How Artificial Intelligence is Influencing Graduate Employability and the Global Higher Education Sector

Analyzing the ripple effects of technological change on higher education

www.qs.com
# Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>1</td>
</tr>
<tr>
<td>Does artificial intelligence threaten highly skilled jobs?</td>
<td>2</td>
</tr>
<tr>
<td>Artificial intelligence and graduate skills</td>
<td>6</td>
</tr>
<tr>
<td>The social impact of artificial intelligence</td>
<td>11</td>
</tr>
<tr>
<td>Key findings</td>
<td>17</td>
</tr>
<tr>
<td>About QS</td>
<td>19</td>
</tr>
</tbody>
</table>
Introduction

The late Stephen Hawking commented in The Guardian that artificial intelligence (AI) will be, “either the best, or the worst, thing ever to happen to humanity.”

Much of this statement speaks to the findings of this report, to a feeling of uncertainty, alongside both positive and negative projections about the impact of AI on the global labor market in coming years.

Entrepreneur Elon Musk infamously once claimed that AI is, “our biggest existential threat.” Such concerns have launched the Leverhulme Centre for the Future of Intelligence (LCFI) at Cambridge University, a multi-disciplinary institute which is exploring the social impact of AI as it rapidly advances.

Some recent predictions about the development of technology claim we could have implantable cellphones by the year 2025, reading glasses connected to the internet by 2023, internet-connected clothes by 2022, and one trillion sensors connected to the internet by 2022 (Penprase B.E., 2018).

Meanwhile, AI is projected to shake up entire industries, with the potential for as many as 50% of jobs becoming automated in some fields of work, like the food, manufacturing, and retail sectors.

As technology develops, and fundamentally alters the fabric of our social and economic infrastructures, the employment market is likely to witness huge shifts. As such, higher education (HE) must evolve to meet the demands of this brave new world.

A number of academics have begun carving out the important role HE should play during the fourth industrial revolution, in order to ensure it stays relevant and allows graduates to succeed in an uncertain and evolving employment market. As such, this report will provide recommendations for universities and students looking to prepare for skill automation.

The data for this report was collected between December 2018 and April 2019 and incorporates the views of over 14,000 employers from a range of industries worldwide. We also spoke to prospective students in Asia in April 2019, visiting five different cities including Jakarta, Kuala Lumpur, Taipei, Beijing, and Shanghai.

This report will explore several key questions which arise in the debate about the impact of AI on the global graduate labor market. This includes the assumption that AI is a threat to graduate jobs itself, alongside the social impact of AI and projections about the automation of highly skilled labor.

The aim of this report is to offer insight into a future which does not yet exist, to challenge conventional thinking and contentious debates, and encourage the HE sector to respond to the threat, however small or large.

DEMOGRAPHICS

Location:

Jakarta
Kuala Lumpur
Taipei
Shanghai
Beijing

Participants:

300+ survey responses
20 focus groups
50+ individual interviews
Does artificial intelligence threaten highly skilled jobs?

As we move closer towards the fourth industrial revolution, the transformation of the global labor market as a result of AI has arisen as a divisive debate.

Typically, concerns have been leveled towards manual labor jobs in traditional industries like manufacturing and farming, with the possibility of AI providing a more efficient and cost-effective alternative increasingly on the horizon.

Indeed, some jobs have already been replaced, with cashiers being automated and factories experiencing vast drops in human labor. This is likely to become more prevalent in the coming years, with reports that automation could erase 50% of current jobs in agriculture, forestry, fishing, and hunting, which accounts for 328.9 million employees globally (Mckinsey Global Institute, 2017).

In the manufacturing industry, as many as 64% of current jobs could be automated, representing a considerable 237.4 million employees worldwide (ibid).

The impact on highly skilled jobs, which university graduates are likely to be performing, is less clear, though some believe AI will be capable of performing increasingly complex roles within fields like law, architecture, medicine, and more.

**The employer perspective**

Do you think artificial intelligence will provide a more cost-effective alternative to highly skilled jobs by 2030?

- **Yes**: 67%
- **No**: 33%

**Chart 1.** Percentage of employers who think AI will provide a more cost-effective alternative to highly skilled jobs by 2030

Such an environment is the impetus for one of the key questions in this report; Do you think artificial intelligence will provide a more cost-effective alternative to highly skilled jobs by 2030?

Overall, 67% of employers feel that by the year 2030 AI will indeed provide a more cost-effective alternative to highly skilled jobs, showing that almost two thirds regard AI as a threat to the graduate labor market.

Whilst this may draw a concerning picture for some, Nancy Gleason (2018), the Inaugural Director of the Hillary Ballon Center for Excellence in Teaching and Learning at NYU-Abu Dhabi and Visiting Assistant Professor of Social Sciences, says that 10 years from now many new jobs will exist that we cannot yet imagine. “AI, along with the other major technologies of the fourth industrial revolution such as 3D printing, the Internet of Things, blockchain technology, and virtual reality, will alter completely how we live and work.”
"How and when these changes play out in a given society will depend on political and socio-economic contexts. Populations who are more digitally literate and less concerned with notions of privacy will adapt faster than those who are not."

Moreover, some experts in the field of machine learning don’t believe that AI is a threat to highly skilled jobs. Thomas G. Dietterich, a distinguished Professor at the Emeritus School of Electrical Engineering and Computer Science and one of the founders of the field of machine learning, states: "I do not see AI-based software systems replacing highly skilled jobs. I do expect that AI-based tools will help make people more effective in their jobs."

**By region**

Do you think artificial intelligence will provide a more cost-effective alternative to highly skilled jobs by 2030?

<table>
<thead>
<tr>
<th>Region</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>Asia Pacific</td>
<td>76%</td>
<td>24%</td>
</tr>
<tr>
<td>Europe</td>
<td>56%</td>
<td>44%</td>
</tr>
<tr>
<td>Latin America</td>
<td>67%</td>
<td>33%</td>
</tr>
<tr>
<td>Middle East</td>
<td>56%</td>
<td>44%</td>
</tr>
<tr>
<td>North America</td>
<td>70%</td>
<td>30%</td>
</tr>
</tbody>
</table>

*Chart 2. Regional breakdown of employers who think AI will provide a more cost-effective alternative to highly skilled jobs by 2030*

When looking at this question regionally, it appears that employers in the Asia Pacific (76%) and North America (70%) are highly likely to regard this statement as true, which is unsurprising given the technological advancement currently being spearheaded within these regions. This is also perhaps why employers in Africa are the least likely to believe highly skilled jobs will be replaced in the coming years, where tech industries are less developed.

France (34%), Switzerland (38%), and Saudi Arabia (41%) are the three countries which host the most skeptical employers, with each of these nations far less likely to regard AI as a threat to highly skilled jobs.

On the other hand, employers in Taiwan (91%), Vietnam (87%), and Indonesia (85%) appear to be considerably convinced that AI will indeed provide a more cost-effective alternative to highly skilled jobs by 2030, demonstrating the concentration of this viewpoint in Asia.

Professor Gleason (2018) has pointed out that when we consider the fourth industrial revolution, “by nation rather than industry, we see massive shifts for the world's biggest economies.”

McKinsey (2017) estimates an astonishing 395.3 million employees in China hold positions in potentially automatable jobs, accounting for 51% of the labor force, whilst in India this figure reaches 235.1 million. Such projections perhaps explain why employers in Asia are more likely to consider highly skilled jobs under threat from AI.
By industry

Do you think artificial intelligence will provide a more cost-effective alternative to highly skilled jobs by 2030?

![Chart 3. Industry breakdown of employers who think AI will provide a more cost-effective alternative to highly skilled jobs by 2030](chart)

Employers in the logistics (73%) and consumer goods (74%) industries are most likely to predict that some highly skilled jobs within their fields will be automated by 2030.

Employers in the HR/recruitment/training industry (66%) express this view the least frequently of those displayed, though with only a 7% difference, suggesting that views on this matter are fairly even across the board. The latter industry is perhaps slightly less inclined to view highly skilled jobs as automatable due to its association with soft skills.

Whilst employers in these industries by and large feel that more cost-effective, automated alternatives to highly skilled labor will emerge over the course of the next decade, experts in the field do not necessarily feel that this shift will cause mass unemployment.

As Professor Dietterich suggests, humans will have to learn how to work with AI, which will ultimately make them more efficient at their jobs.

Professor Gleason states that highly skilled managers will have to, “learn how to manage a non-human workforce,” indicating perhaps that lower-level jobs are more at risk and, indeed, she cautions that, “there will certainly be technological unemployment for those with college degrees.”

However, Mona Sloane, Ph.D. Fellow, The Institute for Public Knowledge (IPK), Adjunct Professor, Tandon School of Engineering, New York University, spoke to QS and says that it is important to be critical about: “the message that AI will inevitably be the number one job killer moving forward.”

Professor Sloane argues that this narrative is fueled by Silicon Valley’s rapid ascent to global power, alongside: “China’s announcement to become world leader in and through AI.” Whilst Professor Sloane acknowledges that powerful technologies will replace some highly skilled jobs, she also warns: “By not questioning the narrative that AI will replace jobs, we are accepting that job loss through automation and precocity are the result of technological progress, and not a policy decision.”

The student perspective

In 2019, QS conducted a research trip in Asia, which encompassed five cities, including Jakarta, Kuala Lumpur, Taipei, Shanghai, and Beijing, as well as 20 focus groups, over 50 individual interviews, and over 300 survey responses. Students were asked for their view about the impact of AI on the global graduate labor market.
Interestingly, the response mirrors those of employers proportionally, with 66% of those surveyed believing AI will be capable of performing highly skilled jobs by the year 2030.

This is felt particularly strongly by prospective students in the arts and humanities (79%), which is perhaps indicative of a more philosophical mindset, whilst those within the medicine and health discipline (60%) are the least likely to regard AI as a threat to highly skilled jobs.

When broken down by city, it appears that students in Beijing (72%), Jakarta (68%), and Taipei (65%) are most likely to consider AI capable of outperforming highly skilled labor in the coming years.

![Chart 4. Percentage of students who think AI will be capable of outperforming graduates in highly skilled jobs by the year 2030](image)

**It will affect other industries, but not mine**

A number of students in Asia share the view that they feel AI is likely to have a negative impact on unemployment within other industries, but not the one they wish to enter.

This is mainly expressed by engineering students, who feel that their prospective career will not be compromised by AI as it is not possible to automate highly skilled engineering roles, as Mohammed in Jakarta says: "I think it would impact the employability rate in general, but I'm currently studying geophysical engineering and I think it would be very hard for a robot to replace that because you need to have a deep understanding about the earth itself and problem-solving skills that cannot be copied by some mere algorithm."

Given that 67% of employers surveyed in the engineering industry feel highly skilled jobs are replaceable by AI, there appears to be some misalignment between the employer and student perspective.

There is also a perception among students in Asia that AI will need human supervision, thus making a more efficient workforce an appealing picture for some. This idea is highlighted by Sahaf in Jakarta: "I think that by 2030 AI will be really developed and the robots will be doing all the labor, while the humans just supervise what the robots are doing. I think what's been proven in our industries is the efficiency, and I fully support that idea."

Moreover, some students are unconcerned about AI, believing it will have no impact on the graduate employment market by 2030. Such mixed perceptions portray a climate of uncertainty, which is evident amongst employers, students, and experts in the field.
The relationship between graduate skills and employer expectations has given rise to one of the key debates facing HE; the global graduate skills gap. Such an environment has also launched a series of reports by QS, including this year’s 2019 Global Skills Gap Report.

This year, we added questions to our employer survey about the possibility of AI performing graduate skills by 2030. It is important to question the impact AI might have on the global skills gap if it becomes capable of performing roles previously carried out by humans. This could have a positive impact on the skills gap, as technology evolves to fill the shortfall in graduate skills acquisition.

Moreover, such insight can help students and universities think about what skills might become less important in the coming years, and which skills they should focus on developing.

Most employers regard emotional intelligence as beyond the capabilities of AI

Overall, employers worldwide are most likely to consider analytical/quantitative skills (48%), technical skills (45%), problem solving (32%), depth of knowledge in subject (31%), and language skills (29%) as abilities AI will be outperforming humans in by the year 2030.

In the middle are more interpersonal skills, like communication (16%), teamwork (13%), and creativity (12%), whilst negotiating skills (8%) and leadership (9%) are generally not considered skills which AI will be capable of outperforming humans in by the end the next decade.

Just 5% of the 14,000 employers surveyed regard all of the skills in chart 5 as replaceable. Indeed, employers are more likely to think none of these skills will be replaced at all, at 12%. These findings suggest that most employers regard emotional intelligence beyond the capabilities of AI, with more technical skills, like analysis, experiencing greater levels of optimism.

Professor Gleason, however, disagrees: “It is a fool's errand to guess what skills are distinctly human versus which will be replaced by AI. Nearly all tasks will be performed differently as we ease into the fourth industrial revolution. The human competencies of creativity, resilience, and entrepreneurialism are extremely sought after in the job market and represent high end skills that AI is not yet good at. Empathy and ethics are human competencies that AI cannot "feel." But it is the constant change of what AI and big data can do that requires cognitive adaptability and emotional intelligence, not any one skill. AI can already be creative and resilient.”

Professor Gleason’s projections could be considered divisive, given that this is a contentious debate with no singular school of thought. Professor Dietterich, one of the founders of machine learning, has a different view: “Any job that requires improvisation and item-by-item customization is likely to be untouched by AI-based technology for quite a long time. And certainly, jobs that involve human skills (dialogue and empathy) will remain un-automated for a very long time if not forever.”
This discrepancy, again, highlights the uncertainty surrounding AI and its impact on our future employment market.

Emma Wright, Director of the Institute of Artificial Intelligence and Commercial Technology Partner at Kemp Little, believes that AI may be able to play some part in undertaking the soft skills normally done by humans: “I think AI may be able to play a role in the initial steps for all of these skills, for example negotiating to the final few points and then a human will take over the matter until completion. AI has already proven its capabilities in game playing.”

“Creativity is the one area that everyone focuses on. There are now some excellent examples of a machine producing a creative output, whether that’s a picture or music that can convince a significant number of people that the output has been produced by a human, when in fact it has been produced by an algorithm built by a human to produce an end result. This indicates to me that AI continues to drive deeper into those areas typically seen as areas that can only be performed by human, and so in my opinion the focus should be on the quality and veracity of the data and algorithms being developed.”

“I do think however that for at least the foreseeable future that human interaction remains a key component of many roles and there will need to be a wider societal change in approach before this is no longer a requirement.”

![Chart 5. Percentage of employers who think AI will be capable of outpeforming humans in key graduate skills by 2030](chart.png)
By region

Employers in Africa are most inclined to predict that, by 2030, all of the skills displayed in chart 6 will be replaceable by AI, though still with a relatively small margin at 10%. This is followed by 9% of North American employers who agree.

On the other end of the spectrum, 26% of employers in North America think none of the skills assessed will be performed by AI in the coming years (26%).

In general, there are no huge discrepancies between the differing regions, with most agreeing that AI is most likely to outperform technical skills but fall short of achieving more interpersonal skills, like leadership and negotiating.

![Chart 6. Regional breakdown of employers who think AI will be capable of outperforming humans in key graduate skills by 2030](image)

By industry

Patterns remain fairly similar across industries when employers are asked to share which skills they feel AI will outperform humans in by the year 2030. Employers in the pharma/biotech industry (25%) are most likely to feel that none of the skills displayed in chart 7 will be replaced by more capable machine learning technology by 2030.

This is followed by employers in the agriculture/fishing/forestry industry (16%), education (16%), and R&D/science (16%). Employers in the agriculture/fishing/forestry (15%) and education industries (15%) are more inclined to view all of the skills measured as replaceable.

Negotiating skills, which is generally viewed with skepticism as a replaceable skill by most employers surveyed, is identified with slightly more optimism by employers in hospitality/travel/tourism (12%) and HR/recruitment/training (11%), in comparison to the 8% global average.
Widest gaps in analytical/quantitative skills: Industry breakdown

Employers in the non-profit/charity sector display the biggest dissatisfaction ratios for analytical/quantitative skills, with an importance score of 91 and satisfaction score of 34. Given most employers view this as a replaceable skill, this could suggest that AI may well emerge as highly useful to this industry in the coming years, as technology fills the gap created by graduate skills shortages.

Such a view is suggested by Professor Sloane: “The positive aspect of AI systems and the labor market is that they are likely to make workplaces safer and lessen the impact of labor on the human body.” Other industries where employers identify big skills gaps in this area are media/advertising and metals/mining.

Professor Sloane points out that the focus on AI can be harmful to other areas of research within HE: “The concern about automation and large-scale job loss is old, and there are policy strategies that can be put in place to mitigate the effects of that, should it actually occur. My concern is that the AI hype will distract us from bigger and more important questions we must ask about education, work, and universities. We should be mindful of the fact that there is large (government and private) scale funding made available for AI, often at the expense of other areas of research and education. This focus affects the politics of knowledge production.”

Chart 7. Widest skills gaps in analytical/quantitative skills: Industry breakdown
The student perspective

Some students in Asia, especially in STEM subjects, feel that the skills they would have used in the past whilst studying have already been automated. This is expressed by chemistry student Deepalakshmi, in Kuala Lumpur: "The basic experiments that we do have been replaced by machines. Graduates need hands-on experience to get to know in-depth details about what we are doing. If the machines are doing it then we are going to lose the concept behind it. For me personally, I think there is no need for the machines when we can do it ourselves."

Deepalakshmi shares an intense feeling of frustration at being unable to carry out experiments herself, a feeling which might become more widespread in the graduate labor market if skills start being replaced.

Indeed, Deepalakshmi claims she has already seen this happening amongst friends who have recently graduated: "I am seeing, especially in the analytical field, people are not able to find their place there, just because most of the work is taken by machines. It’s not that everything can be done by machines, but the bar has lowered and it’s being increasingly crossed by machines nowadays."

Like Professor Dieterich, Adel in Kuala Lumpur does not think AI will be capable of performing soft skills, which require emotional intelligence: "AI is replacing almost everything except for the EQ, the emotional intelligence, which is the ability to understand each other and our creativity in our fields. This is where machines cannot really replace us, at least not in the time being."

Time will tell if such a statement is true in the employment market, but to date AI has proven itself capable of writing songs, film scripts, and books. Moreover, Facebook was forced to abandon an experiment after two artificially intelligent programs begun conversing in a new language only they understood, indicating perhaps that AI is indeed capable of creative thought.
The social impact of artificial intelligence

Investigating the potential social impact of AI has become almost as important as the development of it. So much so that the Leverhulme Centre for the Future of Intelligence (LCFI) has been erected at Cambridge University for this very purpose, hosting a multidisciplinary cohort of academics including mathematicians, philosophers, engineers, political scientists, and computer scientists.

The truth is, it is not yet clear exactly what the social impact of AI will be. It's still an evolving phenomenon, one that has the potential to fundamentally alter the meaning of work and, indeed, our global economic system.

Equally, the social impact could be much less monumental than many predict, at least where employment is concerned. Some dream of utopia in which humans no longer need to work, whilst others envision a dystopia fueled by mass unemployment and poverty. Such binaries are perhaps not necessarily helpful when exploring this topic and it may be more worthwhile to look ahead at how we can respond to an environment which brings both new challenges and new solutions.

Uncertainty about the social impact prevails

In your view, what is the social impact of artificial intelligence replacing some of the highly skilled jobs, currently performed by humans?

- Positive: 59%
- Not sure: 25%
- Negative: 15%

Chart 8. The social impact of AI replacing some highly skilled jobs - employers overall

Almost 60% of employers worldwide consider that the social impact of AI will be positive if some of the highly skilled jobs currently performed by humans are replaced by 2030. This suggests that the majority of employers view the development of technology in the workplace as progressive rather than potentially harmful to graduate employability. Despite this, 15% believe the impact will be negative and 25% are unsure, demonstrating that almost half of participants view the social impact of AI with either fear or uncertainty.

Professor Dietterich acknowledges that the social impact of AI could be both positive and negative, explaining that whilst AI will be the catalyst for the creation of new jobs, complex ethical questions will arise simultaneously. "Mass face recognition is a good example of a task that is currently not performed by humans because it is infeasible. Now it will become feasible due to AI but will also require substantial staff support to ensure accuracy. The likely result is increased employment demand rather than decreased demand. The social impact is increased surveillance, which may be very damaging to personal freedom."
The jeopardy of civil liberties due to a global surveillance infrastructure, which has already seeped into our daily lives due to the mining of personal data, alongside the prevalence of security cameras, means that HE needs to educate students about these pitfalls. So, how can the HE sector educate the next generation so they are aware of the ethics of AI, carrying this knowledge with them into their personal and professional lives?

Professor Gleason points towards the uncertainty in our survey findings, suggesting that labor economists are in two minds about the social impact: “Some think we are witnessing the same hysteria we saw in the last three industrial revolutions, and those predictions were wrong because new jobs came along.”

But she also acknowledges that the fourth industrial revolutions differs from its predecessors because, “it is about the automation of knowledge,” and as a result, “the social impacts are difficult to predict but will likely result in considerable increases in unemployment by 2030, despite the emergence of new jobs and new industries. It will take at least a decade to reskill/upskill the adult labor force needed to perform the new tasks of the automation economy.”

**Artificial intelligence and gender inequality**

When broken down by gender, the survey reveals that there is less optimism and more uncertainty for female employers in comparison to men. The results indicate that 54% of female respondents feel the social impact of AI replacing highly skilled jobs will be positive, 32% are unsure, and 15% think it will be negative.

In contrast, 62% of male employers feel the social impact will be positive, 22% are unsure, and 16% predict a negative outcome.

These slight differences between male and female respondents could reflect the increasing concern about the role women will play in the development of AI, and in a future employment market driven by the engineering and tech industries.

As technology evolves, the question of who is shaping AI is becoming more urgent. Men have predominantly been the engineers of AI thus far and a lack of gender diversity in machine learning courses is exacerbating this environment.

Evidence suggests women lack the confidence to pursue post-graduate study in male dominated fields like computer science and technology (DeNisco Rayome 2017). Women are also more likely to pursue subjects with communal and humanistic goals which are not typically associated with the AI field, as computer science Professor Marie Desjardins, at the University of Maryland, has demonstrated. In the US, one alarming statistic identifies women graduating in computer science at just 18%.
Alarming gender gap ratio prevails in engineering and tech

The QS 2019 Employer Survey mirrors trends identified elsewhere when it comes to the gender distribution within the engineering and tech industry. According to our respondent numbers, 21% are female and a considerable 78% are male, portraying a huge gender gap in this industry.

A 2017 report found only 11% of the global engineering workforce was female (WES 2018), whilst more recently only 20% of tech jobs were reported to be held by women. Just 12% of engineers at Silicon Valley startups are women and only 11% of executive positions are maintained by women.

The fourth industrial revolution will have different social impacts for men and women, according to Professor Gleason (2018). Women are less likely to have digital literacy and thus are also less likely to have opportunities in the tech sphere.

The fact that women are troublingly underrepresented in the technology-related workforce has been thoroughly explored. The ISACA survey demonstrates a multitude of reasons including “[a lack of] female mentors, gender bias, unequal growth opportunities compared to men, and unequal pay for the same skills,” (Gleason 2018).

The unequal gender distribution at post-graduate level in engineering and machine learning courses is blamed on similar structural and social issues, including a scarcity of female role models, professors, and study partners, alongside experiences of stereotyping and sexism (DeNisco Rayome 2017).

If current gender gap proportions prevail into the 2020 period, “for men there will be approximately one new STEM job per four jobs lost, but for women, for every single new STEM job created, 20 jobs will be lost,” (Gleason 2018).

What can HE do?

HE must encourage greater female participation, nurture development, and provide a balanced learning environment. Gleason (2018) suggests we need more organizations like Women 2.0 and Girls Who Code, which are fostering support networks in the US. Alongside this, Adaptive Learning methods, which adjust to the individual needs of students, could help nurture women who might suffer from confidence issues.
By region

In your view, what is the social impact of artificial intelligence replacing some of the highly skilled jobs currently performed by humans?

<table>
<thead>
<tr>
<th>Region</th>
<th>Positive</th>
<th>Not sure</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>43%</td>
<td>35%</td>
<td>22%</td>
</tr>
<tr>
<td>Asia Pacific</td>
<td>61%</td>
<td>23%</td>
<td>16%</td>
</tr>
<tr>
<td>Europe</td>
<td>54%</td>
<td>29%</td>
<td>17%</td>
</tr>
<tr>
<td>Latin America</td>
<td>64%</td>
<td>26%</td>
<td>10%</td>
</tr>
<tr>
<td>Middle East</td>
<td>51%</td>
<td>30%</td>
<td>18%</td>
</tr>
<tr>
<td>North America</td>
<td>60%</td>
<td>21%</td>
<td>20%</td>
</tr>
</tbody>
</table>

Employers in Latin America (64%), the Asia Pacific (61%), and North America (60%) are the most likely to view the social impact of artificial intelligence replacing highly skilled jobs as positive, whilst Africa (43%), the Middle East (51%), and Europe (54%) are more cautious.

The regions which show the most uncertainty are Africa (35%), the Middle East (30%), and Europe (29%). This could be related to a lack of strength in the tech industry in comparison to other regions like North America and China.

Africa and North America are most likely to view the social impact as negative. In the case of North America, this could be related to the proximity to Silicon Valley. A narrative has developed about its rapid ascent to global power, thus making employers in this region at the center of ongoing debates in relation to AI.

By country

In your view, what is the social impact of artificial intelligence replacing some of the highly skilled jobs currently performed by humans?

<table>
<thead>
<tr>
<th>Country</th>
<th>Positive</th>
<th>Not sure</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>58%</td>
<td>21%</td>
<td>21%</td>
</tr>
<tr>
<td>China</td>
<td>71%</td>
<td>26%</td>
<td>3%</td>
</tr>
<tr>
<td>South Korea</td>
<td>58%</td>
<td>16%</td>
<td>27%</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>47%</td>
<td>35%</td>
<td>18%</td>
</tr>
<tr>
<td>United States</td>
<td>61%</td>
<td>19%</td>
<td>19%</td>
</tr>
</tbody>
</table>

Employers in countries with the most positive outlook include, Japan (77%), Ecuador (73%), and the Philippines (73%), whilst Bangladesh (28%), South Korea (27%), and Russia (23%) maintain the most employers who feel the social impact will be negative, according to our survey. Uncertainty arises most often in the Netherlands (49%), New Zealand (41%), and Egypt (40%).

“The social impact will vary by country,” says Professor Gleason. “Nations with strong central governments and robust public support systems will fare differently than those with a highly individualized political culture. Some nations will turn to universal basic income, others will reject the technology and not have a need for it by 2030. But every country will be facing a shift in how we live and work by 2030.”
By industry

In your view, what is the social impact of artificial intelligence replacing some of the highly skilled jobs currently performed by humans?

<table>
<thead>
<tr>
<th>Industry</th>
<th>Positive</th>
<th>Not sure</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumer Goods</td>
<td>50%</td>
<td>31%</td>
<td>18%</td>
</tr>
<tr>
<td>Engineering</td>
<td>61%</td>
<td>25%</td>
<td>14%</td>
</tr>
<tr>
<td>Health/Medical</td>
<td>51%</td>
<td>32%</td>
<td>17%</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>62%</td>
<td>23%</td>
<td>15%</td>
</tr>
<tr>
<td>Technology</td>
<td>64%</td>
<td>23%</td>
<td>13%</td>
</tr>
</tbody>
</table>

Chart 12. The social impact of AI replacing some highly skilled jobs – industry breakdown

Unsurprisingly, employers within the technology industry are most likely to view the social impact of AI on the graduate employment market as a positive possibility, with 64% of respondents in this field citing it as such. This is followed by manufacturing (62%) and engineering (61%), whilst consumer goods (50%) and health/medical (51%) employers are slightly less optimistic.

Uncertainty and negative projections about the social impact of AI arise most frequently in the health/medical field (32%) and consumer goods (31%). Professor Gleason provides some answers to such a response, at least where the medical industry is concerned: “Radiologists and dental hygienists are a good example already. These highly trained and well-educated adults will need to be reskilled with government, higher education, and industry collaboration. The job titles may not change, but tasks performed will certainly shift, even for the highly skilled.”

Within HE it appears that AI will even be able to grade papers, which removes the potential for unconscious bias and allows professors to focus on the research and teaching aspects of their job: “Admittedly, algorithms have dangerous biases. But in grading, these are biases we can measure and fix. That is not the case with the implicit biases imbedded in human graders of student work,” says Professor Gleason.

Do institutions have a responsibility to prepare students for this environment?

We asked this question of students and experts in the field and the answer was unanimous; HE should be at the forefront of any shifts in the employment market, evolving to meet the demands of a new technologically enhanced workforce by providing the necessary education for graduates to survive.

Such a view is expressed by a Master of Management student, Jonathan, in Taipei: “I think it’s important for students to gain more knowledge about how to co-work with AI, and also how to take advantage of this technology. So, I think if there are some courses which teach students how to get along with and how to use the newest technology, then it will be helpful for graduates to face a situation which might be harmful.”

Jonathan, like other prospective students in Asia, feels that in order to ensure graduates are not replaced by AI, universities should encourage students to look beyond their subject and gain a multidisciplinary background, alongside the cultivation of soft skills.
Lifelong learners

According to Professor Gleason, HE has an obligation to deliver a resilient and adaptable workforce: "The best way for universities to help prepare graduates for a work environment in which employees work side by side with AI and other new technologies is to pair up with industry and governments in funding innovative work-learn programs. Experiential learning is essential but expensive so government and industry can help deliver these learning experiences."

Professor Gleason believes that reskilling will become essential in this future environment, with students becoming ‘lifelong learners’ and classes at university enjoying a much more mixed cohort in terms of age range. "It is also important to keep in mind that new jobs will come alongside the replacement of highly skilled labor in existing jobs and tasks. The technology of the fourth industrial revolution, including AI, and the platform economies of Alibaba and Facebook, are creating new jobs we couldn’t have imagined five or ten years ago. Universities are distinctively qualified to offer degrees and badges or certifications in new areas. MIT’s micro-master’s certifications are a great example of this," says Professor Gleason.

Emma Wright agrees: "I think governments and the leaders in AI need to ensure AI benefits all sections of our workforce and society and the wider global workforce. For example, it may mean in the Western world that we are genuinely freed from some of our mundane tasks, freeing up time which may allow us to focus and spend more time on building and supporting our communities."

"I think there is a risk that AI’s development and its applications fragment between the US, China, and Europe, so AI will never realize its full potential to address global issues, such as climate change. At the Institute of AI, we are focused on building this collaboration at a global level to ensure best and worst practice, both in terms of regulatory approach and application, can be shared at a global level."
Key findings

Employers worldwide largely consider AI a more cost-effective alternative to highly skilled jobs

- Overall, 67% of employers feel that by the year 2030 AI will provide a more cost-effective alternative to highly skilled jobs, showing that almost two thirds regard AI as a threat to the graduate labor market.

- When looking at this question regionally, it appears that employers in the Asia Pacific (76%) and North America (70%) are highly likely to regard this statement as true, which is unsurprising given the technological advancement currently being spearheaded within these regions.

- Employers in the logistics (73%) and consumer goods (74%) industries are most likely to predict that some highly skilled jobs within their fields will be automated by 2030.

- A number of students in Asia share the view that they feel AI is likely to have a negative impact on unemployment within other industries, but not the one they wish to enter. This is mainly expressed by engineering students, who feel that their prospective career will not be compromised by AI.

Most employers regard emotional intelligence as beyond the capabilities of AI

- Overall, employers worldwide are most likely to consider analytical/quantitative skills (48%), technical skills (45%), problem solving (32%), depth of knowledge in subject (31%), and language skills (29%) as abilities AI will be outperforming humans in by the year 2030.

- In general, there are no huge discrepancies between the differing regions, with most agreeing that AI is most likely to outperform technical skills but fall short of achieving more interpersonal skills, like leadership and negotiating.

- Patterns also remain fairly similar across industries. Employers in the pharma/biotech industry (25%) are most likely to feel that none of the listed skills will be replaced by AI by 2030.
Key findings

Almost half of the employers surveyed view the social impact of AI with either fear or uncertainty

- Almost 60% of employers worldwide consider that the social impact of AI will be positive if some of the highly skilled jobs currently performed by humans are replaced by 2030, suggesting the majority of employers view job automation as progressive.

- Despite this, 15% believe the impact will be negative and 25% are unsure, demonstrating that almost half of participants view the social impact of AI with either fear or uncertainty.

- The regions which show the most uncertainty are Africa (35%), the Middle East (30%), and Europe (29%). This could be related to a lack of strength in the tech industry in comparison to other regions like North America and China.
About QS

With offices around the world, QS is a global market leader for the research and understanding of international and domestic students. Each year we deal with hundreds of thousands of students globally, giving us a unique insight into the student recruitment market. Our research, strategy, enquiry, admissions, and enrollment services mean we have hands-on experience of the obstacles and opportunities within specific countries and regions, helping clients mitigate risk, benefit from our existing relationships, and build sustainable recruitment strategies in an increasingly complex marketplace.

To access other resources from QS visit www.qs.com