

# Visions of the Future: Hope and Fear in an Age of Automation

**Paine Schofield**

Hult International Business School, United Kingdom

## Abstract

This paper explores students' perceptions and feelings about their education, work choices and the skills they feel they will need to equip themselves for a new world increasingly shared with technology. There is wealth of literature detailing the impact of technological developments, and specifically Artificial Intelligence (AI), on the worlds of work and education (e.g. Ford, 2017; Brynjolfsson & McAfee, 2016; Aoun, 2017). A number of studies have been conducted to examine how susceptible jobs are to automation (e.g. Frey & Osborne 2017, Pajarinen & Rouvinen 2015, Arntz, Gregory & Zierahn 2016). This research aims to investigate students' hopes and fears for the future by examining their awareness of the technological developments that will affect them, how they plan to prepare themselves for the coming changes, and their attitudes to the impact of AI on the worlds of work and education. Qualitative and quantitative data was collected via online surveys, face to face discussion groups, students written work in the form of essays, and an online survey and discussion tool for real-time collective intelligence. Participants include both a general undergraduate student population studying in the UK and the US ( $n=356$ ), and a specific group of undergraduate students studying a 'Robotics, Business and Society' course in the UK ( $n=53$ ). The results and discussion focus on how to prepare students for increasing automation as well as the new challenges that AI presents for higher education more broadly. The findings provide valuable information around how students perceive their future in an increasingly automated work environment. As such, they provide guidance to educators looking to understand and best prepare today's workforce for the world of tomorrow; and will help students think critically about the kinds of future they could be navigating in a few years' time.

**Keywords:** Automation, Education, Workplace.

## Introduction

There is a large and growing body of work that explores the likely impact of AI on the worlds of work and on education (e.g. Aoun, 2017; Brynjolfsson & McAfee, 2016; Ford, 2017). With all of the hype surrounding technological unemployment, a number of studies have been conducted to examine how susceptible particular jobs are to computerisation (e.g. Arntz, Gregory & Zierahn 2016; Frey & Osborne 2017; Pajarinen & Rouvinen 2015). There are endless statements in articles about jobs being replaced, questions around what will happen in the future, and coverage about how prepared “we” as a workforce are for this future. The messaging in both the media and academic and practitioner literature alternates from alarmist and pessimistic (‘the machines will take all of the jobs’: e.g. Carr, 2015; Keen, 2015; Shewan, 2017) to more cautious and optimistic (‘new jobs will emerge’: e.g. Brynjolfsson & McAfee, 2017; Cowen, 2013; Ford, 2009; Lonsdale, 2017; Pistono, 2014).

It has been argued that unlike previous industrial revolutions, which affected some sectors more than others, the AI revolution is pandemic; it affects all sectors of the workforce, from blue collar jobs to white collar professionals (Ford, 2017). Amidst the fourth industrial revolution (Schwab, 2016) and industry 4.0, technological developments have enabled AI systems to perform many of the skills traditionally reserved for humans. In this sense, humans are facing a new kind of competitor when it comes to seeking employment. Robots do not need downtime, leadership or benefits and are completely loyal to their employers, generating relentless and consistent output. As technology changes, so too do the skills that workers need. Individuals must be able to make effective use of the tools of modern technology, as well as develop skills that technology cannot replace. Therefore, educators face the challenge of preparing today’s students for the new world of work enabling students to navigate their way through shifting opportunities and make decisions about what seem to be increasingly uncertain employment prospects. However, less literature has investigated the perceptions, feelings and plans of these young individuals who will be navigating a future increasingly shared with technology.

### Research Aim

This research focuses on a specific set of individuals: the current generation of undergraduate students on the cusp of entering the workplace. This group of young people are of particular interest to educators because of the unique position they occupy in history. They are the first generation who will see AI having a definite impact on their working lives – yet they have been educated in a system which is only just beginning to wake up to the implications of automation for the workforce. Many students are themselves not fully aware of what the future will hold. This research explores these students’ visions of their futures, their awareness of how technological development may affect them, their hopes and fears, how they plan to prepare themselves for the coming changes, and their attitudes towards the impact of AI on the world of work and education.

## Method

### Participants

Data was collected from two different groups of participants:

1. Group 1 (n=356) was a group of students studying in the UK and the US aged between 16 and 26 years. The group was made up of slightly more males than females (56% and 43% respectively), and was from a mix of socio-economic backgrounds.
2. Group 2 (n=53) was a group of students registered in an undergraduate ‘Robotics, Business and Society’ course offered to second year students in a Bachelor of Business Administration program in the UK. These students took the course during the summer

term of 2018. The students were aged between 18 and 22 years. Again, the group was made up of more males than females (64% and 34% respectively). The university is fee-paying, and students tend to be relatively privileged in terms of socio-economic background.

### Design

Both qualitative and quantitative data was collected from these students.

#### Qualitative data collection

Students from both Group 1 and Group 2 participated in a Crowdscope (www.crowdscope.com), which is an online survey and discussion tool for real-time collective intelligence. This tool allowed students to anonymously contribute to the following discussion: “AI is changing the future of Education and Work. How do you feel about the impact of these changes on your future career?”.

Group 2, the smaller group of students on the Robotics course, took part in two focus groups (n=41 and n=44) at the end of the course that allowed them to discuss these same topics and share ideas and experiences. Group 2 also wrote essays at the end of their course (n=53). The essay question was composed of different sections as follows: “a) How has AI transformed an industry/sector (that you see yourself working for/in the new future) in the last 5 years? What further changes are predicted to happen within the next 5-10 years? b) What effects will these changes have on the workplace and on society in general? c) How do you think your university can help you develop the knowledge base, skills and attributes you need to flourish as a worker and a citizen in this new environment?”

#### Quantitative Data Collection

Students in Group 2 also took part in online anonymous pre- and post- Robotics course surveys (n= 50 and n=33 respectively), both of which featured a mixture of open, closed and multiple-choice questions. These questions asked students to think about a variety of topics including their knowledge of AI and automation, their attitudes towards it and the extent to which they feel prepared for a future in which AI plays an ever-increasing role at work.

## **Results and Discussion**

### Data Analysis

Descriptive and inferential statistics were used to analyse the survey data. Focus group data was analysed thematically by organising excerpts of transcripts into categories which referred to the topic of speech (e.g. the human element of business), and the nature of the opinion that they were expressing (e.g. the human element of business is important/not important) (Boyatzis, 1998). Sentiment analysis (Lui, 2012) was used to examine students’ open responses to the Crowdscope discussion. Student essays were analysed using the content analysis method (White & Marsh, 2006). Recurring, aspects topics were coded and analysed to identify concepts and patterns in the data and recurring metaphors/analogies helped capture the meanings and emphasis expressed by participants.

All of the data was combined to present the findings in the results and discussion section around four key themes as follows:

1. What kinds of future do students envisage in an increasingly automated work environment?  
Findings in this section include students’ hopes and fears, and the benefits and challenges they see in a future increasingly shared with technology.
2. How do students see themselves in these futures?  
Findings include how prepared students feel they are and the reported impact AI is having on their lives.
3. How do students plan to actively respond?  
Including what strategies students plan to develop to help them negotiate the changing workplace and what skills students think they need.
4. What advice students have for younger students and for educators.

### What Kinds of Future do Students Envisage?

#### Hopes and Fears

Sentiment analysis was used to examine Group 1’s open responses to the Crowdscope discussion and code them as shown in Table 1. Responses were sorted into groups depending on whether they expressed positive, negative, balanced (views with a positive point followed by a negative, or vice versa) or neutral views with regard to AI and its potential impact on the respondents lives.

Potential impact of AI on the future	% (n=356)
Hopes (positive response)	31%
Fears (negative response)	18%
Balanced (mix of positive and negative response)	27%
Neutral (statement)	24%

Table 1. Sentiment Analysis of student responses to Crowdscope discussion on potential impact of AI on future (n=356).

As Table 1 shows, students’ responses displayed mixed attitudes of fear and hope when asked to reflect on their feelings towards a workplace dominated by AI and automation. Almost one third (31%) of these students felt mostly hopeful about the future. Around one quarter (27%) felt both hope and anxiety, 18% felt mainly fear and 24% were emotionally neutral about the prospect of living and working with AI and automation.

The responses from Group 2, who took the Robotics course, showed that they expressed similar sentiments in terms of displaying a mixture of both hopes and fears. Survey responses from this group showed that before taking the course, the majority (96%) reported being worried about the changes AI could bring to their working lives. The majority (90%) also reported being enthusiastic about these potential changes.

The Robotics course asked students to research and reflect upon academic and industry sources on the topic of AI in the workplace and after studying the course many students reported feeling more empowered and less frightened of the future than they did pre-course.

Specifically, the post-course survey findings showed that 28% of students felt ‘more enthusiastic’ about the changes AI could bring to their working life. One quarter (25%) of students stated they felt ‘more prepared’ in some way to navigate a workplace which may be increasingly shared with AI. These students described how more knowledge, learnt on the course, led to them feeling more hopeful and seeing more opportunities in their futures. They felt that learning more about emerging technologies and ways in which they were likely to impact the workplace gave students a sense that there were things they could do as graduates to navigate the coming changes successfully rather than simply be overwhelmed by them. For example: *“I see my future career with an amplified spectrum of opportunities and impact that could not be possible without AI.”*

### Benefits

Both groups of students who expressed hopes for the future felt AI would make life “easier,” speaking of a workplace that was more “efficient” and “effective”. They described how emerging technologies would “reduce costs”, “save time”, “eliminate the drudgery of repetitive tasks.” Therefore, they would have more time for other interests, personal hobbies and more meaningful and interesting work: *“AI is transforming the way we learn and perform our working activities. I feel AI will play an important role to bring efficiency to businesses by taking care of repetitive and time consuming activities and allowing the workforce to focus on more important activities and decision making.”*

In their essays and focus group discussions, the Robotics course, students were excited by the prospect of new kinds of jobs, of having more and better data to work with and of big data having the potential to change our lives for the better in all kinds of fields, from healthcare to clean energy to effective marketing techniques. Repeatedly, students spoke of AI and automation having the potential to completely disrupt and transform whole sectors of employment. Not all students were equally entranced by this vision of disruption, however. Other students’ essays described potential downsides, for example *“developments [in AI] risk diluting the personal relationships between people to such a degree that the hospitality industry would simply not be the same,”* and *“If there is no connection between employees and customers, we cannot talk about hospitality anymore, it should be called something else.”*

### Challenges

For both groups of students, by far the most commonly mentioned challenges were the “loss of jobs”, “increased competition for existing jobs” and “growing social inequality.” Many students also spoke of an “overreliance on technology,” “privacy concerns,” “reduced human interaction and communication,” a “loss of skills/thoughts,” as well as “an existential threat to humanity and what it means to be human.”

Further details about concerns were taken from the students in the focus group discussions and essays from the Robotics course. When considering big data in their essays, these students reflected on the threat of loss of privacy and on the possibility of hacking, fraud and security breaches of all kinds. These students showed a lack of trust in AI, describing how they would feel safer if humans were in control of areas like military medicine and teaching (as they did not trust robots in these roles). The feelings of fear were sometimes underpinned by references to films and literature (e.g. Terminator and George Orwell's 1982). *“I think that the way the artificial intelligence is going and how fast its evolving, is really scary, like for example the robot Sofia, who's the smartest robot in the world. Robots in the future will "steal" and replace humans, and this is totally stupid and things shouldn't be like that.”*

Imagined Futures

Students feel that the future is not one thing. The future depends on who you are, and there are a range of potential futures. Based on all the findings from both groups of participants, the students imagined futures for individuals, for society and for industry and are summarised here:

For individuals, students imagine a better work life balance. They predict less social skills, and privacy than ever before. They are aware that not only their ‘jobs’ but also their ‘careers’ will be different. There will be new possibilities, which will demand different skills for this future: *"AI and automation help advancement. Though these take away few jobs that are too tedious for humans to do, it definitely creates more opportunities and helps in the betterment of creating ease of life. It creates more challenging jobs which open new doors to learn and explore."*

For society, students describe a *"bright future,"* with *"enriched lives"* (through innovation, human development and progress). At the same time, students are concerned about human and social decline, including: *"higher inequality"*, *"higher crime rates"* and *"social unrest."* They talk of social values and norms changing. One student described: *"I'm mostly concerned about the gap that it [AI] could create because a lot of middle class jobs will be lost, and it would allow wealthy owners to reduce costs and become wealthier and then middle class would be destroyed and that would create imbalance in the world and there would be a lot of fighting and hatred between rich and poor because of the gap. So, I don't know it scares me that it might become an apocalypse."*

For industry, some of the students referred specifically to the industries they were hoping to work in and predicted AI’s impact on those. In all cases both hopes and fears were described. For example, the job losses and transfer of power to AI on one hand, to a more personalised, accurate and possibly inclusive world on the other hand. Overall, students described a painful transition period, with human responsibility to regulate and steer AI developments in a positive direction.

How Do Students See Themselves in These Futures?

Impact of AI

Based on the pre- course survey data of students on the Robotics course, all (100%) of the students feel that AI will impact their future career to some degree, and just over half (51%) feel that the impact is ‘very likely,’ as can be seen in Table 2.

How likely AI will impact future career	% (n=46)
Very Likely	51%
Somewhat Likely	49%
Not At All Likely	0%

Table 2. “How likely do you think it is that AI will impact your future career?” (pre-survey; n=49).

The post course survey data shows that after studying the robotics course, 55% of the students think that AI is even ‘more likely’ to impact their career. One student described the relationship between education and the workplace and the impact of AI on both: “...*AI will impact education [and] it will impact jobs because both will go together. If Jobs change then education needs to change. We study in order to get a job in the future and to acquire the knowledge that is needed to do so.*”

Preparation for a Future Shared with AI

Despite this certainty about the impact of AI, there is a mixture of findings around how prepared the students in Group 2 feel to navigate this future workplace. As can be seen in Table 3, prior to taking the Robotics course, almost two thirds (63%) of students confessed to feeling only ‘somewhat prepared’ for the future, with a further one fifth (17%) feeling completely ‘unprepared’ and only (20%) feeling confident and ‘very prepared’ for what is to come.

How prepared to navigate a workplace increasingly shared with AI	% (n=46)
Very Prepared	20%
Somewhat Prepared	63%
Not At All Prepared	17%

Table 3. “How prepared do you feel to navigate a workplace increasingly shared with AI” (pre-survey; n=46).

These findings may be explained in part by the current generation of students who took part in this research. As mentioned previously, these students’ careers will undoubtedly be affected by AI, yet so far education has failed to prepare them. Discussions during the focus groups and students’ essays responses showed that many students are not fully aware of what the future will hold, and this uncertainty may be influencing how prepared they feel.

A significant majority of these students feel that their education has failed to prepare them for this future. For example, “...*I have been wondering if I am ready to go into the workplace since I believe that no university can prepare you for a world that is changing so fast...*” The uncertainty and anxiety students feel as is contributing to a sense of insecurity and fearfulness. For example, “*Students across the world will have to face the possibility that perhaps what they are dedicating their lives to studying right now, at this very moment, may soon become redundant... Before taking the class, I would never have guessed that AI was this close to becoming a worldwide innovation that would perhaps take over ...our home or business environment.*” Following studying the Robotics course, 25% of respondents claimed to feel less anxious and better prepared for the future, and the qualitative data from the focus groups showed that this was linked to the knowledge they gained during the course. In their end of course essays, several students expressed a desire for more courses of a similar nature, arguing that students need to be better prepared to be strategic about continually improving and upgrading their skillset and mind set in order to cope with the coming changes in the workplace. With the right knowledge and skills, they felt, said changes could work for them rather than against them. As one student expressed, “*we need to act now to gain a deep understanding and prepare ourselves for the digital age, which will also require policy changes to our educational systems.*”

Some students described how universities need to adapt to remain relevant for the future of work, and how it is the responsibility of the educational institutes to prepare them. At the same time, many students also described their own responsibility to prepare themselves to adapt to changes and remain relevant. Overall, it was clear from the findings that universities must do more to discuss this topic and also relieve feelings of uncertainty, particularly in this generation of students.

A Level of Scepticism

Robotics course students’ essays and focus group data, revealed a sense of “*not me*” and “*not yet.*” Perhaps due to optimism bias, the students felt that the low-skilled workers and peers with fewer educational qualifications would be negatively impacted, not university students like themselves. A significant minority also saw their future selves as employers rather than employees, and concentrated on the increased savings and profits they were likely to amass thanks to automation and AI. This view remained even after students were exposed to texts that described the risk to white-collar workers– in some cases, even more so than blue-collar workers (Ford, 2017). For example, *"I'm an entrepreneur and marketing major and I don't intend to work with AI, it's not that I don't want to, but nobody's perfect and I feel like as an entrepreneur, you have to make mistakes to learn from it, so you can grow. But if you have an AI then it's almost too perfect, so you don't get to make mistakes, or learn new things, so I personally am not interested in it and I don't care if I learn about the AI in the workplace"*. The Robotics students were predominantly from relatively privileged backgrounds which may explain why many felt confident that with the right preparation they could navigate these changes successfully.

Several students also described how any impact of AI would not be felt by them for a long time. For example: *"I think we should be still confident because I think for our generation AI will play a role but not a major role, not a complete major role that you could actually become useless"* and *"I don't know, that's in a long time, I don't think it will be in our generation where it will be redundant."*

How Do Students Plan to Respond?

Participants in Group 2 were asked in the pre- Robotics course survey what the top three skills they felt they needed to develop for a career increasingly shared with AI. Forty-three students provided a total of 114 responses, as summarised in Table 4. The participants were asked the question again after completing the Robotics course, and 22 students provided a total of 62 responses, as summarised in Table 4.

	Pre course	Post course
Skill	% (n=114)	% (n=62)
Computing/Technology	29%	21%
Understanding AI	16%	10%
Human/Soft skills	16%	36%
Adaptability	10%	13%
Mathematics/Analysis/Engineering	6%	6%

Table 4. “Top skills need to develop for a career increasingly shared with AI” (pre-survey, n=114; post-survey, n=62).



Table 4 shows that prior to studying the robotics course the most common skill listed by students as one they needed to develop for a career increasingly shared with AI was “Computing/Technology,” 29% of students listed this skill. They felt that this would give them a competitive advantage over their peers. This was followed by 16% of students listing “Understanding AI” and 16% listing “Human and Soft Skills,” such as ethics and creativity. 10% thought they should try to improve their own ‘adaptability’ and 6% thought they should study mathematics or engineering.

After they took the course, the skill listed by the largest percentage of students (36%) was “Human and Soft skills.” Students felt that these were the skills that AI was less likely to take over, a view that is highlighted in some of the literature (e.g. Aoun, 2017). From the qualitative data gathered in the focus group discussions and essays it was clear that students perceived qualities and abilities such as complex decision making, critical thinking, intuition, emotional intelligence, grit and entrepreneurship as areas that are exclusively human and are therefore less likely to be replaced by AI. The students felt that being human made them more valuable e.g. *"I think our emotions and understanding of subjects like philosophy and critical thinking that involves emotion in a positive way could never be done by AI because it can't be influenced by anger which would influence a person's behaviour or love. I think that already makes us a lot more valuable"*. Students also described the need for educators to help them with this. For example, one student stated *"[Educators] could increase the range of subjects offered and concentrate on the skills that will be needed rather than on information that is currently losing relevance."*

More students listed “adaptability” as a skill (16%) after studying the Robotics course. Students felt that the future workplace will be characterised by continual and rapid changes and that they need to be prepared to constantly update skills and knowledge and being prepared for change. For example, as one student stated, *"I think I have more broad knowledge about everything so you can be flexible and adapt to new situations because, for example, if I specialise in one thing and they find a robot that can do it and in five years' time maybe I won't have a place to work, So, it's better if I just try to have broad knowledge about everything so I can be flexible and adapt."*

Another feeling expressed by some students was that human beings need to guard against skills erosion by keeping their brains sharp. For example, *"[schools should] introduce classes that emphasise the importance of training the brain and learning without always relying on AI."* The idea here is that to compete with the machines, we need to keep our brains sharp and ensure that we can be self-reliant rather than dependent on AI.

Overall, students from both groups emphasised the need to keep skills updated, be flexible, stay familiar with developments in AI and keep themselves marketable, so as not to fall behind the technology trends. For example, *"I think, for me, it's adaptation, I think that's really important these days like everything is changing every day and all these things and I think if you can adapt well to any situation, especially in the case of robots, then you won't have a problem."*

#### What Advice do These Students Have

Students who took part in the robotics course were asked in the post course survey for advice for younger students and educational institutions. These responses were combined with any responses from the focus groups, essays and Crowdscope that also referred to advice in this area.

### Advice for Younger Students

Participants counselled younger students to be:

- adaptable and stay flexible to changes that can impact future education and careers: *“The only constant in the world is change and you must be ready to adapt to technological changes that may impact the course of your education and career”*
- learn IT skills, and keep them up to date, and be prepared to invest time and energy learning about AI, and how this will affect any career you are interested in: *“Invest thought into the development of AI and learn to integrate it into your choice and life as it is developing and gaining presence and it is important to learn to adapt to it now in order to not miss out on opportunities in the future”*
- be alert and informed, gather knowledge (though internships/ experience) to make informed decisions, and learn to spot trends and react to them fast
- keep your options open, think broadly, rather than vocationally, pursue a broad range of interests, and take advantage of any learning opportunities (particularly online ones): *“I think if you want to survive in a world where AI is becoming a lot more powerful, you need as many skills as possible”*
- follow your passion: *“Do something you are passionate about rather than a lucrative career as this could cease to exist by the time you are qualified”*

Overall, students emphasised an appreciation that lifelong learning is more than a slogan – it is a survival strategy and they emphasised that all students should be aware of this.

### Advice for Educators: Content

Students provided the following advice for educators in terms of content.

- Students declared themselves hungry for all kinds of courses – theoretical ones and also practical ones. They want to be offered courses on:
  - programming: coding; technology engineering; data analytics
  - AI and Emerging Technologies: how different industries are being changed; AI in real businesses, what is happening already, what might happen.
  - humanities: history of humanity, psychology, sociology. Underpinning this was a sense of the need to preserve humanity in itself and guarding against artificial versions of humans.
  - what it is to be human: ethics and moral judgement; people skills; writing; psychology; creative. Participants felt that with the increase in AI and technology, there was a responsibility to use and implement it in an ethical and sustainable way so that in future when they were tasked with working alongside AI they had a solid and moral basis to make decisions from.
- Students urged educators to embed the impact of technological development and AI into *all* subjects taught: *“create more classes on AI alone, and then extra classes on how AI affects each major that is offered”*. Students emphasized the importance of the core subjects: *“it is a great idea to redesign for an advanced world. However, the very basis of a business school and its core should not be forgotten”*

### Advice for Educators: Delivery

Advice to educators in terms of delivery of content much of the advice focused on the importance of hands on, real life, practical experience, including asking educators to:

- use new technologies, emphasising the importance of linking to real examples and case studies
- use AI in the classroom, and be allowed to experiment with new forms of AI. For example:

- “*support small 'sandbox' projects where students can experiment with business ideas involving AI*”
- “*Schools should have a 'Maker's Lab' where they can experiment (with support) with 3D printing, Virtual Reality and other cutting-edge tools*”
- offer internships with companies using AI, or at least closer relationships with organisations/businesses
- visits and field trips to see AI in action in industry
- seminars with expert speakers to talk about ongoing changes and development in different companies and sectors.

Finally, many students referred to the importance of keeping the traditional, human aspect of teaching. Again, there was this sense that in an age of rapid technological invention, it remains all the more important to understand and value our humanity.

### **Conclusion**

The research found that students envisage a future with AI and automation that contains both positive and negative elements. This particular generation of students believe the future holds many opportunities for those who are prepared, but is also threatening in many ways. Those students who were the best informed had clearer thoughts and insights in the range of futures that were likely and the best ways these futures could be negotiated.

The students who discuss how they actively plan to respond say they will do this by being alert to emerging technologies and doing their best to learn about them and get practical experience from them. The key advice students have for younger students and for educators is to learn about AI and automation, make sure to have the necessary skills but not to forget what makes one human: “*Your humanity is important and valuable, maybe even more so in an age of automation and AI.*”

The findings from this research provide valuable information around student’s education and future skills needed. The findings can inform proposed changes to undergraduate and higher education curriculums more broadly, enabling us to better prepare students for the future.

Finally, future research in this area should follow this demographic into the workforce, to look in more detail at how they actually navigate the impacts of AI throughout their early careers. It would also be interesting to explore all of the above themes with HR managers and leaders, and also educators, to provide further insight in to how these stakeholders can work together to prepare everyone for a future increasingly shared with technology.

## References

- Aoun, J.E. (2017). *Robot-Proof: Higher education in the age of artificial intelligence*. Massachusetts: MIT.
- Arntz, M., Gregory, T., & U. Zierahn (2016), The Risk of Automation for Jobs in OECD Countries: A Comparative Analysis, *OECD Social, Employment and Migration Working Papers*, No. 189, OECD Publishing, Paris.
- Boyatzis, R.E. (1998) *Transforming Qualitative Information, thematic analysis and code development*. Sage Publications.
- Brynjolfsson, E. & McAfee, A. (2016) *The Second Machine Age: Work, Progress, And Prosperity In a Time of Brilliant Technologies*. New York: Norton.
- Carr, N. (2015) *The glass cage: Where automation is taking us*. Random House.
- Cowen, T. (2013) *Average is over: Powering America beyond the age of the great stagnation*. Penguin.
- Ford, M. R. (2009) *The lights in the tunnel: Automation, acceleration technology and the economy of the future*. Acculant Publishing.
- Ford, M. (2017) *The Rise of the Robots: Technology and the Rise of Mass Unemployment*. London: Oneworld Publications.
- Frey, C.B. & Osborne, M.A., 2017. The future of employment: how susceptible are jobs to computerisation? *Technological Forecasting and Social Change*, 114, 254-280.
- Keen, A. (2015). *The Internet is not the Answer*. Atlantic Books Ltd.
- Liu, B. (2012). Sentiment analysis and opinion mining. *Synthesis Lectures on Human Language Technologies*, 5(1), 1-167
- Lonsdale, J. (2017, April 12). AI and robots will take our jobs but better ones will emerge for us. *Wired*. Retrieved from <https://www.wired.co.uk/article/jobs-of-the-future>
- Pajarinen, M., Rouvinen, P., & Ekeland, A. (2015). Computerization threatens one-third of Finnish and Norwegian employment. *Etna Brief*, 34, 1-8.
- Pistono, F. (2014) *Robots will steal your job, but that's ok: how to survive the economic collapse and be happy*. CreateSpace.
- Schwab, S. (2016) *The 4<sup>th</sup> Industrial Revolution*, New York: Crown Business.
- Shewan, D. (2017, Jan 11). Robots will destroy our jobs – and we're not ready for it! *The Guardian*. Retrieved from <https://www.theguardian.com>
- Silverman Research. *Crowdoscope*, Retrieved from <https://www.crowdoscope.com/>
- White, M. D, & Marsh, E.E. (2006). Content analysis: A flexible methodology. *Library Trends*, 55(1), 22-45.