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 ethics.hls@coventry.ac.uk 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 www.ico.org.uk. Questions, comments and requests about your personal data can also be sent to the University Data Protection Officer - enquiry.ipu@coventry.ac.uk

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.

	Please initial
1. 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 (30th 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: .....

APPENDIX SIX

GATEKEEPER EMAIL

Dear tutor,

I have recently joined [redacted] and [redacted] in the [redacted] careers 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 [redacted] has given me permission to conduct at [redacted]

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)

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

Lead researcher: Jacky Rattue

Introduction:

What is the context of my dissertation?

- Jonnie Penn, AI 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.** (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)	AI	Productivity could grow annually by 0.8 - 1.4%

(Figures from McKinsey, quoted in 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.

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

- **Question:** ***We don't know how reliable forecasts like these are, but what do you think AI has to offer, economically?***

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?***

Issue 3: skills

- AI 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

  (All Party Parliamentary Group on Artificial Intelligence, Findings 2018)

- Skills for success (in order of significance) in the Fourth Industrial Revolution:

  1. Complex problem solving
  2. Critical thinking
  3. Creativity
  4. People
  5. Co-ordinating with others
  6. Emotional Intelligence
  7. Judgement and decision-making
  8. Service orientation
  9. Negotiation
  10. Cognitive flexibility

  (K. Schwab, World Economic Forum, 2016)

- **Question:** ***What do you think of this list of skills for the automated workplace*****?**

In conclusion:

- **What are your thoughts and feelings overall about jobs and work in an AI world?**
- **How can careers advisers/careers services 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 direct:

jacky.rattue@activatelearning.ac.uk

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, AI 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) AI 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 AI may affect the economy? Circle the number that represents your view.

0--------1--------2--------3--------4--------5--------6--------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

▶ AI 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 expected to see in the list that aren't there?

_____

_____

In conclusion:

▶ **What are your thoughts and feelings overall about jobs and work in an AI world?**

_____

_____

_____

_____

▶ **How can careers advisers/careers services 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

G2 average score: 4.91

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

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 = ?)