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AI-Driven Technological Unemployment and the Role of Education

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Abstract

The goal of artificial intelligence (AI) is to simulate, and sometimes even surpass, human intelligence in order produces the best results. The unpredictability of AI growth means that certain harmful impacts are not being considered, which entails risks that in some circumstances could be viewed as threats. All agree that the impact of AI on the workforce is an undeniable fact. AI needs to be seen from a human-complementary standpoint to have a beneficial impact, that is, to maintain both productivity and the workforce. "What is the purpose and function of education?" is the question that now must be answered. Artificial intelligence education needs to support social life by utilizing AI to lower economic disparity and boost productivity. Education can help transform the workforce to fit the needs of the AI-based economy.

Keywords: Artificial intelligence, technological unemployment, education

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Introduction

Artificial intelligence (AI) is a set of algorithms that have the ability to perform tasks that require human intelligence, go beyond human intelligence, make decisions, solve problems and create new opportunities (Castellvecchi, 2016; Dobrin, 2023; Mitchell, 2019). From another perspective, software that models intelligent behaviour with minimal human intervention (Haenlein & Kaplan, 2019) is a new digital frontier that will transform business and working life (WIPO, 2019). Artificial intelligence is being used in sectors as diverse as agriculture, automotive, logistics, textiles, energy, health, security, and education. For example, the use of robotic technologies and crop monitoring in agriculture; autonomous driving, diagnostics, infotainment, and navigation in automotive; it is preferred in retail for purposes such as customer service, innovation and resource chain management (EIU, 2023).

Although artificial intelligence has become publicly known with ChatGPT as of November 2022, it has already been used in numerous applications, particularly on platforms such as Netflix, Amazon and Duolingo, or on Alexa or Siri. However, since the direction of AI development is not preordained in advance, it is a technology whose destructive effects are not currently taken into consideration and that carries risks that can be considered a threat in economic, political, and sociological contexts (Acemoğlu, 2021a). These risks include the manipulation of voter preferences, the implementation of more surveillance and control (algorithmic oppression), the perception of individuals as automated machines and the denial of their rights, security, and access to resources (algorithmic exploitation), and ultimately the harming of people by the weakening of their position (algorithmic dispossession) (Mohamed et al., 2021). Consequently, AI technologies have the potential to erode democratic values, narrow areas of freedom, disrupt social justice, and negatively affect the future of professions (Acemoğlu, 2021b).

In response to concerns, various regulations have been enacted in the European Union, the United States of America, and the People's Republic of China. For instance, the European Union has the objective of becoming a global regulator and intends to implement regulations that will require AI technology to undergo a risk analysis before entering the market and to focus on companies' AI algorithms. In the United States, the political structure presents a challenge to the implementation of effective regulation. Some regulatory studies include limited

enforcement mechanisms, particularly from a neoliberal perspective, and are therefore unlikely to become law. The People's Republic of China has enacted regulations pertaining to the use of GenAI. At this juncture, studies are being conducted with the objective of safeguarding users and ensuring the transparency of algorithms (EIU, 2023). Although the efforts of global actors regarding artificial intelligence regulations appear to be motivated by the best of intentions, the current concerns are most evident in the context of employment issues.

Designed for greater profit and control, the combination of AI and automation has the potential to take over the work of many workers (Dehlendorf & Gerety, 2021). The unpredictable capacity of artificial intelligence heralds an incredible change with the emergence of productive artificial intelligence, but it also heralds many devastating effects, especially unemployment. Companies want to reduce the number of employees and increase efficiency by using AI technologies (Acemoğlu & Restrepo, 2022a). In addition to reducing production costs, this perspective also aims to deal with fewer human-related problems (Acemoğlu and Restrepo, 2022b). The first reflections of this aim can be seen in unskilled jobs. With the spread of artificial intelligence, jobs that do not require many qualifications and can be easily transferred to machines will become obsolete (Taylor, 2021). This will exacerbate the ongoing phenomenon of economic inequality, as workers become more expendable in the face of machines. In the United States, for example, positions that are not compatible with AI are being reduced and the skill requirements of the remaining jobs are being updated (Acemoğlu et al., 2022). Acemoğlu et al. (2023) posit that the prevailing approach to artificial intelligence will result in increased unemployment. They argue that an alternative path for AI should be human-complementary. Consequently, "education for AI" should be to sustain social life by working with artificial intelligence in order to both increase productivity and reduce economic inequality.

AI-Driven Technological Unemployment and the Role of Education

With the process of automation, machines began to replace human labour and many jobs were automated. Although automation, like any technological innovation, leads to pessimism about the future of jobs, this situation has receded from the agenda as new areas of business have emerged. However, discussions about the future of jobs have been reignited by advances in artificial intelligence technologies, the last wave of technological progress, which have the potential to perform not only tasks that require human labour, but also tasks that require human intelligence (David, 2017; Guliyev, 2023; Oschinski & Wyonch, 2017). The focus of these discussions is that the widespread use of artificial intelligence will save labour and create mass unemployment, defined as technological unemployment (Brynjolfsson et al., 2024; Mutascu, 2021).

Technological unemployment is when the demand for human labour decreases and reaches a mass level due to the use of innovative technologies in production and service sectors (Abbott & Bogenschneider, 2018; Acemoğlu & Johnson, 2023). Keynes was the first to use this concept in a broad sense (1930 [1963]: 364):

> "We are being afflicted with a new disease of which some readers may not yet have heard the name, but of which they will hear a great deal in the years to come-namely, technological unemployment. This means unemployment due to our discovery of means of economising the use of labour outrunning the pace at which we can find new uses for labour. (…) But this is only a temporary phase of maladjustment. All this means in the long run *that mankind is solving its economic problem.*

Although Keynes's prophecy did not come true, the rise of artificial intelligence has begun to bring the dystopian perspective to a realistic point, and it has begun to be loudly spoken that this new actor has the potential to be disruptive to the workforce and is about to reverse the optimistic scenarios (Cazzaniga et al., 2024; Korinek & Stiglitz, 2019). One of these highlights three possible effects of artificial intelligence on the workforce (Peters et al., 2019): (1) joblessness (jobs will be disappeared), (2) hybrid (human-being in control) and (3) normal (AI will create new jobs). The first scenario is pessimistic, the second is cautious and the third offers the perspective that fears are completely unfounded.

AI, which has the potential to have a profound impact on the global economy, affects 60 per cent of global employment in advanced economies. Overall exposure is 40 percent in emerging economies and 26 percent in low-income countries (Cazzaniga et al., 2024). AI affects high-skilled jobs, especially managerial jobs, more in advanced economies than in emerging economies (Felten et al., 2023; Pizzinelli et al., 2023). Even if AI has a

complementary feature for these jobs, it does not reduce the possibility of unemployment. Because it is assumed that a new economy with artificial intelligence (robonomics) will take control of the labour market (Crew, 2016; Deschacht, 2021; Ivanov, 2021). This new economy has an increasingly negative impact on both wages and the workforce (Acemoğlu & Restrepo, 2020; Bordot, 2022), and eventually a displacement effect - technological unemployment - manifests itself (Acemoğlu & Restrepo, 2019).

Nevertheless, there are also opposing views. For example, Mutascu (2021) examined the impact of AI on unemployment in the 23 most high-tech and developed countries. Mutascu found that artificial intelligence has a nonlinear impact on unemployment, with the acceleration of the use of artificial intelligence reducing unemployment, but only occurring at low levels of inflation. Similarly, Guliyev (2023), who examined the relationship between AI and unemployment rates in 24 high-tech developed countries from 2005 to 2021, found that AI reduces the level of unemployment. Guliyev found that AI has the potential to revolutionize the workforce by creating new job roles, automating routine tasks, and increasing productivity. AI-enabled technologies can free up workers to focus on more complex and creative work that requires human skills such as critical thinking, problem solving and innovation.

As artificial intelligence develops, it will become more difficult for young people to enter the workforce. It is estimated that unemployment will be inevitable, especially in low-skilled jobs, and there will be downward pressure on wages in high-skilled jobs. This situation will exacerbate the problems of social justice and may also give rise to the perception of artificial intelligence as an enemy, in a manner just like the Luddites. If legal regulations are unable to be universally applied, it is evident that other factors, such as education, cannot be considered a viable solution to the underlying reality. (OECD, 2018; WEF, 2024).

In the context of the imminent technological unemployment, the following question arises: "What is the purpose and function of education?" This question can be answered with four possible responses (Peters et al., 2019):

1. The objective is to enhance societal well-being through the establishment of collaborative relationships between corporations, government entities, and communities. This can be achieved by adopting a utilitarian approach, such as the implementation of do-it-yourself job cultures, education for design, fashion, and entertainment, among other strategies. This can be interpreted as a scenario in which AI driven automation has assumed a dominant role in the workforce, yet society persists in adapting to this change in various ways.
2. The public is being encouraged to accept the principles of neoliberalism -such as working from cradle to grave for companies- with greater willingness. This approach advocates the education of neoliberal business to equip people with the skills required to become programmers, Internet developers, and entrepreneurial platform providers. It is unfortunate that this scenario indicates that the workforce is evolving into a form of modern slavery.
3. This perspective, in which artificial intelligence and humans work in concert, is also designated as augmented intelligence. It seems plausible to suggest that the effectiveness of artificial intelligence is enhanced when it is directed by humans. This means the formulation of the requisite social and political frameworks for the harmonisation of humans and machines, with the implementation of legislation to regulate the ethical issues pertaining to control, ownership, data management and privacy. Thus, education may have a new role to play in harmonising with employment in the context of augmented intelligence.
4. The last scenario posits that AI-driven automation will result in a significant increase in unemployment. This situation not only disrupts the relationship between education, labour, and wages, but also renders education irrelevant. Furthermore, the mass unemployment will have a profound effect on the collective psychology of society, which will not be reversed.

The first of these four scenarios posits the role that education will play in equipping individuals with the requisite competencies to navigate the challenges of AI-induced technological unemployment and to engage in activities that enhance their quality of life. The second scenario envisions a role for education in training the workforce, which will become the modern-day equivalent of slaves, as global capital transitions to AI-driven automation. The third scenario concerns the role of education in a future where humans and artificial intelligence will work together and where control will be in the hands of humans. The last scenario posits that, in the worst-case scenario, education will become unnecessary and meaningless in the face of AI.

Looking at these four scenarios, the third scenario has the potential to reduce economic inequality. For the third to happen, the first step should be that the development direction of artificial intelligence should aim at human-AI cooperation, and the second step should be that the understanding of "education for AI" should dominate. In fact, every other step requires a political strategy (Schiff, 2022). A strategy of this nature should facilitate the development of an AI-ready workforce through education.
Trajtenberg (2019) emphasises the necessity for a new education revolution to prepare the workforce for an AI-empowered future. This is necessitated by the advent of AI as the new GPT, which has the potential to reshape the workforce in the context of an AI-based economy. The objective of this revolution is to implement a new model of education that is personalised and encompasses a set of global skills that can be considered in three dimensions (Table 1).

Table 1
Skills for AI-Empowered Workforce

Type 1 Analytical, Creative, Adaptive	Type 2 Interpersonal, Communication	Type 3 Emotional, Self-confidence
Critical and creative thinking	Effective communication	Self-awareness
Analytical and research	Interpersonal relationships/abilities	Empathy
Sense-making	Social intelligence	Coping with stress
Novel adaptive thinking	Virtual collaboration	Manage cognitive load
Design mind-set		Coping with emotions

In its reports on D9+ countries (ICG, 2023; ICG, 2024a; ICG, 2024b; ICG, 2024c), the Implement Consulting Group (ICG) presents a framework for capturing the benefits of AI: Enable innovation and invest in AI research and development; Create a conducive and aligned AI regulation; Promote wide spread adoption and universal accessibility; *Build human capital and AI-empowered workforce*; Invest in AI infrastructure and computer power. The fourth dimension (shown in italic) of this roadmap is aligned with the objective of this study, which is to highlight the role of education in the context of AI-driven technological unemployment, a global concern. The fourth dimension encompasses the following recommendations:

- Build an AI-empowered workforce by investing in human capital, education, and training systems. This means treating AI as a core component of the education system.
- Focus training and upskilling on areas where AI enhances and augments the capabilities of workers so that workers are trained to work together with the new technology. The aim should be to improve the marginal productivity of workers rather than replace them.
- In those selected types of jobs where AI risks displacing workers, efforts should be devoted to re-skilling workers for other jobs.
- Ensure a flexible labour market and continuous lifelong training enabling new opportunities in the labour market.

Conclusion

The objective of AI is to achieve the greatest possible outcome by emulating the capabilities of human intelligence, and in some cases, to exceed it. AI is used for many areas such as agriculture, automotive, logistics, textiles, energy, logistics, health, security, and education. Since the direction of AI development is not preordained in advance, some destructive effects are not currently taken into consideration, which carries risks that can be considered a threat in some contexts. Consequently, the question of whether AI is for or against humans is an ongoing debate. Conversely, the impact of AI on the workforce is an irrefutable fact, universally acknowledged. In order to have a positive impact, that is to say, to preserve both productivity and the workforce, AI must be approached from a human-complementary perspective.

At this point, a new education revolution is needed to prepare an AI-empowered workforce. In the context of the imminent technological unemployment, the following question arises: "What is the purpose and function of education?" The role of education for AI should be to sustain social life by working with artificial intelligence to both increase productivity and reduce economic inequality. With the aid of education, the workforce can be

reshaped for the AI-based economy. In this context, it is imperative that workers are trained to work in conjunction with the new technology. Furthermore, efforts should be made to re-skill workers for alternative roles and to ensure a flexible labour market and continuous lifelong training, thereby creating new opportunities.

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