/ntype.htm?id=201911010100000430018105&servicedate=20191031>

¹⁷ AI training for the employees in CJ Olive networks <https://www.zdnet.co.kr/view/?no=20190522165850>

¹⁸ AI education from Samsung-SNU-KAIST <https://www.yna.co.kr/view/AKR20191204052800030?input=1195m>

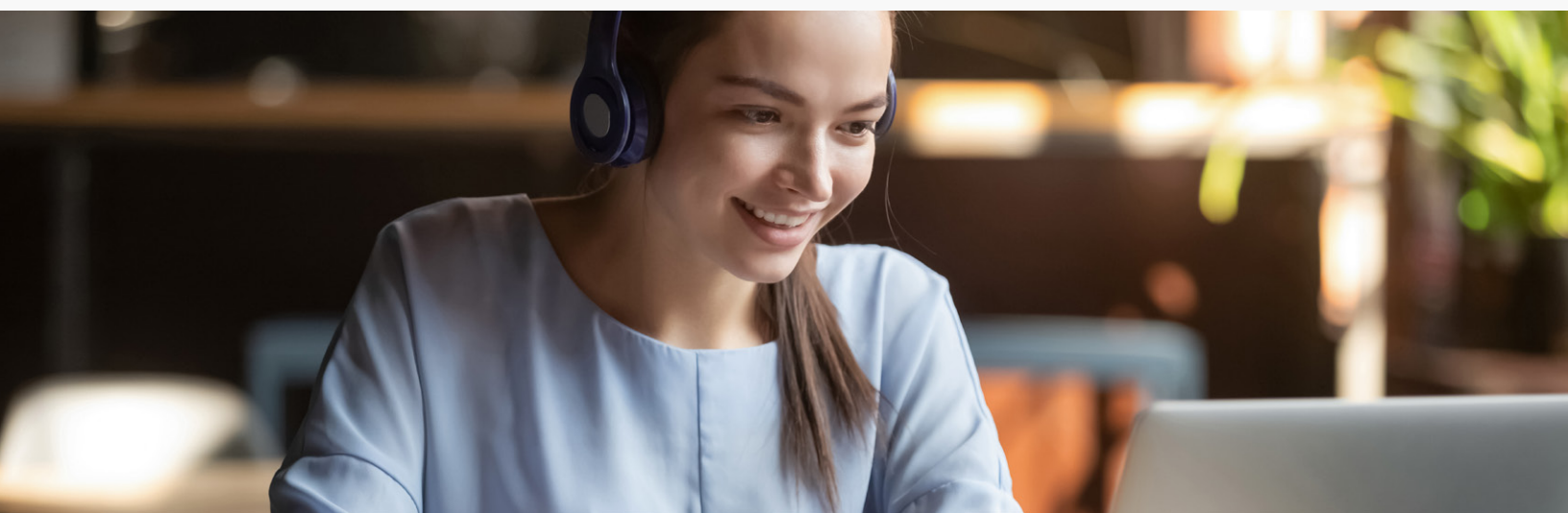
¹⁹ Study in Australia – Technical and Further Education

<https://www.studiesinaustralia.com/studying-in-australia/what-to-study-in-australia/types-of-education/technical-and-further-education>

²⁰ NITI Aayog - National Strategy for Artificial Intelligence 2018

https://niti.gov.in/writereaddata/files/document_publication/NationalStrategy-for-AI-Discussion-Paper.pdf

²¹ KPMG – Online Education India <https://assets.kpmg/content/dam/kpmg/in/pdf/2017/05/Online-Education-in-India-2021.pdf>



Conclusion

AI technologies require advanced skills and workers who can maintain complex AI systems and applications. According to a study, compiled by the Tencent Research Institute, there are just 300,000 AI engineers, researchers and practitioners worldwide, when several millions of them will be needed over the next two decades. Attendance in machine learning and AI courses have skyrocketed in recent years, as have enrolment in online courses, but there is obviously a lag as individuals complete their education.

While AI is high on the agenda for many economies, there is a global shortage of AI talents, especially in Asia. In most countries in the region, lifelong learning and upskilling

schemes are already helping professionals to upgrade and diversify their skills. To bridge this talent gap governments in the region, including Australia, have recently started to bring curriculum reforms in their education systems. Governments understand that they need to start devoting more resources to universities to boost the number of undergraduate and graduate students and the focus is clearly on core STEM subjects. Governments rely more or less heavily on the participation of the private sector and industries in cultivating talents and providing students training and internships to work in AI innovation labs. For China, the goal of becoming a world leader in AI by 2030 is clear.