Artificial Intelligence: student perceptions of its impact on jobs and work

The Fourth Industrial Revolution (4IR), with Artificial Intelligence (AI) at its heart, is changing the labour market on a colossal scale. Questioning the assumption that digital natives should transition comfortably to the automated workplace, a study was conducted in May 2019 into students' views of the impact of AI on the economy, skills and jobs. It found that these students viewed AI negatively: they felt threatened and disempowered by it, pushed into an automated future they did not want, and their most dearly-held values conflicted profoundly with the principles they perceived would govern machine-human interactions.

Research Context

When articulating 4IR, Klaus Schwab anticipated the disparity between "those who embrace change versus those who resist it" (Schwab 2016: 97). A possible 65% of children entering primary school today will work in jobs that don't yet exist (WEF cited in North 2019). More companies are investing in AI than in any other digital technology (McGrath 2019) because AI isn't just a new technology, it is "*the* next general-purpose technology (GPT)" (Trajtenberg 2018: 1), the platform on which all other technologies and applications will run.

Imminent accelerators are 5G and the Internet of Things (IoT). Ericsson expect 5G to have 2.6 billion subscriptions covering up to 65% of the world's population by 2025 (2019). IoT will extend connectivity to a wider range of devices, but this sits uncomfortably alongside digital poverty figures revealed by the Covid-19 lockdown that few UK state schools have an online platform (private schools 60%, state schools in affluent areas 37%, state schools in deprived areas 23%)(Cullinane and Montacute 2020).

The UK aims to be ranked third, behind China and the US, in the global AI race (Iqbal 2018). The UK government's Industrial Strategy (GB Dept for BEIS 2017) lists AI and the Data Economy as the first of four Grand Challenges, and an All-Party Parliamentary Group on AI (APPG AI) was created in 2017, one of whose Four Pillars is Citizen Participation. This study explores the views of three groups of younger people, to hear their voices as discussions begin and policies form about AI.

Literature Review

As in every era of technological innovation, the private sector is at the cutting edge in 4IR. According to Cookson (2019), the first AI-related patents were filed in the 1950s, reaching 18,995 worldwide in 2013, almost tripling to 55,660 in 2018, while the ratio of scientific publications on AI to AI patents fell from 8:1 in 2010 to 3:1 in 2016, showing a shift from theoretical research to industrial application. PwC predicts that UK GDP may approach 14% higher in 2030 as a result of AI (Rao and Verweij 2017), with 55% of businesses planning more investment in new technologies and one third expecting radical disruption by 2021 (McGrath 2019).

Public opinion has been fed by media stories, emanating from innovators and commentators, where impact and corporate self-interest are a higher priority than truth, accuracy and ethics (Scott Brennen 2018). In 2018, at two careers guidance conferences, key speakers (Hooley 2018, Kemp 2018) spotlighted the theme of alarmist media coverage about AI. The ubiquity of AI in creative output, such as films, video games, fiction and non-fiction, has been evident for over 30 years, with conspicuously nihilistic treatments.

Balancing this, academic attempts to collate, rationalise and interpret have emerged, beginning with Frey and Osborne's shocking research in 2013 estimating that 47% of US employment is at risk because of computerisation, particularly impacting on low-paid, low-skilled jobs. By 2015, Ford concluded that AI has the capacity to re-invent the labour market totally, exemplified by the gig economy (Hook 2015) and zero-hours contracts (Chiripanhura 2019). Also in 2015, Susskind and Susskind judged that the professional labour market may be similarly at risk, as machines perform routine elements of professional work previously done by people. Hambly and Bomford (2018) anticipate growing social inequality and lack of opportunity for self-actualisation; Hooley's (2019) changing world of work narrative rethinks the categories of work and education, while Diane Coyle advocates a new agenda of "welfare economics", which factors in more qualitative measurements, such as time (Coyle 2019: 44m 57s).

There is now a public policy response, aiming to take control of AI-driven changes, especially in the fields of ethics and workforce skills. There are growing pleas for

regulation and distinct developments in this direction: the EU is working on a Framework for Trustworthy AI and the Information Commissioner's Office is considering an AI auditing framework (Gardner 2019). The impetus towards skills development is better understood and universally accepted. The People foundation of the government's Industrial Strategy white paper (GB Dept. for BEIS 2017: 11) announces three key policies: a technical education system; boosted learning in STEM skills; and a National Retraining Scheme to re-skill older workers and enable existing workers to adapt to new skills demands.

Analysis of the skills needed is offered by many commentators, among them the World Economic Forum (2018: 22), where analytical thinking and innovation top the list in 2018, having not even made the top ten in the 2016 report. A similar skills list is identified by Bakhshi et al (2017), who draw optimism from the scope for re-skilling. At the heart of the government's strategy for AI skills is versatility and the ability to learn (Iliadis 2018), with individuals understanding the skillset of the future and assessing what he/she may need (Easton and Djumalieva 2018). Kashefpakdel and Percy (2019) consider how careers education can support students in their quest for crucial labour market skills. The National Careers Strategy (DfE 2017) omits Artificial Intelligence and automation, although it does cover STEM engagement at length and acknowledges new technology and digital talent; the Education Technology Strategy (DfE 2019) also recognises the digitally enabled world and the duty to maximise the benefits of technology. This is all top-down, however; the voices of citizens have been absent.

Methodology

The study was conducted during May 2019 at City of Oxford (FE) College, amongst Access to HE students. The approach was non-selective, as they were invited to participate as tutor groups. Of six tutors approached, three agreed to participate. The students were not personally invited in order to preserve anonymity and privacy; in the event, the participants were those who happened to be in college on the day the of the research. There were 26 participants, from Combined Sciences, Art & Design, and Nursing courses, estimated to be aged 19 to 35 years old, with an average of around 25. The research was conducted with two focus groups (Combined Sciences and Art & Design students) and one group surveyed by questionnaire (Nursing students). Oneto-one interviews were rejected to avoid the risk that talking about a potentially threatening topic might make students feel vulnerable. No prior knowledge about AI or automation was assumed and students were not asked to prepare beforehand. To avoid direct and inappropriate questioning, the interview design was structured around four themes: AI in relation to the economy; to jobs; to skills; and their own personal response, including how they felt the CG profession could help. For each theme, relevant material selected from recent sources plus two or three questions were presented as a starting point for discussion. Every attempt was made to present purely factual material in as balanced a way as possible, in order to avoid introducing bias. The interviews were then analysed thematically.

Key Findings

The study explored what AI means to these students; what their feelings about it are; how it might manifest in the workplace; its possible effect on their own careers; and how careers services can help. While direct questions probing these issues were considered unacceptably intrusive, the evidence from the interviews was nonetheless analysed in this light.

Economic progress was viewed with scepticism, even fatalism

The views expressed were overwhelmingly negative: of the words used to describe AI, 62% were negative, 24% were positive, 11% were neutral and 3% gave no response.

"It's good in the sense that it's boosting the economy, but at what expense?" "(AI's) will just take over, won't it? They're more efficient than people – people need maternity leave, sick leave, things like that."

Machines will take jobs away from humans

This was a recurring theme, influenced by films, video games and media headlines. "Will there be more unemployment as a result of it? Will people like workers lose their jobs in the process?"

"What if AI wiped out, like, a whole industry?"

Al is just another wave of technology that may also create new jobs

They could see that AI might simply be the next technological innovation which creates jobs that could not have existed before, although some might be of dubious quality.

"You have IT technicians - they weren't a thing 40 years ago. It's nothing we haven't seen before; it's just progress."

"I think it's just going to create jobs that aren't real, like influencers on Instagram."

A job is more than an occupation

They were quick to see that work is about more than salary; purpose, meaning, identity and self-actualisation really matter.

"As a nation, we'll be strong economically, but what does that mean per person?" "If you've got robots doing everything for you, what are you here for?"

Al will affect the skills needed

They agreed that skills training is key, and were well aware of the risks of technological unemployment.

"If people who aren't tech-savvy apply for jobs...it might exclude a lot of people from the working environment."

"(Learning soft skills) doesn't fit our educational structure at all, we don't learn any of those things, it's only work experience for two weeks."

The human factor

Their greatest concerns were over jobs where empathy is critical, which they saw as a uniquely human skill.

"You could click all the symptoms you have and then it will give you a diagnosis, but when I go to the doctor's, I need that personal human interaction."

Al comes with serious ethical and social issues

These moral dilemmas were a source of real anguish, from machines becoming actively dangerous to wreaking intolerable social change.

"Data breaches are possible and people will abuse the technology."

"Will it just make the people at the top richer?"

Concrete knowledge about AI and the labour market

There is a big gap in knowledge about AI; reliable information is scarce and the automated labour market feels mysterious. Careers services have a key role to play. "As long as the infrastructure and support are there from Careers and industry, as long as they are able to equip people with the skills they need to move with the evolving workplace, I think people will be okay."

Discussion

Any new GPT is, by its nature, radical and disruptive (Laino 2019). In its Al incarnation, it lays down particular challenges to the CG profession, and is prompting a radical response (Watts 1996), where social inclusion and mobility are under such threat from new economic structures that Hooley, Sultana and Thomsen (2018) identify social justice as the contemporary battleground in CG.

The interviewee responses in this study revealed a deep vein of resignation to the technology and its potential human consequences. Seen through the lens of Roberts' Opportunity Structure Theory (1968), they felt trapped by a narrow range of unappealing options, while the real opportunities would flow to those with social and economic advantages. The hysteria that robots will take our jobs, our purpose and our identity (Schwab 2016) had proved infectious, and had engendered a mindset towards automation that saw many disadvantages and few benefits. An approach using Hodkinson's (1997) Horizons for Action is badly needed. In an AI-enabled world, people will have jobs, learn skills, grow and express themselves, but few of us have, as yet, any idea how. The students' responses showed an instinctive tendency to see their entry into the automated labour market in terms of personality and fit with environment (Holland 1985), but where they could only see misfit and minimal chances of self-actualisation (Maslow 1943).

It may be that narrative approaches, such as Life-span, Life-space Theory (Super 1980) and Life Design and Storytelling (Savickas 2005), emphasising personal interpretation, will enable people to accommodate the coming changes and see the alienation caused by automation not as personal exclusion but as part of a bigger pattern that affects almost everyone. In the face of radical and disruptive change, customers' ability to confront change and achieve transition will be critical, using

models such as Schlossberg's Career Development Transition Model (1995) and the Wheel of Change (Prochaska and DiClemente 1994).

If one imagined the collective evidence from this study presented as one individual in a CG interview, one could apply MDOTS (based on DOTS, Law and Watts 1977) to enumerate the CG actions needed. The negative mindset is a high priority, as it is driven by antipathy towards AI and desire to reveal its faults; attempts to encourage engagement with AI could struggle with someone who wants to see it fail. In the context of such negativity, decision-making will feel pointless, and, instead, a person may choose to defer making career decisions involving AI until it is forced on them, hardly a situation where self-efficacy (Lent, Brown and Hackett 1994) can shine. The area which offers true scope for change is opportunity awareness: the level of accurate knowledge about the automated workplace is very limited, yet a small amount of good information from a reliable source can help enormously. If anything can enable a person see what jobs exist, where they could fit in, how they might thrive, it is better knowledge of the opportunities. The issue of transitional skills is well recognised and provision is growing, although it remains the task for every individual to assess their own skills and identify and address their gaps. Selfawareness might offer a good transition point: helping someone understand their Career Anchors (Schein 2016) could build confidence and resilience, and change mindset.

Implications for professional practice

- Al needs to be de-mystified: we should be clearer about what Al is, what it does, and how. By defining and demonstrating it, people can be informed by facts, not myth, and the mistrust and fatalism seen in this study can be replaced by empowerment, confidence and enthusiasm.
- Excellent LMI about AI-enhanced jobs: we need to explain how AI enhances a job. What does that job entail? How is it different from the same job without AI? How do you learn to do it? What does it feel like? We need to help students see themselves working in it.

- Strong links with employers: in certain sectors, many jobs already incorporate robotics and AI; those employers and employees could very usefully share their knowledge, putting a human face on the tech and making it real. Digital T levels commence delivery from September 2020, and we need to develop AIencounter opportunities in all forms of work-based learning.
- Experiential learning: because AI cannot be seen, heard or touched, the best way to understand it is to learn by doing. The CDI already has a strategy for developing digital platforms and tools; this could be extended to automated platforms and tools in its next iteration, and learning needs arising from digital poverty should be addressed.
- Openness to change: much of these students' antipathy towards AI was born of existential fear and visceral reluctance to change. They perceived that the world they had grown up in was changing, and were anxious about separating from their younger selves in a simpler world. CG work already entails a high level of support when transitioning: in an AI context, it gains new urgency.
- Ethics: the message from these students was simple. If they aren't happy about the ethics of AI, they can't be happy about any of it. This resistant mindset could prevent other good work from being effective. As CG practitioners, we should routinely review our own views of AI, to avoid bias.

Conclusion

The greatest challenge isn't about technology, skills, or ethics, important as they are, but about people management in the face of huge, impending change (Gifford and Houghton, 2019). Our role is to help customers confront that change and reach a point where they can not only cope, but thrive.

As one interviewee summarised:

"Progress will happen, it's human nature. We like to move forward, but it's also taking people with you and reassuring them that 'hang on, the future *is* for you, you're *not* excluded from that future and the change that is taking place'."

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APPENDICES

APPENDIX ONE

GLOSSARY AND ACRONYMS

4IR	The fourth industrial revolution
AGCAS	The Association of Graduate Careers Advisory Services
AI	Artificial Intelligence
APPG AI	All-Party Parliamentary Group on Artificial Intelligence
CDI	Career Development Institute
CEIAG	Career education, information, advice and guidance
CG	Career guidance
DfE	Department for Education
FE	Further Education
GDP	Gross domestic product
GPT	General purpose technology
HE	Higher Education
ICT	Information and Communications Technology
iCeGS	International Centre for Guidance Studies
LMI	Labour Market Information
MDOTS	A practical four-stage model of career management developed by Law
	and Watts (see References), addressing: Mindset, Decision-making,
	Opportunity awareness, Transitional skills and Self-awareness
NGO	Non-governmental organisation
OECD	Organisation for Economic Co-operation and Development
STEM	Science, Technology, Engineering and Mathematics
WEF	World Economic Forum

APPENDIX TWO

CERTIFICATE OF ETHICAL APPROVAL



Certificate of Ethical Approval

Applicant:

Jacqueline Rattue

Project Title:

Artificial Intelligence: student perceptions of its impact on jobs and work.

This is to certify that the above named applicant has completed the Coventry University Ethical Approval process and their project has been confirmed and approved as Medium Risk

Date of approval:

09 May 2019

Project Reference Number:

P80161

APPENDIX THREE

ACTIVATE LEARNING CONSENT TO RESEARCH

Certificate of Ethical Approval.pdf; Sponsor Letter.pdf;

From: Jacky Rattue Sent: Thursday, May 9, 2019 12:07:30 PM To: Anne Haig Smith Subject: Re: ALF Update 5 March 2019

Dear Anne,

My Ethics Approval has just come through today; I attach the Certificate of Ethical Approval and the Sponsor Letter from Coventry University. They have also supplied me with a Certificate of Employers' Liability Insurance and a Professional Indemnity Letter; if you would like to see these too, do let me know.

I will be interviewing in the remaining weeks of May and in June. I will submit the dissertation in August and will be able to share it with you in September.

Many thanks, again, for agreeing to allow me to conduct the research at City of Oxford College.

Regards,

Jacky

From: Anne Haig Smith Sent: 08 April 2019 08:43 To: Jacky Rattue Subject: RE: ALF Update 5 March 2019

Hi Jacky

Thank you for submitting your form. I can confirm that we give our consent for you to undertake your research within Activate Learning on the following conditions:

- 1. A copy of the ethical approval consent from Coventry University is supplied to me prior to the start of research.
- 2. You confirm that all data will be kept securely in accordance with our GDPR regulations and not data is sent by email attachment unless it is password protected, and the password is sent in a separate email.

Kind regards and I hope the research goes well. Do keep in touch.

Anne

From: Jacky Rattue Sent: 24 March 2019 19:26 To: Anne Haig Smith <Anne.HaigSmith@ActivateLearning.ac.uk> Subject: Re: ALF Update 5 March 2019

Thank you, Anne, much appreciated.

Jacky

APPENDIX FOUR

PARTICIPANT INFORMATION SHEET

ARTIFICIAL INTELLIGENCE: STUDENT PERCEPTIONS OF ITS IMPACT ON JOBS AND WORK

PARTICIPANT INFORMATION SHEET

You are being invited to take part in research on "Artificial Intelligence: student perceptions of its impact on jobs and work". Jacky Rattue, Career Guidance Masters student at Coventry University, is leading this research. Before you decide to take part it is important you understand why the research is being conducted and what it will involve. Please take time to read the following information carefully.

What is the purpose of the study?

The purpose of the study is to observe and document student opinions about Artificial Intelligence (AI) and its impact on jobs and work.

Why have I been chosen to take part?

You are invited to participate in this study because you are a student at City of Oxford College, which is the group I have chosen to focus on in this study.

What are the benefits of taking part?

By sharing your experiences with us, you will be helping Jacky Rattue and Coventry University to better understand what individuals think about AI and the effect it may have on jobs and work. Policy-makers and influencers are engaged in energetic debate about this while individuals, the ones who will actually feel this impact, are not being consulted are barely being engaged in the debate. This study aims to bring individuals into that conversation.

Are there any risks associated with taking part?

This study has been reviewed and approved through Coventry University's formal research ethics procedure. There are no significant risks associated with participation. If at any time you feel uncomfortable about these issues or it raises concerns that you would like to discuss, please tell Jacky Rattue and she will arrange for you to see a careers adviser or student welfare officer, as appropriate.

Do I have to take part?

No – it is entirely up to you. If you do decide to take part, please keep this Information Sheet and complete the Informed Consent Form to show that you understand your rights in relation to the research, and that you are happy to participate. Please note down your participant number (which is on the Consent Form) and provide this to the lead researcher if you seek to withdraw from the study at a later date. You are free to withdraw your information from the project data set at any time until the data are fully anonymised in our records on 31st August 2019. You should note that your data may be used in the production of formal research outputs (e.g. journal articles, conference papers, theses and reports) prior to this date and so you are advised to contact the university at the earliest opportunity should you wish to withdraw from the study. To withdraw, please contact the lead researcher (contact details are provided below). Please also contact the



Research Support Office at <u>ethics.hls@coventry.ac.uk</u> so that your request can be dealt with promptly in the event of the lead

researcher's absence. You do not need to give a reason. A decision to withdraw, or not to take part, will not affect you in any way.

What will happen if I decide to take part?

You will be asked to respond to a number of statements reflecting a range of views about AI and jobs/work. The focus group will take place in a safe environment at a time that is convenient to you. Ideally, we would like to audio record your responses (and will require your consent for this), so the location should be in a fairly quiet area. The focus group should take around one hour to complete, including instructions and explanations bat the beginning and a wrap-up at the end.

Data Protection and Confidentiality

Your data will be processed in accordance with the General Data Protection Regulation 2016 (GDPR) and the Data Protection Act 2018. All information collected about you will be kept strictly confidential. Unless they are fully anonymised in our records, your data will be referred to by a unique participant number rather than by name. If you consent to being audio recorded, all recordings will be destroyed once they have been transcribed. Your data will only be viewed by the researcher/research team. All electronic data will be stored on a password-protected computer file at the lead researcher's home address. All paper records will be stored in a locked filing cabinet at the lead researcher's home address. Your consent information will be kept separately from your responses in order to minimise risk in the event of a data breach. The lead researcher will take responsibility for data destruction and all collected data will be destroyed on or before 30th September 2019.

Data Protection Rights

Coventry University is a Data Controller for the information you provide. You have the right to access information held about you. Your right of access can be exercised in accordance with the General Data Protection Regulation and the Data Protection Act 2018. You also have other rights including rights of correction, erasure, objection, and data portability. For more details, including the right to lodge a complaint with the Information Commissioner's Office, please visit <u>www.ico.org.uk</u>. Questions, comments and requests about your personal data can also be sent to the University Data Protection Officer - <u>enquiry.ipu@coventry.ac.uk</u>

What will happen with the results of this study?

The results of this study may be summarised in published articles, reports and presentations. Quotes or key findings will always be made anonymous in any formal outputs unless we have your prior and explicit written permission to attribute them to you by name.

Making a Complaint

If you are unhappy with any aspect of this research, please first contact the lead researcher, Jacky Rattue, at rattuej@uni.coventry.ac.uk. If you still have concerns and wish to make a formal complaint, please write to:

Paul Gaunt Senior Lecturer in Career Guidance Coventry University Coventry CV1 5FB Email: paul.gaunt@coventry.ac.uk

In your letter please provide information about the research project, specify the name of the researcher and detail the nature of your complaint.



APPENDIX FIVE PARTICIPANT INFORMED CONSENT FORM

Participant Informed Consent Form

Artificial Intelligence: student perceptions of its impact on jobs and work

The purpose is to observe and document student opinions about AI and its impact on life and work.

	Pleas
 I confirm that I have read and understood the participant information sheet (insert version number) for the above study and have had the opportunity to ask questions 	
2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving a reason	
3. I understand that all the information I provide will be treated in confidence	
4. I understand that I also have the right to change my mind about participating in the study for a short period after the study has concluded (30 th June 2019)	
5. I agree to be recorded and for anonymised quotes to be used as part of the research project	
6. I agree to take part in the research project	
Name of participant:	
Signature of participant:	
Date:	
Name of Researcher: Jacky Rattue	
Signature of researcher:	

Date:

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APPENDIX SIX GATEKEEPER EMAIL

Dear tutor,

I have recently joined and and and in the access team, and am based at the Oxford campus. I am extending my Career Guidance qualification by completing a Masters in Career Guidance at Coventry University. It includes a research project which

The purpose of my study is to observe how students perceive the impact of Artificial Intelligence on jobs and work. Subject to approval by Coventry University Ethics, this study will be using focus group discussions based on a spectrum of six statements about AI and work/jobs to stimulate their discussion. I will have the same six statements available for students to respond to in a questionnaire format where it is not feasible to hold focus groups.

I'm writing to ask your permission to be allowed access to your tutor group to hold a focus group discussion. I anticipate that this should take 45-60 minutes, ideally in one sitting but it can be split into different sittings if need be, and can be conducted at a convenient time and date (to be arranged). The students would not need to prepare in advance, nor follow up afterwards. All views are equally valid, that is, those who know quite a bit about AI as well as those who don't; those who like technology and those who don't. There is no obligation to participate and I will have a detailed Participant Information Sheet setting out what they can expect from me.

All answers and results from the focus groups/questionnaires will be kept strictly confidential, in accordance with the Activate Learning GDPR policy, and the results will be reported via ALF in a research paper available to all participants on completion.

If you are happy for me to approach your tutor group for my study, please could you reply to me, for now just saying you agree? I will then get back in touch with you to arrange dates and times. I am also very happy to come and talk to your tutor group beforehand, so that they have a chance to ask questions in advance. Of course, if you have any questions yourself, do please ask me. I will be using my Activate email address throughout the study and, while I am only on campus two days a week, I am very happy to answer questions at any time.

Thank you very much indeed for your help with this.

Yours,

Jacky Rattue

Group Careers Consultant

APPENDIX SEVEN

TABLE OF PARTICIPANTS

GROUP NUMBER	NUMBER OF STUDENTS	ACCESS TO HIGHER EDUCATION SUBJECT	INTERVIEW DATE	INTERVIEW LOCATION
G1	10	Combined Sciences	15 May 2019	Oxford
G2	6	Art and Design	21 May 2019	Oxford
G3	10	Nursing	20 May 2019	Oxford

Notes

- 1. All participants were aged over nineteen years, as that is the threshold for entry to the Access to Higher education course.
- 2. No further information was collected, such as employment history, education, gender, religion, ethnicity or prior knowledge of AI, as this was not relevant to the study.

APPENDIX EIGHT

INTERVIEW SCHEDULE: FOCUS GROUP SLIDE (GROUPS 1 AND 2)



<text><list-item>



Issue 2: jobs Within the economy as a whole, employment is likely to be reallocated rather than eliminated: ▶ Automation is likely to lead to the steady rearrangement of labour over a period of decades. The tasks involved in most jobs will evolve, and gains in some sectors are likely to outweigh losses in others. New jobs and ways of working will emerge, often in close partnership with machines. Jobs which augment machines may pay more and be more stable, while jobs that run alongside machines may pay less and be less stable. Machines are likely to do some tasks that people do currently. It may be that machines will do the mundane, routine activities and people will be freed up to do more of the imaginative tasks that we are better at. (Institute for Public Policy Research, 2017) "65% of today's university students will end up doing jobs in the long term that don't even exist yet." ► (US Dept of Labor, 2016) Question: What are your thoughts about working in this environment? On a scale of 1-10 (low to high), how optimistic do figures like these make you feel about the way AI may affect the economy?





APPENDIX EIGHT continued

INTERVIEW SCHEDULE: QUESTIONNAIRE (GROUP 3 ONLY)

MASTERS RESEARCH QUESTIONNAIRE

Hi,

I am one of the Careers Advisers at City of Oxford College, and I am doing a Masters degree in Career Guidance at Coventry University.

As part of this, I am conducting a small research project amongst the Access to HE students at the college on the topic of Artificial Intelligence (AI). The questions I would like to ask you are set out below; you don't need any particular knowledge about AI to answer them – the point is simply for me to find out what students think. It is set out as an introduction, three separate issues (the economy, jobs, and skills) where I have set out some statements for you to respond to, and an overall question to conclude. Your responses will be completely anonymous – you will see I have not asked for your name, as I don't need it. When you have finished, please give this questionnaire to your tutor.

Thank you very much for doing this. I really do appreciate your time and support with it, as I know you have exams coming up soon. If you find any aspect of the questionnaire worrying or distressing, you can get help from the college Student Services and from the Careers Team.

And finally, before you start, please make sure you have completed the Participant Consent Form and handed it back to your tutor, and that you have a copy of this together with a Participant Information Sheet, which sets out your rights as a participant.

Thank you for doing this; I hope you find it interesting.

Jacky Rattue

Group Careers Consultant, Activate Learning and Career Guidance Masters Student, Coventry University

Oxford, May/June 2019

Please turn over

ARTIFICIAL INTELLIGENCE (AI): STUDENT PERCEPTIONS OF ITS IMPACT ON JOBS AND WORK

Introduction:

What is the context of my dissertation?

Jonnie Penn, Al researcher at the University of Cambridge: "The conversation around skills is based on prosperity. Ultimately, we are trying to decide what skills we need to prosper." We should be having broader conversations on what we want in this world, what we mean by citizenship, what we qualify as prosperity, etc. Citizens should be encouraged to prototype their ideas. Young people want to aspire and be valuable in society; and, hence, adults should provide a narrative for younger generations to speak and participate in shaping the future. (All Party Parliamentary Group – Artificial Intelligence [APPG-AI], Findings 2018, page 17).

This study creates an opportunity for younger people to speak and participate in the debate about AI.

Issue 1: the economy

- ► The growth of the economy:
 - 1850 1910 (60 years) Steam engine Productivity grew annually by 0.3%
 - 1993 2007 (14 years) Early robotics Productivity grew annually by 0.4%
 - 1995 2005 (10 years) ICT
- Productivity grew annually by 0.6%
- 2015 2065 (50 years) Al
- Productivity could grow annually by 0.8-1.4%

(Figures from McKinsey, quoted in Institute for Public Policy Research [IPPR] 2017, page 17)

PwC refers to AI as "the biggest commercial opportunity in today's fast changing economy," predicting UK GDP* to be 10.3% higher in 2030 as a result of AI.

* GDP = Gross Domestic Product, which is the total monetary value of goods and services produced in a country during one year. It is a measure of a nation's overall economic activity and wealth generation.

(Quoted in APPG-AI Findings 2018, page 11)

On the scale below, how optimistic do figures like these make you feel about the way Al may affect the economy? Circle the number that represents your view.

0------7-----8------9-----10

Not at all optimistic

Very optimistic

Why is this?

Issue 2: jobs

Within the economy as a whole, employment is likely to be reallocated rather than eliminated:

- Automation is likely to lead to the steady rearrangement of labour over a period of decades. The tasks involved in most jobs will evolve, and gains in some sectors are likely to outweigh losses in others.
- New jobs and ways of working will emerge, often in close partnership with machines. Jobs which augment machines may pay more and be more stable, while jobs that run alongside machines may pay less and be less stable.
- Machines are likely to do some tasks that people do currently. It may be that machines will do the mundane, routine activities and people will be freed up to do more of the imaginative tasks that we are better at.

(IPPR, 2017)

"65% of today's university students will end up doing jobs in the long term that don't even exist yet."

(US Dept of Labor, 2016)

What are your thoughts about working with machines in this way?

What is your reaction to the second statement (the US Dept of Labor one)?

Issue 3: skills

Al is transforming the types of skills individuals will need. The emerging skills agenda requires STEM* skills but it will also require non-STEM* skills, including design thinking, systems thinking, innovation and creativity, evidence-based practice, and interpersonal skills.

* STEM = science, technology, engineering and maths

(APPG-AI, Findings 2018)

- Skills for success (in order of significance) in the Fourth Industrial Revolution:
 - 1. Complex problem-solving
 - 2. Critical thinking/analytical
 - 3. Creativity
 - 4. People skills/empathy
 - 5. Co-ordinating with others
- 6. Emotional Intelligence
- 7. Judgement and decision-making
- 8. Service orientation*
- 9. Negotiation
- 10. Cognitive flexibility*

(Schwab, K., World Economic Forum, 2016)

*Note: "Service orientation" means seeing something from the perspective of the user, not the producer. "Cognitive flexibility" means switching from thinking about one thing to thinking about something else.

Is this list of skills for the automated workplace what you expected?

Please circle: yes no

Comments:	
Which three skills surprise you most:	1
2	_ 3
Are there any skills you would have exp	pected to see in the list that aren't there?
In conclusion:	
What are your thoughts and feelings	overall about jobs and work in an Al world?
How can careers advisers/careers see	ervices help?

Thank you very much indeed for your participation.



I will be able to share my findings in the autumn term. I will send out a copy of the final version via tutors, but you are also welcome to contact me now and I will add your email address to the list of people I will inform:

jacky.rattue@activatelearning.ac.uk

(take a photo of this or email me now)

APPENDIX NINE

SCORES AND WORDS REFLECTING LEVELS OF OPTIMISM ABOUT AI

These are referred to in Section 5 Findings and Analysis

1. Two of the three groups (G2 and G3) were asked to score how optimistic they felt about working in the automated workplace on a scale of 1 (low) to 10 (high).

G2 scores were:

SCORE:	NO. OF STUDENTS:
1	1
2	0
3	1
4	0
5	1
6	1
7	1
7.5	1
8	0
9	0
10	0

G3 scores were:

SCORE:	NO. OF STUDENTS:
1	0
2	1
3	0
4	1
5	4
6	0
7	2
8	1
9	0
10	0
left blank	1

G2 average score: 4.91

G3 average score: 5.33 (blank score excluded)

APPENDIX NINE continued

2. Words used that reflect feelings about AI: the lists below collate the words used overall, throughout the focus groups and questionnaires.

G1	G2	G3
good (+)	scary (-)	interesting (+)
exciting (+)	tricky (-)	not sure (o)
progress (+)	scares me (-)	ambivalent (o)
rigid (-)	dangerous (-)	worried (-)
mixed feelings (o)	controlled state (-)	(blank responses) (?)
regress (-)	depression (-)	
great (+)	pointless (-)	
	disconnected (-)	
	controlled state (-)	
	awful (-)	
	not feeling appreciated (-)	
	artificial (-)	
	addicted (-)	
	good (+)	
	interested (+)	
	suspicious (-)	

27 words in total

Simple analysis:

Positive	24%	(7/27)	(symbol = +)
Neutral	11%	(3/27)	(symbol = o)
Negative	62%	(17/27)	(symbol = -)
Left blank	3%	(1/27)	(symbol = ?)