Using Student Data to Identify Students Who Are At Risk Of Failing To Progress.

SIMON HANDLEY

A thesis submitted in partial fulfilment of the requirements of

Birmingham City University

for the degree of Doctor of Education

January 2022

Faculty of Health, Education and Life Sciences

CONTENTS

Acknowledgements

There are so many people to thank who have helped me to carry out this research. Family, friends, colleagues and supervisors have all provided me with the opportunity and support necessary when being engaged in part-time study. There are so many of you who have kept me on track.

Many years ago, I played the part of the lone researcher when I completed my MPhil. The lack of a research community at that time was a real challenge. When I first started exploring the idea for this research I was drawn to the, then new, EdD (Doctor of Education) programme. The idea of studying as a cohort was immediately attractive. We have established our own research community and we often meet for coffee to discuss how our research is progressing. This has been immensely powerful and has reached across the University and beyond. Therefore, many thanks to the course team for coming up with the idea, and to my student colleagues for their support and coffee.

My thanks must go to the Faculty of Computing, Engineering and the Built Environment Senior Leadership Team for giving me time, space and support to carry out this work.

Special thanks to my two supervisors, Maxine Lintern and Mark O'Hara, who have been supportive in so many ways. Particular thanks go to Alex Wade for his insight into Bourdieu and the creation of the final thesis. Additional and heartfelt thanks to Robert Cooke and Mohammed Gaber for all their help with the statistics.

I would especially like to thank my wife, Catherine Lander, who has managed to put up with me during the creation of this body of work.

Abstract

It is imperative to ensure student progression for two reasons. Firstly, to be sure that the students, who are investing years of their lives, are guided to a successful completion of their studies, and secondly, to provide a reliable income which is needed to maintain the viability of the course, through the continued payment of fees from students who are fully engaged with their academic studies.

Universities hold vast quantities of student administrative data. Traditionally there has been limited use of this data in providing student support. The academic process has generated student performance data and used it for making progression decisions. In addition to this, generic student data has been gathered during the admissions process, such as qualifications, gender, socio-economic classification and parental experience of higher education. This has been collated to produce reports required by the government for monitoring and reporting purposes. My research has made use of this data to investigate and analyse potential relationships to student progression using both academic and non-academic factors. A Bourdieusian approach was adopted to explore student and Institutional Habitus, Cultural Capital and Cultural Social Reproduction to provide a focus for the variables or factors investigated.

Using Adjusted Binary Logistic Regression, five factors have been identified as having a statistically significant relationship to student progression. These are entrance qualification type, commuting/non-commuting students, students who achieve/exceed the UCAS tariff entrance requirement, students whose GCSE mathematics result is higher than grade C, and those students who are studying in one of four academic schools. No significant difference was found in the progression of students based on the non-academic factors of gender, socio-economic classification, ethnicity or parental experience of higher education.

Qualification type was identified as the most significant factor for progression. Vocational students were found to be less likely to proceed to a second year of study when compare to A-level students. Curriculum designers need to reflect on this result and identify methods to provide equal opportunities for progression.

1 Introduction

1.1 The Context

Academia is the name given to things related to a formal education. Academia is a state of aspiration, and universities form a fundamental part of it. Academics are individuals who spend their lives as researchers, lecturers, senior lecturers and professors, all enjoying the academic environment and providing and facilitating this for others. Undoubtedly, universities would be nothing without the academics. In any University the greatest asset is not the buildings, IT network, sports facilities or campus, but the intellectual capital held by the academics and developed and released through them in their students. However, the lifeblood of the University is the student body without whom the University would not exist. Students who attend university are there to gain knowledge, skills and an understanding of knowledge derived from the intellectual ideas and, in the case of practice-based universities, to develop the skills needed to join a range of professions that are deemed to require an academic background in order to practise successfully. Students arrive at University with their qualifications and their life experiences or habitus to start on a journey in their chosen degrees. Students are often referred to as learners; they are receivers of the wisdom and inspiration needed to acquire knowledge which is generated from the institutional intellectual capital. John Henry Newman (Newman, 1907) documented his ideas that a University was of a place of learning but not necessarily of practical or skills-based learning.

"If then a practical end must be assigned to a University course, I say it is that of training good members of society"..." It is the education which gives a man a clear, conscious view of their own opinions and judgements, a truth in developing them, an eloquence in expressing them, and a force in urging them. It teaches him to see things as they are, to go right to the point, to disentangle a skein of thought to detect what is sophistical and to discard what is irrelevant."

Newman clearly had a view that education provided knowledge and understanding that allowed "man" to evaluate and dissect problems to reach a rational conclusion (Newman,

1907). Bloom's taxonomy of learning objectives (Bloom, 1956, pp. 201-212). The higher order learning objectives would easily fit into Newman's thesis.

Stefan Collini (Collini, 2012, p. 89) suggests that governments have many views about universities depending upon the audience that they are addressing.

> *"when boasting of the standing of Britain's 'top' universities among the world elite, they laud 'research excellence'; when speaking for 'UK plc' they insist on 'training for employment' and 'technology transfer'; when speaking directly to the electorate they emphasize 'opportunity' and 'the development of talent'."*

Education therefore could be said to refer to the holistic application of skills acquired, towards the ultimate goals of analysis, synthesis and evaluation of problems and questions. When a person is awarded a degree, this indicates that they have achieved some or all these ultimate goals. It must be clearly understood that in being able to demonstrate one's mastery of these goals they will have acquired knowledge about the subject, have a demonstrable comprehension of the subject, and be able to apply a set of skills that are sought by society and employers. Examples of skills acquired in one's journey to enter higher education include basics such as literacy, numeracy, ICT skills and scientific knowledge. In addition to these core curriculum-based attributes students have their life experiences that Bourdieu referred to as being their cultural capital (Bourdieu, 2010, p. 95).

Students put their trust in universities to provide them with the opportunity to advance their knowledge, and in return universities receive funding to financially support the delivery of this opportunity. The long-term viability of universities is dependent upon a stable and adequate income. Successful undergraduate students who have progressed through three or four years of a degree course provide significant income to the University. It is therefore in the economic capital of universities to recruit and to retain students for the full duration of their course. In addition to the financial benefit there is both a reputational and a moral aspect to ensure the students who have joined the University are able to maximise their potential in terms of their educational results and future employment.

1.2 The UK Education System

In England, primary education usually starts at the age of five and is split into Key Stage 1 (infant) and Key Stage 2 (junior) schools, although schools are usually combined into a single operational unit. Secondary education starts from the age of 11. Children and young people remain in compulsory education until 18. There are approximately 3500 secondary schools in the English state sector. These schools will take pupils from the age of 11 until 16 years of age but it is usual for pupils to continue their studies until the age of 18/19 either in a secondary school or at sixth form colleges, Further Education providers, and University Technical Colleges. There are a few local authority areas in the country using lower, middle, and upper or senior schools but they cover the same age range. In England, Wales, and Northern Ireland there is a clear framework of qualifications, and their levels are shown in Table 1-1 derived from (Banerjee & Myhill, 2019, p. 3).

Education Level (RQF)	Example Qualification(Examples)
8	Doctoral degree
7	Master's degree (MSc, MA, PgDip)
6	Bachelor's degree (BA, BSc, BEng)
5	Higher National Diploma (HND)
4	Higher National Certificate (HNC)
3	A-levels, BTEC Extended Diplomas, IB, Foundation Years
2	GCSE[1] (Grades A*- C or 9 - 4)
1	GCSE (Grades D-G or 3-1)

Table 1-1 Qualification Levels for the UK[2]

1.3 The National Curriculum

The National Curriculum was first introduced through the Education Reform Act of 1988. The purpose of the act was to define a compulsory curriculum for all primary and secondary schools in England and Wales. State schools were required to implement the curriculum,

[1] General Certificate of Education
[2] For England Wales and Northern Ireland.

although independent schools were exempt. However, many independent schools choose to follow the national curriculum.

The curriculum is split into four stages or "Key Stages". These Key Stages are used to specify the subject coverage for the different age groups in primary and secondary education.

Table 1-2 The National Curriculum outlines the overall structure of the national curriculum in terms of Core subjects, Foundation subjects and their inclusion in the various key stages. (Extracted from National Curriculum 2013) Key stage 4 corresponds to GCSEs. Schools must also offer at least one subject in the arts, design and technology, humanities and modern foreign languages indicated by “Option” in the table below.

	Key stage 1	Key stage 2	Key stage 3	Key stage 4
Age	5–7	7 – 11	11 – 14	14 – 16
Year groups	1–2	3–6	7–9	10 – 11
Core subjects				
English	✓	✓	✓	✓
Mathematics	✓	✓	✓	✓
Science	✓	✓	✓	✓
Foundation subjects				
Art and design	✓	✓	✓	Option
Citizenship			✓	✓
Computing	✓	✓	✓	✓
Design and technology	✓	✓	✓	Option
Languages		✓	✓	Option
Geography	✓	✓	✓	Option
History	✓	✓	✓	Option
Music	✓	✓	✓	Option
Physical education	✓	✓	✓	✓

Table 1-2 The National Curriculum

1.3.1 General Certificate of Secondary Education

The General Certificate of Secondary Education (GCSE) was first introduced in 1986 with the first sitting in 1988. It replaced the GCE Ordinary or “O” level and Certificate of Secondary Education (CSE). Pupils normally take the GCSE examinations at the conclusion of Key stage

4, although there is no restriction on age for candidates. Indeed, many adults take GCSE examinations through further education establishments.

GCSEs have been graded from G to A* since their introduction, although from 2017 a numerical grading system from 1 to 9 has been implemented. Grade 9 is the highest pass mark and is set above the previous A*. The standard pass is a grade 4 and is equivalent to a grade C. See Figure 1-1 GCSE Grading Structure

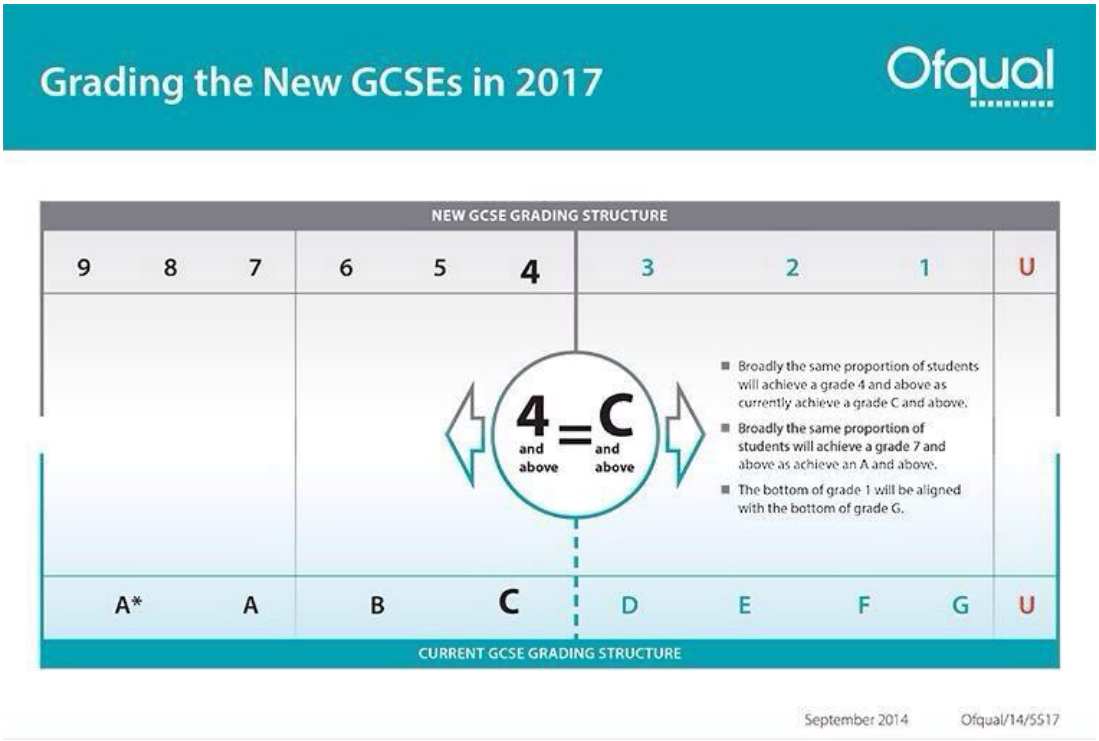

Figure 1-1 GCSE Grading Structure

Examination boards have been responsible for developing their own syllabuses based upon the requirements of the national curriculum. The development of content and assessment has been guided by the criteria defined and monitored by The Office of Qualifications and Examinations Regulation (OFQUAL) formerly known as the Qualifications and Curriculum Authority (QCA).

The GCSE is a graded award; the intention of the grading is to show the level of knowledge and skill achieved by the learner against the OFQUAL defined criteria (OFQUAL, 2019). Originally, one of the key features of the new GCSE curriculum was that an element of

continuous assessment/coursework was included in the final award calculation. However, since September 2012 assessment is limited to examination only, and is at the conclusion of the two-year study programme. Further refinements, designed to improve overall standards, mean that students can obtain extra marks by demonstrating sound knowledge of the use of English grammar, spelling, and punctuation, in English Literature, Geography, History and the other key subjects.

Traditionally, all pupils sat the same final examination. In 1996, a new tiered scheme of examinations was introduced. The two tiers, Foundation and Higher, were designed to cover grades C to G and A* to D respectively. The decision as to which of the tiers the pupils would be entered for was normally made towards the end of the two-year GCSE study programme. It should be noted that there was an overlap between the grades between the Foundation and Higher tiers, and no grades can be awarded outside of the defined boundaries. In Mathematics there were originally three tiers, and in 2006 these tiers were brought into line with the two-tier system of the other GCSEs. The Oxford Cambridge and RSA (OCR) Exam board's GCSE Mathematics specification describes the content, assessment and grading (OCR, 2011).

1.3.2 A-Levels

The A-level or, to give it the correct title "the General Certificate of Education Advanced Level", was first offered in the 1950s and is seen in the popular press as the gold standard of secondary education (International, 2017). A-levels are offered in England, Wales and Northern Ireland and are traditionally assessed through at least one final examination. As part of the Curriculum 2000 review a new structure was applied to A-levels. A-levels were split into two parts, the AS-level (Advanced Subsidiary) and the A2-level (Advanced). Candidates would receive a qualification for each level of the subjects they passed. It was quite normal for students to undertake four AS-levels in their first year of sixth form studies, and then in the second year they would continue to the Advanced level in at least three of the four subjects. The students could accrue a range of A and AS-levels. However, A-levels have since moved from a modular to a linear style of assessment following recent reforms (OFQUAL, 2017).

The Universities and Colleges Admissions Service (UCAS) regularly conducts a comparison of all qualifications through "Expert Group" reports. The Expert Group reviews the content and assessment of qualification groups and makes recommendations for the acceptance of awards, and their suitability for conversion to UCAS tariff points. A-levels are graded as follows: A*, A, B, C, D, E, F and AS-levels are graded as A to F. The tariff points are then used to provide comparability across all qualifications accepted for entry to Higher Education. The "Expert Group Report for Work to Bring the Restructured GCE A-Level Into the UCAS Tariff" can be found on the UCAS website (Johnson & Hayward, 2008).

Following the acceptance of the report, the following tariff table was developed. This table can be used to implement the conversion from qualification grading to the UCAS tariff points. The table given below provides details of how each qualification grading converted into UCAS tariff points in 2014. This has since changed (UCAS, 2017b).

Grade					Tariff points
GCE & AVCE Double Award	A-level with additional AS (9 units)	GCE A-level and AVCE	GCE AS Double Award	GCE AS & AS VCE	
A*A*					280
A*A					260
AA					240
AB					220
BB	A*A				200
BC	AA				180
	AB				170
CC					160
	BB				150
CD	BC	A*			140
DD	CC	A	AA		120
	CD		AB		110
DE		B	BB		100
	DD		BC		90
EE	DE	C	CC		80
			CD		70
	EE	D	DD	A	60
			DE	B	50
		E	EE	C	40
				D	30
				E	20

Table 1-3 UCAS Tariff 2014

1.3.3 Edexcel (BTEC) National Awards

National Awards can be traced back to the 1920s. The National Certificate Scheme was first introduced as an innovative collaboration between the Board of Education and the Institution of Mechanical Engineers. The cooperation began in 1921 and was available to students in technical schools and colleges. The innovative scheme was quickly taken up by other Professional Institutions such as, the Institution of Electrical Engineers, Institute of Building, Institute of Chemistry, and many more. Initially it was a part-time scheme of study that was later expanded to include a full-time Diploma. A fuller description of the development and growth of the National Certificate Scheme and other technical and vocational education schemes can be found on the Technical Education website (Evans, 2009).

Business and Technology Education Council (BTEC)/Edexcel National Awards are the present-day incarnation of technical and vocational education qualifications. They can be studied both full-time and part-time and can provide strong routes into, and a foundation towards, technical and scientific degrees.

As previously stated, Universities and Colleges Admissions Service (UCAS) regularly conducts a comparison of all qualifications through the "Expert Group" reports. The Expert Group reviews the content and assessment of qualification groups and makes recommendations on the acceptance of awards, and their suitability for conversion to UCAS tariff points. The current National Awards qualifications are graded with Pass, Merit, Distinction and Distinction*. The tariff points are then used to provide comparability across all qualifications accepted for entry to Higher Education (HE) Levels.

In the case of the Edexcel/BTEC national awards the "Expert Group Report for Award Seeking Admission to the UCAS Tariff" can be found on the UCAS website (Ramshaw et al., 2010).

Following the acceptance of the report, the following tariff table was developed and used to implement the conversion from qualification grading to the UCAS tariff points. Table 1-4

given below provides an example of how each qualification grading converts into UCAS tariff points. This can be found on the UCAS website www.ucas.com.

Extended Diploma	Diploma	90 credit Diploma	Subsidiary Diploma	Certificate	Tariff points
D*D*D*					420
D*D*D					400
D*DD					380
DDD					360
DDM					320
DMM	D*D*				280
	D*D				260
MMM	DD				240
		D*D*			210
MMP	DM	D*D			200
		DD			180
MPP	MM	DM			160
			D*		140
PPP	MP	MM	D		120
		MP			100
	PP		M		80
				D*	70
		PP		D	60
			P	M	40
				P	20

Table 1-4 BTEC UCAS 2014 Tariff Points

In my research data, 80% of the students admitted to the Faculty of Computing, Engineering and the Built Environment (CEBE) undergraduate programmes are from either A-Level or BTEC backgrounds. The cohort is split equally between the two qualification types. This indicates that our courses need to be capable of accepting students from both BTEC and A-Level background. There are many A-Level qualifications across a host of traditional academic and, more recently, applied subjects, such as computer science, which have become popular. BTEC qualifications are normally associated with applied subject areas such as computing, engineering and healthcare. BTEC specifications have a range of optional units that allow for local specialisation to suit employer needs and regional requirements. Their delivery is often associated with a practice-based curriculum style this is sometimes referred to as a flipped curriculum.

1.3.4 Assessment styles

Traditionally A-level studies required independent study skills and have a bias towards end assessments or examinations. Recently this has been reinforced with more examination based assessment strategies being introduced (OFQUAL, 2017). The examinations are set and marked by exam boards. The Computer Science A-Level weighting of assessment is shown in Table 1-5.

Assessment objectives (AO)	Component weightings (approx %)			Overall weighting (approx %)
	Paper 1	Paper 2	NEA	
AO1	8	22	0	30
AO2	12	16	2	30
AO3	20	2	18	40
Overall weighting of components	40	40	20	100

Table 1-5 Computer Science A-Level Assessment Weighting

The assessment is split between 80% examinations and 20% non-examination assessment (NEA). The NEA for computer science is a computing practical project. Successful completion of the course requires students to be successful in examinations.

The Pearson BTEC National Extended Diploma in Computing is equivalent to three A-Levels and consists of 13 units. Of these, seven units are mandatory and four of those are externally assessed, the remaining units are assessed by continuous assessment which is set and marked by the teaching staff.

BTEC assessment strategies, in contrast, usually emphasise vocational activities through continuous assessment, although in some subjects a small number of examinations are used. For example, in the standard for the Extended Diploma in Computer Science (Pearson, 2016), all optional units are internally assessed by the college providers, and the mandatory units assessments are set and marked by Pearson. In the case of the Computer Science specification, the mandatory units contain one examination in Unit 1 and in Unit 2, and the

remainder of the mandatory units are assessed through continuous assessment. Synoptic assessment specifically states that it:

> "…..requires learners to demonstrate that they can identify and use, effectively in an integrated way, an appropriate selection of skills, techniques, concepts, theories and knowledge from across the whole sector as relevant to a key task." (Pearson, 2016).

Although there are elements of commonality in the assessment methods for BTEC and A-level qualifications, the weighting of these methods is clearly different. Does it make any difference to the outcomes of students progressing to further study, and can any predictions of higher education success be made, by looking at the types of qualifications they presented to gain entry to the course?

1.4 About this thesis

This thesis is an examination of student characteristics with a view to identifying those who may find progression to their second year of studies challenging. Progression for all students is the key dependent factor in this thesis. Crucially, it is not looking to identify those small groups of students who already have special individualised support arrangements due to an already identified declaration of need. The concept is to consider the whole student body and their general characteristics. For example, all students will have an academic background of qualification types and grades achieved, they will either live at home or away from home, they may be the first in family to partake in higher education or their family may have experience of higher education. Students may come from a whole host of social and economic backgrounds. This thesis is therefore looking at the first year of study for all the students in order to look for similarities of those who progress and those who do not. Universities gather and hold a vast bank of information about their students. This includes data on student admissions, assessment, progression, and demographic background data such as gender, ethnicity, socio-economic classification and parental experience of higher education. Recently this data has been used to support course application process through the contextualised offer process (BCU, 2021). This information is used in the monitoring of

the University in order to measure and demonstrate widening participation in response targets set out in the BCU Access and Participation Plan (BCU, 2019).

The Literature Review presents an overview of Bourdieu's Cultural Capital theory. The chapter considers the notion of Cultural Social Reproduction reflecting how individuals may change their social status through education opportunities and showing how some types of qualification have supported the Widening Participation agenda. The nature of Habitus is brought under the spotlight providing an insight into how people operate when in new situations, Bourdieu refers to this as the Field.

In chapter 3, Research Methodology, the data sample is presented, a description of how it was collected, and the advantages and disadvantages of carrying out research with secondary data are summarised. Confirmation of the ethical approval is provided. I refer to examples of how others have used similar kinds of data. I summarise my position in this research in the Ontology by providing an insight to my background, University role, and beliefs. The nature of the information and how it represents knowledge of the student cohort is given in the Epistemology. A positivist stance is introduced, and the strategy for the research to use quantitative methods for the analysis of the areas of interest is identified in the literature review. The data was explored, using different statistical methods, to evaluate the statistical significance of the data items related to the dependent achieved variable of progression (pass or fail), firstly assuming all ascribed variables to be independent, and secondly through logistic regression techniques further statistical analysis was carried out that placed no assumptions on the independence of the variables. The variables evaluated included UCAS tariff, qualification type, GCSE mathematics grades, gender, parental experience of higher education, social economic groupings, ethnicity, University Schools and commuter status. These variables are then explored and prepared for data analysis.

In chapter 4, there are key themes to the Results section. The first, Exploring the Data: Two Factor Independence testing, demonstrates the exploration of the data with independent variable analysis. This work is essential to understand the types of variable and the suitability of variables or factors for further analysis. The second theme, Binary Logistic Regression (BLR) Testing, assumes that all the variables are not independent. The output from this testing

identifies the significant variables. For completeness the results of the independent and dependent tests are tabularised, and comments made about their comparability. Finally, a factor association is presented. This shows the strength of association between the variables. The Discussion chapter looks back at the results and considers how the significant factors identified in the results are associated with the other factors.

The Conclusions are presented together with Further work and Recommendations. Changes to the University environment are brought together in the Postscript. This research has been carried out on a part-time basis over several years and there have been a few changes since it all began, including the reorganisation of the Faculty's Schools, an increase in the proportion of students entering with BTEC qualifications, the introduction of a Schools and Colleges Advisory Partnership Board to promote a better understanding of entrant needs. This research has led to the development and implementation of an in-year resit policy that has now become part of the University Assessment Regulations. The CEBE Faculty student population profile data and Ethical approval for my work can be found in the Appendices.

2 Literature Review

Evaluating the potential for students to succeed brings together a mixture of attributes that includes academic qualification types and gradings and non-academic features including parental experience of higher education, social and economic groupings, and commuter status. The academic factors are the primary items used by universities to establish suitability for entry to higher education studies. The application process is managed by UCAS who administer the application, offer making and confirmation processes. There is a multitude of qualifications, the most popular for those choosing BCU are A-Levels, BTEC Diplomas, Access Diplomas and the International Baccalaureate. They all have their own characteristics/features. As already described in the introduction, UCAS has evaluated these and produced a unifying set of "UCAS Points" that can be used for comparison purposes. Each university course identifies the entrance qualifications required, and suitable applicants are issued with a conditional or unconditional offer of a place.

In a perfect world, students with the same entry qualifications and grades may be expected to proceed in a similar way through their degrees and carry on into their chosen careers. However, it is evident (Office For Students, 2019) that the actual degree classification achieved is not always the same for students of equal UCAS tariff. This indicates that progression may relate to more than simply the student's entry qualifications. OFSTED have suggested that education outcomes can be affected by the cultural capital acquired through delivery of the curriculum (Ofsted, 2019). The OFSTED view is that cultural capital aligns with the understanding set out in the national curriculum. It is essential in order to support the knowledge economy for pupils to become educated citizens with an appreciation of human creativity and achievement. Cultural capital in education could potentially be realised through all aspects of the curriculum, exposing students to a large/wide variety of subject topics within Science, Technology, Engineering, Arts, and Mathematics (STEAM); promoting character-building qualities that lead to creating well-rounded, global citizens, and of course the more typical expectations of education, which is to provide young people with recognised and meaningful qualifications that will open doors to career paths.

Cultural Capital is defined as:

> "A term introduced by Pierre Bourdieu to refer to **the symbols**, **ideas**, **tastes, and preferences that can be strategically used as resources in social action**."(Oxford Reference, 2021)

Bourdieu proposed that one's actions were defined by this capital and strongly influences responses to social situations. Bourdieu referred to this as a habitus, a set of class or social conditioned responses that has been internalised so as to be second nature. (Bourdieu, 2010, p. 95). In primary school education this can be found in the study of mathematics where the recall of addition and subtraction number bonds are taught. Ideally it should be second nature for the learners to recall the solution to the addition or subtraction number bods and times tables without the need to calculate the answer each time.

There are three sub areas of cultural capital; embodied capital, objectified capital, and institutionalised capital (Richardson, 1986b).

> **Embodied cultural capital** is knowledge acquired through study, or experiential learning, or inherited through social and cultural experiences. It is a form of capital assimilated over time and becomes part of the individual's character and way of thinking. It becomes part of the person's habitus. Linguistic cultural capital forms part of this learning process, the embodiment of language and its use in relating to others. The appropriate use of different linguistic skills for different occasions would show a clear understanding of when and where to use these acquired skills. Bourdieu referred to this place as the "field".

> **Objectified cultural capital** encompasses the person's possessions or things. It could be a work of art or instrument that can bought or sold for some form of profit be that economic or a measure of esteem. Merely possessing an item is only part of the capital gained. Having insight into the cultural wealth found in a work of art, or the ability to use an instrument to produce additional cultural objects, are examples of an innate cultural capital possessed by the owner. The sale of that object would not

transfer the cultural capital to the new owner except by way of explanation or demonstration in the sale process. One might purchase a Stradivarius violin and although in my opinion it has a great deal of visual beauty, it is only a small part of its value in that to truly appreciate the violin it is essential to hear it played. Unless the owner is a truly gifted player it is unlikely that the full appreciation of the violin will be experienced. There are examples of the wealthy benefactors with an interest in arts have bought a violin and then loaned to a great player. In this way they can enjoy not just ownership of the instrument, hearing it being played by an artist and probably enjoying a special relationship with the musician. The benefactor may also benefit from the private concerts played for them and their friends. The possession of the instrument and the visual enjoyment is only a small part of the cultural capital that is possible.

Institutionalised cultural capital covers society's formal recognition of a person's cultural capital, this could be academic credentials, professional qualifications or formal titles bestowed in recognition of position or honour. The search for and acquisition of employment can rely heavily upon this kind of cultural capital. This can be measured in both quantitative and qualitative forms where the possession and evaluation of the capital is measured against those of other people. The recognition of this type of capital leads provides a practical method of evaluating the potential of the bearer to seek advancement, membership or employment. University admissions processes rely heavily upon the qualifications held by their applicants to identify suitability for their chosen course.

When considering the equivalence of two qualification types, UCAS commissions qualification groups to evaluate and make recommendations on the allocation of UCAS points to the grading structure of the qualification. This is adopted and becomes part of the extensive database for the UCAS points tariff. In the case of the BTEC award structure (Ramshaw et al., 2010) this was carried out in 2010 and became part of the UCAS points tariff in the following year.

The UCAS tariff is, of course, a very useful guide when setting entrance criteria. Many universities standardise their entry requirements by simply stating a tariff, for example 280 UCAS points. The candidate or applicant can then evaluate the likely UCAS tariff that they are expected to achieve against the entrance criteria for the University. However, in a brief survey of 14 UK University websites in September 2017 offering BSc (Hons) Computer Science, the tariff points requested for applicants presenting with A-level qualifications were not always the same as for BTEC applicants. In one case, BTEC students were required to achieve 420 UCAS points (D*D*D*) whereas A-level students were only required to achieve 320 UCAS points (ABB). See Table 2-1 BSc (Hons) Computer Science entrance requirements (September 2017 for 2018 Entry)

Pre-Post '92	Name	A-level Grades	A-Level Points	BTEC Grades	BTEC Points	Difference	Note
Pre	University of Leicester	ABB	320	D*D*D*	420	100	
Pre	Cardiff University	AAB	340	D*D*D*	420	80	
Pre	Aston University	BBB	300	DDD	360	60	
Pre	Nottingham University	AAA	360	D*D*D*	420	60	
Pre	Brunel University	BBB	300	DDD	360	60	
Pre	University of Birmingham	AAA	360	D*D*A	400	40	A level Mathematics required
Post	Oxford Brookes University	BBC	280	DDM	320	40	
Pre	Loughborough University	AAB	340	D*DD	380	40	
Post	Nottingham Trent University	BBB	300	DDM	320	20	Not possible to have equivalent score
Post	Coventry University	ABB	320	DDM	320	0	
Post	University of Stafford	BBC	280	DMM	280	0	
Post	De Montfort University	BBC	280	DMM	280	0	
Post	Manchester Metropolitan University	BBC	280	DMM	280	0	
Post	Birmingham City University	BBC	280	DMM	280	0	

Table 2-1 BSc (Hons) Computer Science entrance requirements (September 2017 for 2018 Entry)

Table 2-1 is sorted according to the difference in A-Level/BTEC points tariff requirements. At the top of the table all but one of the entries are pre-'92 universities in contrast to the lower half of the table where all but one are post-'92 universities. The Pre-'92 Universities require higher UCAS points from the BTEC students indicting they consider there is a difference between the students who come with BTEC and those with A-Levels in accessing their courses.

They are also confident that they can successfully recruit enough students to ensure the viability of their courses. Universities have traditionally relied upon UCAS tariff points to provide a measure of equality between all qualifications. However, as demonstrated in the survey detailed in Table 4-5, universities do not always fully embrace the findings of the UCAS qualification groups. Some universities consider that BTEC students need higher points from BTEC studies to progress. Anecdotally, the Pre-'92 university sector courses require a high degree of independent study skills, and assessment is often biased towards examinations rather than coursework, which is a key difference between the study of A-Levels and BTEC.

Cultural Capital may be seen as a set of tools collected over time, and habitus is the skill to apply the correct tool to a particular situation or field to provide the best outcome. Habitus is the innate knowledge gathered through theory, experience and practice, rather like the number bonds and times tables. Extending this idea of experiential learning beyond mathematics to the arts, sciences, design, and history, provides insight into the development of our society. Having a clear knowledge about how a situation comes about can be important. Windrush (Rawlinson, 2018) is a case study of modern history where people were wrongly detained, denied their legal rights and some were even deported by the UK Government. They were all British subjects who came to UK before 1973. New immigration rules were introduced that the required multiple documents to prove the right for residency and completely disregarded this group of British citizens. Understanding what happened in this case and how to redress the wrongs provides rich food for thought for future changes in rules. Those who created the residency rules did have the Cultural Capital and the resultant errors are still playing out.

The only place where some pupils may be exposed to the vast wealth of cultural capital is through the classroom, and it has been noted that the narrowing of the curriculum in key stage 2 has resulted in pupils not gaining access and experience of this body of knowledge (Her Majesty's Chief Inspector, 2017). It was further reported that the narrowing of curriculum has had a double effect for schools in disadvantaged areas where schools often focused on the core subjects in order to focus on exam results. Pupils may have limited access

to cultural capital at home and also in school (Ofsted, 2019). Advancement from the possession and use of cultural capital can provide opportunities for the accrual of further capital. By analogy with economic capital, such resources can be invested and accumulated and can be converted into other forms. Thus, middle-class parents are able to endow their children with the linguistic and cultural competences that will give them a greater likelihood of success at school and at university. Working-class children, with limited access to such cultural resources, are less likely to be successful in the educational system. Hence education is seen to reinforce class structures (Nash, 1990). Subsequent to Bourdieu's habitus proposals, many researchers have used the conceptual tools to understand and create theories to explain how changes in practice affect outcomes in education. (Bathmaker, 2015)

2.1 Cultural Social Reproduction

Are we to assume that possessing limited Cultural Capital prevents individuals from progressing in society and acquiring more capital financial or otherwise? One example of someone changing their social status in one generation through education is the current leader of the Labour Party, Sir Keir Starmer. He was born to working-class parents, a toolmaker and a nurse. He went to a selective voluntary aided grammar school, where he learnt the violin, studied for an LLB at the University of Leeds followed by postgraduate at Oxford. He became the director of public prosecutions in 2008 and received a knighthood in 2014. He was first in family to graduate (Bates, 2008), (Maguire, 2020).

Education can be a powerful tool for changing the individuals' expectations. It can be a vehicle to level the playing field providing opportunity for those in lower classes to move up. These opportunities can be challenged by the lack of resources as finanicially education is costly. Schools with more financial and cultural capital have better resources, better access to knowledge and possibly better teachers. Eton College School Fees (Eton, 2021) are currently around £45,000 per year whereas the UK State Block Baseline funding per pupil is approximately £4,500 (Education and Skills Funding Agency, 2021). The current UK Conservative cabinet has a significant number of former Etonians who will have benefited from their educational experience and subsequent opportunities to rise to the highest positions in the country. The individual experiences and interactions with their schooling is referred to as the sociology of education and more specifically how it affects educational achievement and outcomes. (Brookover, 1949)

The growth in expectation through education has been postulated by Bourdieu as being Cultural Reproduction and Social Reproduction. He stated:

> "The specific role of the sociology of education is assumed once it has established itself as the science of the relations between cultural reproduction and social reproduction. This occurs when it attempts to determine the contribution made by the educational system to the reproduction of the structure of power relationships and symbolic relationships between classes, by contributing to the reproduction of the structure of the distribution of cultural capital among these classes. The transmission from generation to generation of accumulated information, classical theories tend to dissociate the function of cultural reproduction proper to all educational systems from their function of social reproduction." (Bourdieu, 1973, p. 56)

Bourdieu's ideas have been tested by Social reproduction, when co-opted with cultural reproduction, allows for sociology of education to assume its role (Jenks, 2003). This thesis is concerned with access to and success in Higher Education. For many years the issues of social-class related engagement and access patterns have become a key feature of access and participation planning. All Universities are required to produce access and participation plans. BCU is no exception to this (BCU, 2019). Universities have been measured against their plans and government data has proved a rich vein for researchers. It has been argued that student choices are infused with class and ethnic meanings, and that choice-making plays a crucial role in the reproduction of divisions and hierarchies in HE, but also that the very idea of choice assumes a kind of formal equality that obscures 'the effects of real inequality'. HE choices are embedded in different kinds of student biographies and institutional habitus, and different 'opportunity structures'. (Ball et al., 2002) An opportunity structure in this work refers to students who have experienced an educational journey that has led them to certain qualifications. 49.3% of BCU's students come from IMD quintile 1 neighbourhoods. They may have experienced a narrowing of curriculum that has led to a reduction in the cultural capital that they may have otherwise attained.

Birmingham City University is a practice-based university (BCU, 2017a) providing excellence in creative and professional practice. There is a key driver to prepare graduates for employment. This style of vocational education provides students with the technical skills and knowledge that leads to behavioural competence in the workplace. There is a strong likelihood that students select their chosen courses to enable them to pursue a career in the subject. A concept of vocational habitus has developed (Colley et al., 2003, p. 471) to:

> "explain a central aspect of students' experience, as they have to orient to a particular set of dispositions - both idealised and realised. Predispositions related to gender, family background and specific locations within the working class are necessary, but not sufficient for effective learning. Vocational habitus reinforces and develops these in line with demands of the workplace, although it may reproduce social inequalities at the same time."

The concept of study for the workplace is a key influence in the choice of degree subject. There would appear to be few obvious opportunities for employment in history degrees. History graduates often go on to study further qualification that convert their skills and knowledge to provide employment. For example, it might be that someone with a strong vocational habitus would select a degree that provided a clear route to employment such as medicine, nursing, law, engineering and computer science. Hence the person with a vocational habitus is seeking the practical subjects that are perceived to provide employment opportunities. Vocational study is not just present in HE but also Further Educational (FE) colleges where many students will be taking BTEC qualifications and who are progressing to higher education. BTECs have played an invaluable role in helping facilitate the transition to compulsory participation in education until the age of 18 and, by extension, in widening participation to higher education (Kelly, 2017). BTEC students are less likely to study at selective high tariff providers. First year progression can be a struggle for BTEC students due to their lack of academic skills. This was less of a problem for students who had a combination of BTEC and other qualifications. In addition, many vocational entry qualification students are from a disadvantage background (Banerjee, 2019). Working-class students, for the most part, end up in universities seen to be 'second class' both by themselves and others. In addition, as Bourdieu (Bourdieu, 1999) asserts, 'after an extended school career, which often

entails considerable sacrifice, the most culturally disadvantaged run the risk of ending up with a devalued degree'. (Reay et al., 2010, p. 121) The success stories of many working-class students making their journey through higher education and then on to successful employment are exciting; they are changing their lives and that of their families. Those who do not achieve employment in their chose subject may view themselves as failures. Changing this view is a matter of self-confidence that has developed from a continuing growth in their own ability and the acquisition of cultural capital through their university experience.

2.2 Student Habitus

The "What Works" project (Thomas et al.2017) provided 10 recommendations for supporting students. It refers to characteristics that impacted on students and identified the importance of understanding the local context and characteristics of the students in order to develop appropriate interventions to support students thereby enabling them to succeed. Students come to university with 18 years or more of life behind them. Their experiences and opportunities have shaped their perceptions, expectations, and knowledge base, about the world they live in. This can be referred to as 'Habitus'. Habitus is the way that individuals perceive the social world around them and react to it (Lizardo, 2004).

In 1977, Bourdieu defined Habitus as:

> *"A system of lasting, transposable dispositions which, integrating past experiences, functions at every moment as a matrix of perceptions, appreciations, and actions and makes possible the achievement of infinitely diversified tasks, thanks to analogical transfers of schemes permitting the solution of similarly shaped problems."(Bourdieu & Nice, 1977, p. 95)*

Bourdieu refers to Capital as more than material assets and includes social and cultural assets.

> *"..capital can present itself in three fundamental guises: as economic capital, which is immediately and directly convertible into money and may be institutionalized in the forms of property rights; as cultural capital, which is convertible, on certain conditions, into economic capital and may be institutionalized in the forms of educational*

qualifications; and as social capital, made up of obligations ('connections'), which is convertible, in certain conditions, into economic capital…." (Richardson, 1986a, p. 16)

Field is defined as a structured social space, a field of forces, within a force field. It contains people who dominate and people who are dominated. Constant and permanent relationships of inequality operate inside this space, which at the same time becomes a space in which various actors struggle for the transformation or preservation of the field. The field is an operating space, somewhere we live, study, and work. There are a set of rules that exist in these spaces and we learn to live by them. We have expectations about our existence in our chosen field that is strongly influenced by our position within that field. For example, we could be playing football and therefore we should respect refereeing decisions; yet we see many professional footballers complaining to the referee about their decisions. Compare that with the game of rugby union where the referee is respected by both teams and there is a protocol defined for communicating with the referee; the team captain may approach the referee and ask for clarification about a decision. Football and Rugby are both competitive games played by teams with a strong desire to win, but the social space and the relationships are very different. All the individuals in a setting or situation bring to the competition all the (relative) power at their disposal. It is this power that defines their position in the field and, as a result, their strategies. (Bourdieu, 1998, pp. 31-34) This is the environment in which an exchange takes place. For those of us working in Universities, the Field will be the university environment. This is the area in which we can have an impact and implement change. The students arrive at university, a new Field, with their habitus and capital which they use to engage and exchange in the Field.

The habitus of a person can impact significantly on their ability to cope with the environment they find themselves in. For example, someone brought up in a comfortable environment where shelter, food, physical and emotional needs are met, may be able to experience and gain capital from the arts, music, sport and leisure. Having basic needs met does not always guarantee a broadening of cultural capital as there needs to be opportunity as well. There are examples of musicians who learned to play because there were instruments already available in their home, while other musicians have developed through the extra-curricular activities provided by local authority music schemes. They will have learnt how to behave

and interact with these environments and the people in them. Similarly, someone who has come from an environment without these comforts and securities will have learnt how to survive and interact in that environment. Put these individuals in the other's environment and they both struggle to adapt. Individuals placed in an unfamiliar environment may find it difficult as they have to learn new skills and new ways of behaving as they seek to become part of a new environment.

Learning how to do things requires the skill to be developed. A great performer, when playing a musical instrument, has habitual skills present. They do not have to think about the action of making a particular sound but can concentrate on the production of the overall piece. The musician develops the habitus for their instrument and the piece to be performed so that it is "second nature". "Don't practice until you get it right. Practice until you can't get it wrong." (Buck, 1944, p. 102). The concept of second nature is key to habitus, it is embedded and then embodied and becomes second nature ensuring confidence and self-belief. BCU has a large proportion of commuter students who may find going to university is no different to going to school or college. Their previous habitus has prepared them for this. They will have their family and homelife ready to support them until they ultimately complete their studies. If they were to study away from home they would be faced with a different environment where their support is not so immediate, and they will be faced with the challenges of daily living on their own. They may study at a college on a highly guided practice-based course and achieved very high grades that provided them with the entry criteria to join a more theoretical course that relies on highly developed self-study skills. The preparation that they have received in their previous practice-based course may not have fully prepared them for a different style of study. Further it has been identified the likelihood of 'first in family' students attending a Russell Group university is reduced and "they are more likely to drop out than those with graduate parents". This suggests there is a need to provide "first in family" students with better information and support for their journey through higher education (Nuffield Foundation, 2020).

New Labour's intention to expand the opportunity to join higher education to 50% of 18 year-olds (BBC, 1999) provided the drive for the growth in student numbers. It was not expected that all these students would go to the same type of university or that they would all have the

same qualifications. Only that there would be an opportunity for them to go to university. The Widening Participation (WP) agenda has provided a growth in student numbers and completions (Bolton, 2012). This is of course welcome; however, it does raise considerations around Habitus. What will the study experience be like for the WP students and how will it be perceived by them? They will have arrived in HE with a set of norms and expectations acquired through their home, school, and social environment. Some may have difficulty in finding their identity in the university environment. Working-class students were found to be unfamiliar with the ethos, the requirement for 'being a university student' and the overall expectations of a student, including self-doubt about their working-class, ethnic and gender identities (Crozier et al., 2019).

Working class students' academic performance has been identified as being lower than that of middle-class students. Explanations for this differential achievement have identified cultural capital, parental academic experience or involvement, and the styles of educational institutions attended (Banerjee, 2016). Working class students do not perform as well as middle-class students in standard national examinations in science and mathematics. This group of students were also highly represented in presenting with non-traditional education qualifications such as BTEC. These are often considered to be of a lower status by elite universities. This perception of a division between the value of vocational qualifications and of A-levels is pre-programmed by the results of national examinations (Banerjee, 2019). A pupil's (Idreos et al., 2015) results will be evaluated by sixth-form and further education colleges at the point of application and used to select the courses to be offered to them (King Edward VI Colleges, 2021). Pupils with high GCSE grades will have the opportunity to gain entry to specialist colleges with a strong set of GCSE and study up to four A-levels. This is commonplace and demonstrates pupil choices for the next stage of their education are defined by their current qualifications which have in turn been made possible by their habitus.

The WP agenda has provided many opportunities for students who will be first in family to go to University. According to the 2015/16 HESA Student Record, the number of UK domiciled, first year, full-time undergraduate students studying at UK HE providers defined by parental education* and Mission group** are shown below in Table 2-2 HESA Parental Education Record (HESA, 2017):

	Parental Education					
Mission Group	Yes	No	Don't know	Unknown	Total	% Yes
Russell Group	55,410	28,435	3,875	9,140	96,855	57%
1994 Group	10,975	8,425	1,045	2,875	23,325	47%
University Alliance	37,905	46,510	6,595	10,210	101,220	37%
Million Plus	19,950	28,200	3,915	3,900	55,965	36%
Guild HE	12,565	15,680	2,165	2,150	32,560	39%
Other	52,770	56,385	10,700	11,020	130,875	40%
Total	189575	183635	28295	39295	440,800	43%

Table 2-2 HESA Parental Education Record

*Parental education categories are in response to the following question: "Do any of your parents (including natural parents, adoptive parents, step-parents or guardians who have brought you up) have any higher education qualifications, such as a degree, diploma or certificate of higher education?"

**(0095) Abertay, (0037) Southampton Solent University and (0048) Bath Spa University are included in both Guild HE and Million Plus mission groups.

2.3 Parental experience of HE

At BCU there is a large percentage of students whose parents have not graduated from HE. These are often referred to as "first-generation" students. As part of the UCAS application process, applicants are requested to declare if their parents had higher education qualifications, (UCAS, 2017a). UCAS clearly states that these 'Questions are not used for selection purposes but purely for monitoring equality'. There are examples where the information has been used to identify students for awarding financial support scholarship purposes (Birmingham, 2017), (UCL, 2017).

The BCU figures for 2015/16 are shown in Table 2-3 Students with parents who have graduated from HE. This data is for first year entrants who are also students who will be assessed on standard Undergraduate assessment regulations.

There are many ways to look at the data held but most students joining BCU have no family history of accessing higher education. It has also been identified that first generation students are vulnerable to non-completion, or completion at a slower rate than their fellow students (Nunez & Cuccaro-Alamin, 1998). Academic engagement and retention has also been identified as being lower for first generation students (Soria & Stebleton, 2012).

2015/16 New Entrants						
	UK FT UG ENTRANTS					
Response	BCU	%BCU	YES/NO[3]	CEBE	ALL	YES/NO[4]
YES	1905	32%	39%	270	30%	38%
NO	3032	51%	61%	437	48%	62%
NO RESPONSE	604	10%		128	14%	
Don't Know	343	6%		61	7%	
Refused to say	65	1%		9	1%	
Base Pop (Yes & No)	5949		4937	905		707

Table 2-3 Students with parents who have graduated from HE

Nationally the proportion of students who are starting into HE and whose parents have previously studied and graduated is 43%. At BCU this figure is 32% and in the Faculty dataset 30%. Turning this around 70% of the faculty's students, who did not confirm their parents had experience of HE, will be coming to university without a knowledge or a familial expectation of what it may be like to study at university. The dataset can be used to investigate differences in the performance of students whose parents have experienced graduation from university and those who have not.

2.4 Widening Participation for Socio Economic Classification (SEC) Groups

The agenda of widening participation in education includes social mobility. The ideal is that education and opportunity are made available to all based on merit. In 2003, Charles Clark, the then Secretary for State for Education and Skills, introduced the White paper entitled, "The Future of Higher Education",(Dept for Education and Skills, 2003). This paper stated that the social class gap in entry to higher education continued to remain high. It went on to

[3] The "YES/NO" figure categorises only those respondents not affirming parental higher education qualifications as YES or NO.
[4] The "YES/NO" figure categorises only those respondents not affirming parental higher education qualifications as YES or NO.

describe how the proportion of higher education participants coming from lower-income families was still below desirable expectations. The government at the time was proposing improvements in student finance to reduce financial barriers. Following the White Paper, there were concerns voiced about the uptake of HE studies by socially disadvantaged groups, citing worries about funding arrangements, (Bowers-Brown, 2006). The Higher Education Statistics Agency (HESA) provides annual figures of those engaging in HE studies, including categories for widening participation such as parental occupational, background etc. These annual HESA figures have been reviewed by statistical researchers (Gorard, 2008) who found little evidence of a pattern of underrepresentation due to occupational background, ethnicity, sex or disability. This was further reviewed with the same conclusion (Chowdry et al., 2013).

In 2011 the coalition government provided another White Paper, "Higher Education: Students at The Heart of The System" (Department for Business Innovation and Skills, 2011). This paper described the desire to further improve social mobility:

> "Higher education can be a powerful engine of social mobility, enabling able young people from low-income backgrounds to earn more than their parents and providing a route into the professions for people from non-professional backgrounds."

The improvement in social mobility through higher education requires that all students have an equal opportunity to join and succeed in their chosen studies. The Institute for Fiscal Studies has reviewed the Socio-Economic differences in university outcomes in the UK (Crawford, 2014).

> "We find that the large raw differences in university outcomes between individuals from different socio-economic backgrounds can largely be explained by the fact that they arrive at university with very different levels of human capital. Comparing individuals on the same course makes relatively little difference to the remaining socio-economic gaps in university outcomes, with those from higher socio-economic backgrounds still 3.4 percentage points less likely to drop-out, 5.3 percentage points more likely to graduate and 3.7 percentage points more likely to graduate with a first or 2:1 than those from lower socio-economic backgrounds."

The dataset for this research contains information that has been self-declared by applicants regarding their socio-economic background. The following section introduces the derivation of the groupings that have been used in the evaluation of the uptake of widening participation.

2.5 Socio Economic Classification (SEC) Groups

The National Statistics-SEC is an occupationally based classification but also has rules to provide coverage of the whole adult population. The information required to create the NS-SEC is occupation coded to the unit groups of the SOC2010 (Office of National Statistics, 2010) and details of employment status:

SEC Number	SEC Description
1	Higher managerial, administrative and professional occupations
	1.1 Large employers and higher managerial and administrative occupations
	1.2 Higher professional occupations
2	Lower managerial, administrative and professional occupations
3	Intermediate occupations
4	Small employers and own account workers
5	Lower supervisory and technical occupations
6	Semi-routine occupations
7	Routine occupations

Table 2-4 NS-SEC Analytical Groups

The version of the classification that has been used for the coding of the students in the dataset has eight classes as shown in Table 2-4 NS-SEC Analytical Groups. This was derived from the classification used by the office of National Statistics (Office of National Statistics, 2010).

Socio-Economic Classification is still collected by UK education providers and therefore the data is available from HESA UK Performance Indicators (PI) data, which in the past included NS-SEC classification groups as an indicator for showing widening access. The groupings used with the HESA UK PI data are classified as 1-3 (Higher SEC) and 4-7 (lower SEC).

However, HEFCE stopped using HESA collected NS-SEC data in their UK PI release after 2014/15, and therefore freely accessible data is only available up to and including 2014/15. It is reported that HEFCE stopped using NS-SEC data because there was poor coverage and questions were raised over the quality and reliability of the data. They now use the POLAR3 groupings. The dataset used in this research does not contain POLAR3 groupings and therefore has not been included the comparisons. Table 2-5 SEC Groups 4-7 presents the figures for SEC groups 4-7 joining HE, BCU and CEBE.

Young Full-time UG entrants: % from SEC groups 4-7						
	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17
UK Sector	31.20%	32.70%	33.00%	33.40%		
BCU	42.70%	45.70%	45.20%	47.20%	47.60%	48.30%
CEBE	40.10%	47.20%	44.40%	49.70%	49.70%	49.10%

Table 2-5 SEC Groups 4-7

the dataset to compare the population SEC characteristics with National and University statistics. In addition, an analysis of CEBE SEC characteristics can be undertaken in terms of entry qualification types, UCAS qualifications and overall progression. It is therefore proposed that the research will look at the progression of the dataset students from different socio-economic groups.

2.6 Commuter students

As an inner-city university, BCU has many local students who live at home and travel to study on a daily basis. The rise of the UK commuter student has been noted and was predicted to be 50% by 2020 (Taylor, 2011). BCU reports that over 70% of its students are commuters (BCU, 2019). Although there is not a standard definition of a commuter student, the consensus reached is a student who lives in their own or parent's home compared with a student who lives in university or privately provided student accommodation (Goddard, 2017).

A study has shown that the first-year commuter student experience is very different from the student going away to university, and that the importance of family, friendships and community is very different for the commuter student. There are implications for academic

staff, institutional policies, and space allocation that may need to be considered when supporting the engagement of these students (Pokorny, 2017). Concern about student engagement has led to the proposal of transition arrangements for non-traditional "Commuter" students (Southall et al., 2016). Figure 2-1 Creating effective transition for non-traditional, "Commuter" students (Southall et al., 2016) provides an overview of the issues that may challenge the commuter and recommendations for the University to counteract them.

THE COMMUTER STUDENT

CULTURAL CAPITAL	SELF-EFFICACY AND RESILIENCE	RELATIONSHIPS AND IDENTITY	INDEPENDENT LEARNING	EXPECTATION VERSUS REALITY
May have less understanding of what university is and how it works in the UK.	Does not have to deal with everyday challenges of independent living.	Has continuous contact with former friendship and work groups.	May lack examination skills if coming from course work background.	School/college focus on achieving grades.
May only have family experience of non-UK system to draw upon.	Parents may continue to be problem solvers when in the home environment.	Moves back and forth between being student and child, sibling, carer or partner.	Harder to see self as independent learner when seen as child, sibling etc. at home.	Economic need to work in "spare" time.
See those with greater cultural capital as having "Insider Knowledge."	School and college system may have reduced capacity to deal with failure.	May move between two cultures on a daily basis.	Time management can be issue when working and studying.	May not fully appreciate the need to be on campus even when sessions are not timetabled.
CREATING EFFECTIVE TRANSITION FOR NON-TRADITIONAL, "COMMUTER" STUDENTS				
Clearly explain the systems and mechanisms in all dealings with new students and ensure that no assumptions are made.	Develop approaches that create some "problems" to be overcome early on.	Encourage collaboration between students and staff through the design of assessments and other activities.	Develop teaching and assessment interventions that develop research, reading and analysis skills.	Work more closely with schools and colleges to close the understanding gap.
Provide guidance to parents/guardians via websites or printed materials that seek to explain processes and key events.	Address stress management techniques and provide support throughout the transition process and first year.	Encourage the development of a peer network by encouraging group work and ensuring that a range of activities are included that are suitable for all cultures.	Develop timetables that group sessions together to allow for economic use of time and opportunities for paid employment.	Set out clear expectations at the start of the programme of study. Include information regarding the timetable and the amount of self-study required with pre-induction/post offer information.
CULTURAL CAPITAL	**SELF-EFFICACY AND RESILIENCE**	**RELATIONSHIPS AND IDENTITY**	**INDEPENDENT LEARNING**	**EXPECTATION VERSUS REALITY**

Figure 2-1 Creating effective transition for non-traditional, "Commuter" students (Southall et al., 2016)

Multi-University research has been carried out to investigate the culture of commuter student engagement (Thomas & Jones, 2017). The recommendations from this work include advice on travelling, commuter community development, providing a base for emotional security including lockers and a common room, financial support through bursaries to promote safety and well-being. Commuter students have requested the following to enhance their engagement: careful timetabling to maximise the most of their time when at university, lecture capture when they are unable to attend, and greater opportunities to study at home with access to the appropriate technological resources, this has been explored recently with the COVID pandemic. The positive aspect of these student engagement recommendations is that they may well be beneficial for ALL students.

2.7 Ethnicity

The public sector equality duty act of Parliament was passed in 2010. The "Equality Act" came into force in April 2011. This act requires public organisations to take account of and promote equality and not merely avoid discrimination. There were nine protected characteristics defined by the act: age, disability, gender reassignment, pregnancy, maternity, race, religion or belief, gender, and sexual orientation. Out of the act came the requirement for duty a public-funded organisations, including Universities, must have regard to the need to:

- "Advance equality of opportunity between people who share a protected characteristic and those who do not." (The Equality and Human Rights Commission, 2019)

It has been suggested that there are differences in every stage of the student life cycle for UK domiciled students from different ethnic backgrounds (Students, 2017b). Several issues are highlighted by this report including:

- "Entry to higher education varies between different ethnic groups, particularly to higher tariff providers"

BAME students are failing to gain entry to Russell Group Universities (Adams & Bengtsson, 2017; Boliver, 2016). Currently there is much discussion in the national press about the ethnic diversity of students entering Oxford University (Adams & Bengtsson, 2017). The figures published by Oxford University (University, 2016) provides the information in Table 2-6 Oxford University Student Statistics: Ethnicity of Final Acceptances Academic Year 2016.

Oxford University Final Acceptances		
Ethnicity	Grand Total	% Grand Total
Arab	13	0%
Asian or Asian British - Bangladeshi	13	0%
Asian or Asian British - Indian	80	3%
Asian or Asian British - Pakistani	23	1%
Black or Black British - African	25	1%
Black or Black British - Caribbean	8	0%
Chinese	42	2%
Mixed - White & Asian	96	4%
Mixed - White & Black African	14	1%
Mixed - White & Black Caribbean	17	1%
Other Asian background	30	1%
Other Black background	1	0%
Other Ethnic background	9	0%
Other Mixed background	40	2%
Prefer not to say	36	1%
White	2,177	83%
Grand Total	2624	100%
BAME	447[5]	17%

Table 2-6 Oxford University Student Statistics: Ethnicity of Final Acceptances Academic Year 2016

[5] For the purpose of this analysis, BAME includes all ethnic groups who do not describe themselves as being White.

The overall population for England and Wales was reported as 80.6% White (Office for National Statistics, 2011). Therefore, BAME students appear to be underrepresented in Oxford University. However, I checked the significance of this with a Chi-Test see Table 2-7 Oxford University Entrants and this indicated that this was not significant.

Chi Test	0.6600		Not Significant: NULL Hypothesis Accepted				
			0.05				
The NULL Hypothesis is: The proportion of White and BAME students entering Oxford University is in-line with UK National figures.							
Observed	Oxford	UK	Total		Expected	Oxford	UK
White	83	80.6	163.6	0.818	No First	81.8	81.8
BAME	17	19.4	36.4	0.182	First	18.2	18.2
Total	100	100	200		Total		

Table 2-7 Oxford University Entrants

Looking across the whole university sector, examination of the difference between ethnic groups in terms of retention and the degree classifications achieved provides evidence of areas in which HEI's need to focus their activities in order to fulfil the requirements of the "Equality Act". HESA data for non-continuation rates amongst UK domicile first degree students in English higher education institutions have recorded a spread between 4% for Chinese students and 11% for Black Caribbean in 2014-15. See Figure 2-2.

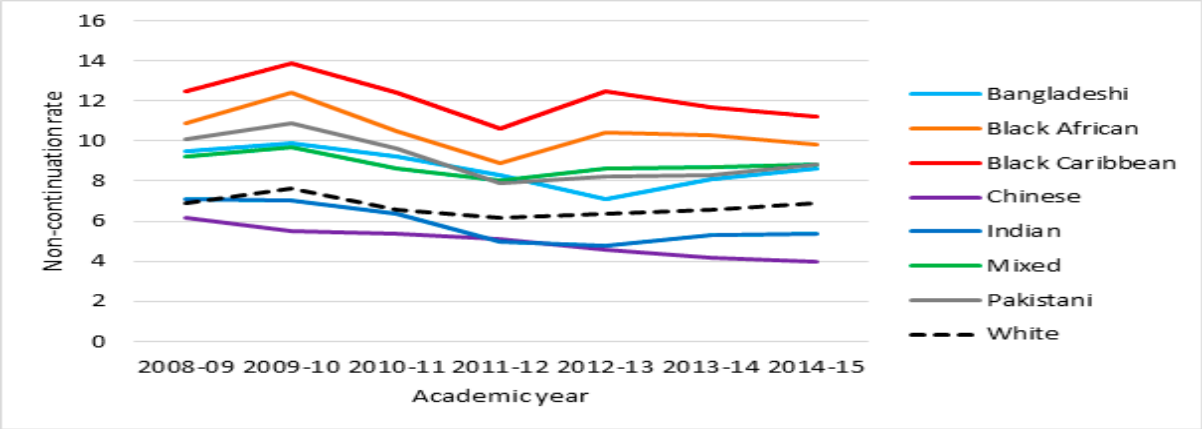

Figure 2-2 Non-continuation rates amongst UK domicile first degree students in English higher education institutions

Looking at the HESA Data again, there is a similar picture of ethnic diversity when degree outcomes evaluated. The UCAS tariff is used as a proxy for entry requirements and throughout the tariff range there is clear indication of a lack of consistency in degree outcomes for ethnicity, see Figure 2-3 Degree outcomes by entry qualifications and ethnicity in England, 2015-16 . It is also interesting to note that A-level students perform better than other students with a mix of qualifications that are represented by the UCAS tariff. This latter group includes BTEC students.

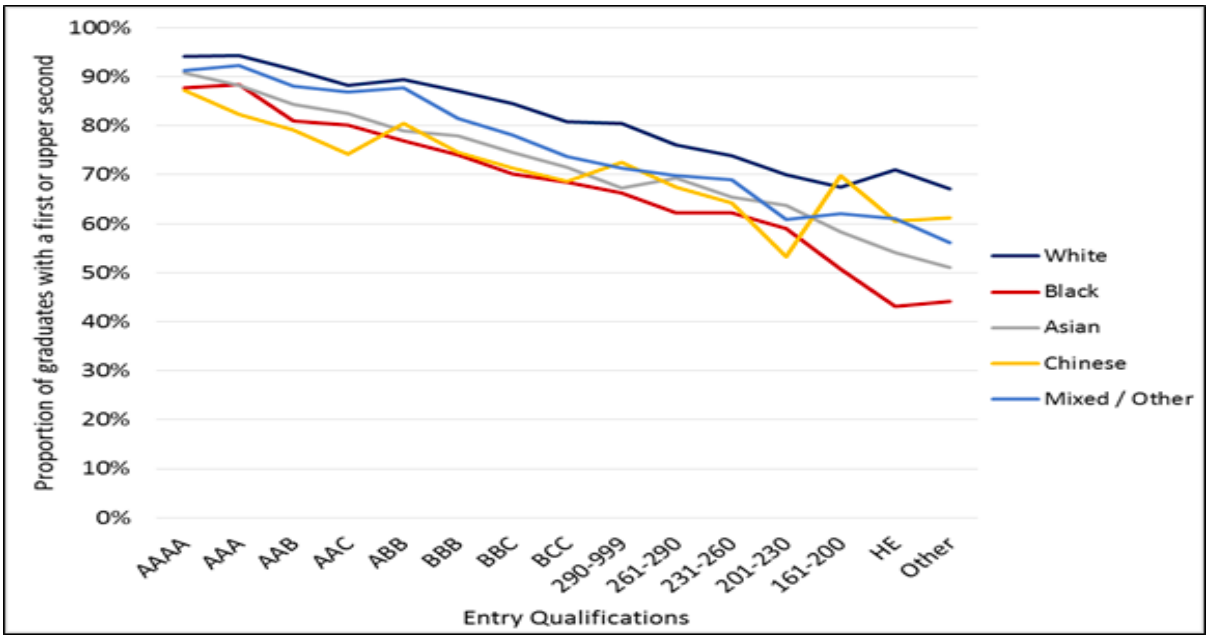

Figure 2-3 Degree outcomes by entry qualifications and ethnicity in England, 2015-16

2.8 Male/Female versus Progression

The recent changes in Higher Education have led to an expansion of student numbers and an equalisation of the gender balance within the student population overall.

In the UK, the Higher Education Funding Council for England (HEFCE) as part of its role as regulator and funder, publishes data which provides an overview of English Higher Education. Data on ethnicity, gender, age, and disability is published, and Table 2-9 (HEFCE, 2015) Higher education student equalities by sex, is derived from the gender data (HEFCE, 2015). This shows that for computer science 15% of the students are female and for engineering and technology 14% are female.

Figure 2-4 Students Obtaining University First Degrees provides an overview of this growth. In 1990, 77,163 obtained a first degree this rose to 350,800 in 2011, a 454% rise (Bolton, 2012). During the same period, there have been slightly more degrees awarded to women than to men, in 2011 197,565 or 56% of women received a degree.

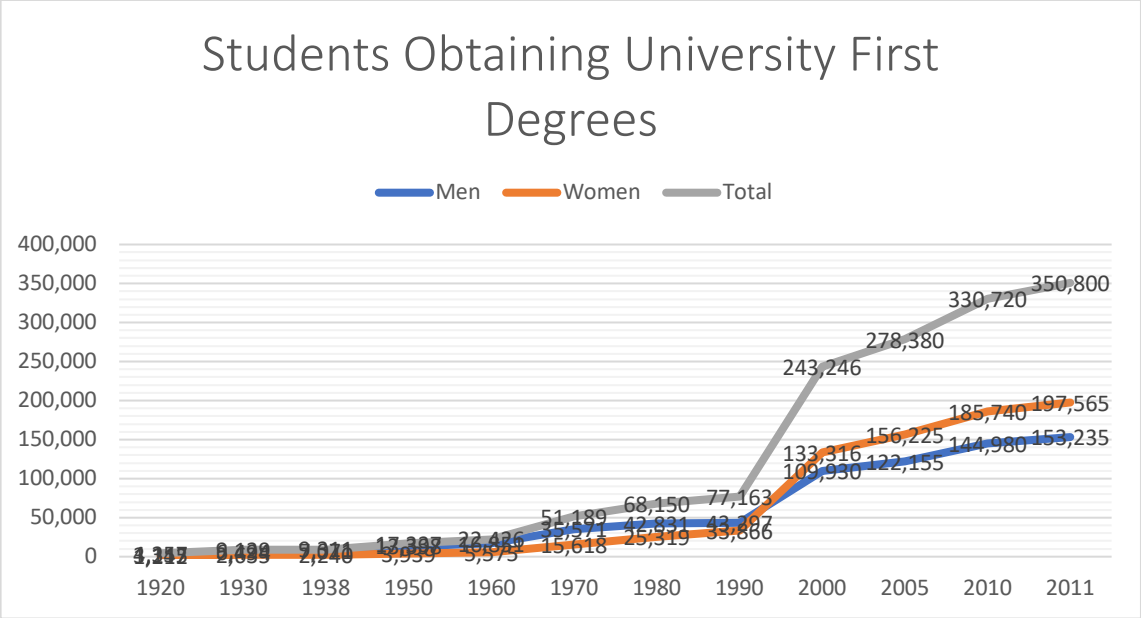

Figure 2-4 Students Obtaining University First Degrees

However, there is a smaller proportion, approx. 16% of women who continue to undertake technology, engineering, and Computer science to degree level than their male counterparts. See Table 2-8 Female HE Participation in Engineering, Technology and Computer Science Source https://www.hesa.ac.uk/data-and-analysis/students/whos-in-he.

Subject	year	Total Students	Female Students	% Female
(8) Computer science	2014/15	61510	9340	15%
(8) Computer science	2015/16	64480	9585	15%
(8) Computer science	2016/17	69070	10325	15%
(8) Computer science	2017/18	72640	10855	15%
(9) Engineering & technology	2014/15	96350	15170	16%
(9) Engineering & technology	2015/16	100060	16245	16%
(9) Engineering & technology	2016/17	103505	17445	17%
(9) Engineering & technology	2017/18	105080	18370	17%

Table 2-8 Female HE Participation in Engineering, Technology and Computer Science

- Women in STEM subjects

Sex by subject type		2013-14						
		Male		Female		Total		
		N	% of all	N	% of all	% Female	%	N
HEI	(1) Medicine and Dentistry	21,150	3%	26,360	3%	55%	3%	47,510
	(2) Subjects allied to Medicine	42,650	6%	170,155	18%	80%	13%	212,805
	(3) Biological Sciences	62,115	9%	96,395	10%	61%	10%	158,510
	(4) Veterinary Sciences	975	0%	3,070	0%	76%	0%	4,045
	(5) Agriculture and related subjects	5,185	1%	8,295	1%	62%	1%	13,480
	(6) Physical Sciences	32,535	5%	18,600	2%	36%	3%	51,135
	(7) Mathematical Sciences	19,765	3%	10,990	1%	36%	2%	30,755
	(8) Computer Science	52,835	8%	9,345	1%	15%	4%	62,180
	(9) Engineering and Technology	79,290	11%	13,025	1%	14%	6%	92,315
	(A) Architecture, Building and Planning	22,410	3%	10,495	1%	32%	2%	32,905
	(B) Social studies	52,310	8%	91,370	10%	64%	9%	143,680
	(C) Law	23,080	3%	37,285	4%	62%	4%	60,365
	(D) Business and Administrative studies	98,425	14%	90,440	10%	48%	12%	188,865
	(E) Mass Communications and Documentation	16,275	2%	20,230	2%	55%	2%	36,505
	(F) Languages	25,705	4%	59,675	6%	70%	5%	85,380
	(G) Historical and Philosophical studies	32,375	5%	36,375	4%	53%	4%	68,750
	(H) Creative Arts and Design	49,680	7%	81,980	9%	62%	8%	131,660
	(I) Education	18,465	3%	66,085	7%	78%	5%	84,550
	(J) Combined	15,135	2%	23,955	3%	61%	2%	39,090
	(K) Initial Teacher Training	11,990	2%	35,775	4%	75%	3%	47,765
	(L) Geographical Studies	13,050	2%	12,660	1%	49%	2%	25,710
	Total	695,400	100%	922,560	100%	57%	100%	1,617,960

Table 2-9 (HEFCE, 2015) Higher education student equalities by sex

The gender imbalance in technology and engineering subjects has long been recognised. This imbalance is also seen in other countries. In Canada around 25% of Engineering students are female (Anderson & Gilbride, 2007). Another study based in Herriot Watt University found that women represented 14% of the cohort in technology, engineering, and computer science (Cronin et al., 1999). The main thrust of Cronin's research was to examine how female students felt about studying in a male dominated HE technology and engineering environments and the types of assessment methods used.

The latest HEFCE published statistics, (HEFCE, 2015) for 2013-14, found that 11% of students were studying Engineering, Technology, and Computer Science related courses. The percentage of women studying these subjects was 14%. See Figure 2-5 % Female by Subject Type (2013-14). Females represent around 14% of the student group of CEBE students at BCU considered in this research paper, therefore BCU is in line with the national picture.

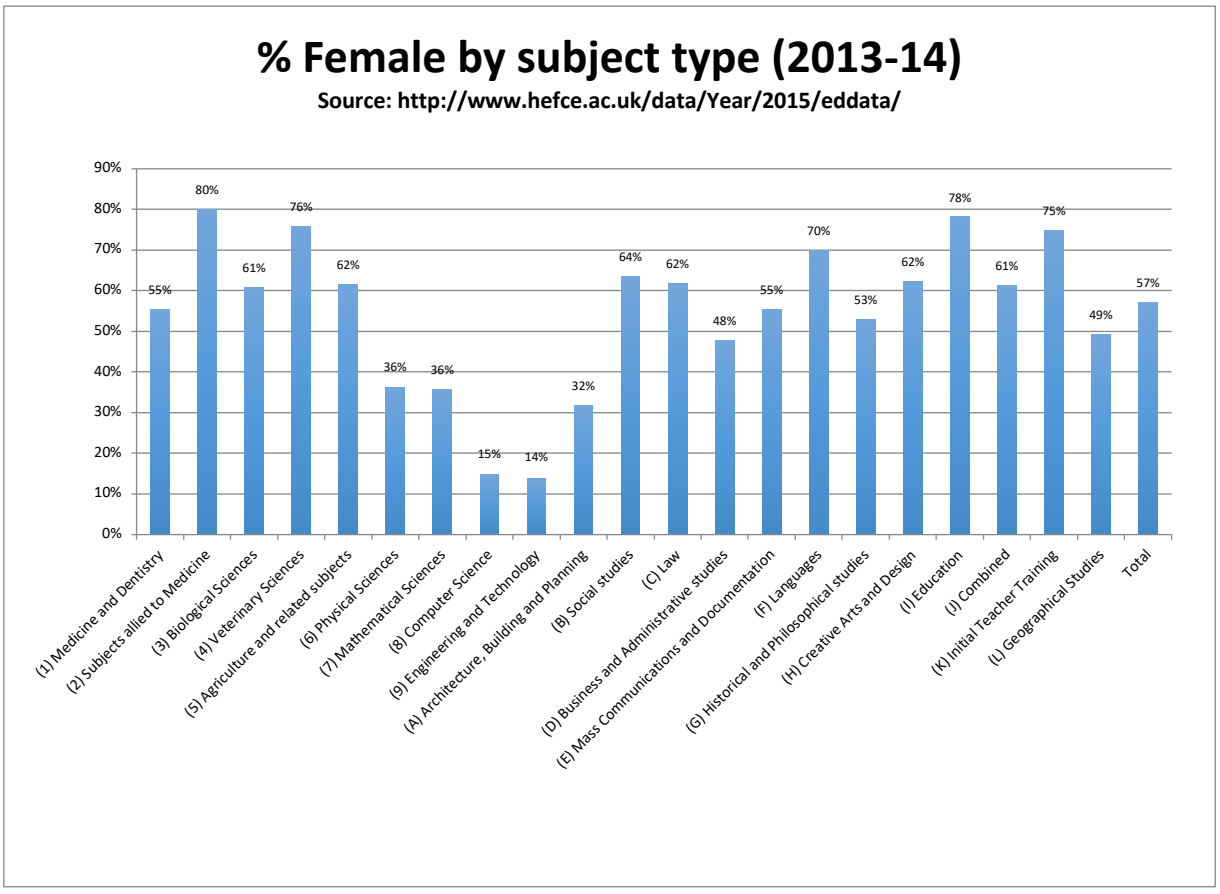

Figure 2-5 % Female by Subject Type (2013-14)

As educationalists, researchers and academics, we should question why the gender imbalance exists and look at recruitment strategies to address the problem. The study of engineering is heavily reliant upon achieving qualifications in science and mathematics. Although there have been some initiatives to try to introduce engineering studies into the schooling provision, the uptake of these studies has traditionally been small. Girls and boys study mathematics throughout primary and secondary education, but there have been numerous studies into the perceived gender imbalance in the study and performance in mathematics.

Reilly (Reilly, 2012) reported that in the USA boys outperformed girls in high school mathematics. In addition, Lubienski reported that in a USA based longitudinal survey:
"Mathematics performance gaps favouring boys appeared soon after children began kindergarten and then widened during elementary grades." (Lubienski et al., 2013). As a consequence of this reported imbalance, there have been other studies investigating why this might be. External factors have been investigated to seek further insight into the imbalance (Cheema & Kitsantas, 2014; Cronin et al., 1999).

Some studies have indicated the existence of Mathematics Anxiety (MA) and Test Anxiety (TA). MA has been defined as the state of discomfort experienced or associated with performing mathematical tasks. It has been reported that secondary school girls show higher levels of MA. This was said to relate to lower levels of mathematical performance (Devine et al., 2012). When comparing boys and girls with similar mathematical grades, girls reported less enjoyment and pride than boys, and more anxiety, hopelessness, and shame (Frenzel et al., 2007). Others have been unable to find significant differences between boys and girls when compensating for mathematics competence (Erturan & Jansen, 2015).

The study of technology and engineering (T&E) based subjects relies on performing well in mathematics. Girls may not be selecting subjects related to T&E because they do not feel confident in the subject, rather than because of their actual ability in the subject. Test anxiety may also be a factor, as mathematics has traditionally been assessed by examinations. Girls who have low confidence in their mathematics ability may be less likely to choose T&E subjects, resulting in a smaller number of female students recorded as going into technology and engineering higher education (HEFCE, 2015).

Accepting that low confidence may be one of the reasons for a reluctance to choose T&E subjects places a challenge on T&E HE providers. They must reach out to schools to show that females can be a part of the T&E community by providing activities to promote their confidence in this area. Women into Science and Engineering (WISE) campaigns for gender balance in science, technology, and engineering. It is supported by industry and academia, and has been in operation over the past few years in CEBE. It has produced inspirational work by industrialists and academics, generating confidence in secondary school girls who are now considering and choosing T&E subjects. Anecdotal feedback from first year tutors has suggested that there is an increase in women students joining our degrees, but the numbers are still small, but this has not been formally measured to establish if a significant change has happened.

The scope of this present research is focused on the information contained in the data set held by BCU. There is no information about the previous environment for level 3 studies. Consequently, we are restricted to the level 3 grades recorded and the progression information. Female students have presumably already overcome any mathematical confidence issues as evidenced by their choice of study. They have already joined T&E programmes in this research, therefore it could be of interest to establish a comparison of progression for male and female students contained in the dataset.

2.9 Qualifications for entry to HE

In my research data, 80% of the students admitted to CEBE undergraduate programmes are from either A-Levels or BTEC backgrounds. The cohort is split equally between the two qualification types. This indicates that our courses need to be capable of accepting students from both BTEC and A-Level background. There are many A-Level qualifications across a host of traditional academic and, more recently, applied subjects, such as computer science, which have become popular. BTEC qualifications are normally associated with applied subject areas such as computing, engineering and healthcare. BTEC specifications have a range of optional units that allow for local specialization to suit employer needs and regional requirements.

Their delivery is often associated with a practice-based curriculum style this is sometimes referred to as a flipped curriculum.

2.9.1 Assessment styles

Traditionally A-level studies required independent study skills and have a bias towards end assessments or examinations. Recently this has been reinforced with more examination-based assessment strategies being introduced (OFQUAL, 2017). The examinations are set and marked by exam boards. The Computer Science A-Level weighting of assessment is shown in Table 2-10.

Assessment objectives (AO)	Component weightings (approx %)			Overall weighting (approx %)
	Paper 1	Paper 2	NEA	
AO1	8	22	0	30
AO2	12	16	2	30
AO3	20	2	18	40
Overall weighting of components	40	40	20	100

Table 2-10 Computer Science A-Level Assessment Weighting

The assessment is split between 80% examinations and 20% non-examination assessment (NEA). The NEA for computer science is a computing practical project. Successful completion of the course requires students to be successful in examinations.

The Pearson BTEC National Extended Diploma in Computing is equivalent to three A-Levels and consists of 13 units. Of these, seven units are mandatory and four of those are externally assessed the remaining unit are assessed by continuous assessment set and marked by the teaching staff.

BTEC assessment strategies, in contrast, usually emphasise vocational activities through continuous assessment, although in some subjects a small number of examinations are used. For example, in the new standard for the Extended Diploma in Computer Science (Pearson, 2016), all optional units are internally assessed by the college providers, and the mandatory

units assessments are set and marked by Pearson. In the case of the Computer Science specification, the mandatory units contain one examination in Unit 1 and in Unit 2, and the remainder of the mandatory units are assessed through continuous assessment. Synoptic assessment specifically states that it:

> "…..requires learners to demonstrate that they can identify and use, effectively in an integrated way, an appropriate selection of skills, techniques, concepts, theories and knowledge from across the whole sector as relevant to a key task." (Pearson, 2016).

Although there are elements of commonality in the assessment methods for BTEC and A-level qualifications, the weighting of these methods is clearly different. It may be useful to know if there is any difference to the outcomes of students progressing to further study, and whether any predictions of higher education success be made, from the types of qualifications that they presented to gain entry to the course.

2.9.2 Predicting academic success from entry qualifications

Knowledge acquisition from level three vocational qualifications has been discussed and a lack of consensus identified concerning the preparedness of students for both work and further study (Bathmaker, 2013). It is suggested that there exists "only a few statistical differences" between applicants presenting with different qualifications, but that those who have studied the extended project and applied A-Levels appear to be particularly well prepared for HE (Gill, 2018). It was suggested that the key skills of problem solving, planning and research are included in these types of qualifications. Conversely, the suitability of applied entry qualifications has been questioned (Kelly, 2017). Kelly also noted that the range of qualifications can provide a widening participation route into HE, but that this is not fully embraced by some selective universities.
Following an analysis of degree classification outcomes and entry qualifications, questions of false equivalence between post 16 entry qualifications have been raised (Shields, 2018).

There are differences in the overall degree performance that have been identified for qualification types (Office For Students, 2019) see Figure 2-6 Degree outcomes by

Qualification Type. "The difference between those entering with A*A*A* at A-level and those entering with below CCD is 29 percentage points, with 95 per cent of graduates with A*A*A* gaining a first or upper second class degree compared with 67 per cent of graduates who entered with A-level grades below CCD. The difference between the highest and lowest BTEC grades is 23 percentage points: 71 per cent for those with three Distinction*s (D*D*D*), and 49 per cent for those with three Merits (MMM) and below." This thesis is concerned with progression after one year of study. This final degree classification information provides a pointer to an area of investigation for progression and qualification type.

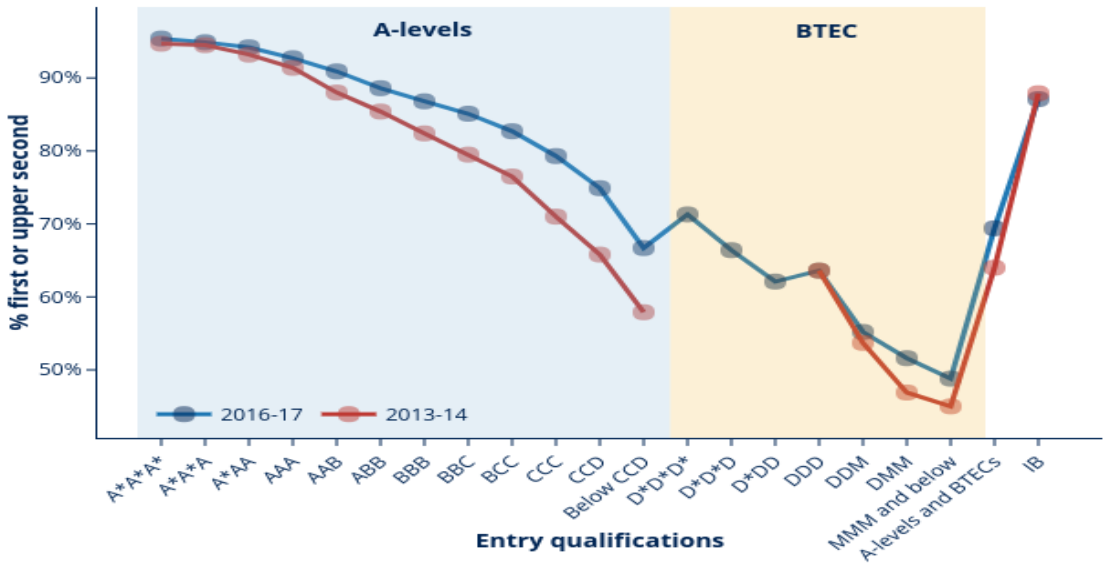

Figure 2-6 Degree outcomes by Qualification Type

The degree outcomes by qualification type are an indication of the difference in overall performance of students. However, this is only for completing students, there will be students who do not get to the final completion of their degree because they have not progressed beyond their first year of study. Investigating the progression from year one by qualification type would add to that body of knowledge and give a fuller picture of what is happening to students.

Universities set their own entry criteria for their degree courses. The process for setting criteria is normally based on the previous year's admissions experience and the current market perceptions. In the case of a new course the entry criteria from similar courses will be reviewed and a judgement made. Admissions tutors know that there will be times when criteria are changed in response to the need to remain competitive, and to ensure that there are suitable cohorts of students to run a viable course.

An offer for entry to a course should be made following the principle of it being equitable, and is usually made on the basis of the academic qualifications. In most cases UCAS points are used to provide parity. It has been my experience that course offers are made in this way. However, there are indications that this has not always been so (Boliver, 2013; Boliver, 2016; Noden et al., 2014).

In terms of university admissions, there are two types of courses, those that select, and those that recruit. Courses that select, will generally have a high contention ratio of applicants to places available, and therefore there needs to be some criteria to inform the offer making process. Typical criteria may include a high UCAS tariff, previous experience, provided through the applicant's personal statement, and possibly a formal interview. In contrast, courses that recruit have a lower contention ratio of applicants to places available and therefore employ different strategies to ensure recruitment targets are met. These lower contention courses may have standard offers often made by administrative admissions teams against predefined UCAS points and GCSE results. These courses may employ the use of unconditional offers based on predicted grades, reduced criteria for desirable qualifications, and may employ a tariff reduction in the clearing campaign.

However, Admissions staff should always be guided by the question: does the applicant have the potential to benefit from their chosen course? When dealing with a normal population distribution there will always be individual students who will perform at the extremes. It is not unheard of for borderline students with low academic qualifications, who have marginally convinced admissions tutors to offer them a place, to finish top of the year on a course of eighty students. In contrast, experience shows us that some highly qualified students may lose momentum and scrape through or even fail. A relationship between academic entry

grades and final degree success has been sought, but “no entry criteria predicted course performance across all years” has been found (Gill, 2018; Morris & Farmer, 1999; Muzyamba et al., 2012).

The recent expansion of Higher Education (HE) participation has led to researchers investigating the effects of widening participation. They have found variations in performance across a whole range of applicant characteristics (Smithers, 2015). UK medical schools are often oversubscribed with applications, and have tried many forms of pre-filtering on a localised basis. Some multilevel modelling of a student’s background, school type, gender, and monitoring of their secondary school attainment statistics, has been looked at. However no effective measure has been identified (McManus et al., 2013).

The WP drive has required HE and FE to provide greater opportunity and maximise retention and has led HE to consider how best to support the student journey into degree courses. Foundation year courses provide this for many students who have not achieved the correct entry qualification to directly join the first year of a degree course. Foundation years provide the necessary development to student academic capital in order to transition onto degree level work. Development of academic skills, habitus and cultural capital has been found to be a key part of successful foundation year study (Jones et al., 2020). Performance data has shown there to be no significant difference in outcomes of direct degree entry students and their foundation entry counterparts at the end of their first year on the degree course (Sanders, 2013).

The Wolf report (Wolf, 2011) and its final progress on recommendations (Wolf, 2015), and also McCoy and Adamson, considered how improvements could be made in vocational education for 14 to 19-year-olds, in order to promote progression into employment and higher education. McCoy and Adamson identified that there was an urgent need for additional work to be carried out on the evaluation of equivalence between the traditional A-Level and vocational BTEC qualifications (McCoy & Adamson, 2016).

The dataset analysed in this research contains qualification type and grades, and progression information for each student. From the above discussion, it is proposed that consideration

should be given to establish whether a pattern, relationship, or correlation can be found, from the dataset, that may identify potential progression, thus supporting admission decisions. In essence, could the qualification type, the grades achieved, and UCAS points be used to predict potential progression, and be able to identify students who may require additional support during the early stages of their degree? Essentially the question proposed is, can a link or indicator be identified between the level three qualifications and student progression? If a link can be found and a prediction made, it raises the question of what to do about it.

2.9.2.1 GCSEs and Progression

In the early 1990s, the Faculty of Engineering and Computer Technology at Birmingham Polytechnic was expanding and diversifying its programmes of study. Traditionally, it had provided mechanical, electrical and electronic, and production engineering courses. At this time, the number of students with the required mathematics and physics entry qualifications was declining and student numbers were dwindling. In response to this decline, the Faculty decided to develop new courses such as a BSc in Industrial Information Technology and a BSc in Export Engineering. These new courses did not require an A-level in mathematics or equivalent for entry, and the course team were seeking to recruit from a wider range of level III qualifications. These courses recruited many of their students through the clearing process. Many of the applicants had not done as well in their sixth form studies as they had hoped. The BSc programme leaders asked academic staff to evaluate the suitability for entry from the A-level qualifications, and also asked them to pay particular attention to the GCSE qualifications of an applicant. Those applicants with particularly strong GCSE qualifications were to be looked upon favourably. The programme leaders believed that a strong GCSE profile and the minimum A-level entry criteria would normally indicate that the applicant would be capable of benefitting from the programme of studies. At that time, it was suggested that this was particularly true for GCSE mathematics and GCSE sciences.

This recruitment strategy certainly provided many opportunities for students to join our programmes, and ultimately gain an honours degree. Although this is anecdotal, there are other studies that have examined the performance of students in higher education based upon their GCSE qualifications. Wharrad (Wharrad et al., 2003) identified that the number of

"GCSE A grades obtained significantly predicted success on the Bachelor of Nursing course". The performance of first-class Oxford students was examined (Ogg et al., 2009) who looked at a student's GCSE profile and whether the school attended was a state or private school. Ogg presented a comparison between an admissions aptitude test score and the GCSE results and concluded that "both metrics are predictive of final degree performance but the effect of the type of school was only statistically robust for art students." Benton(Benton, 2015) used the mean GCSE score and evaluated its value to predict A-level results. The study concluded that, with a few exceptions, the mean score could be used to predict the A-level outcomes.

Following the recent government changes to AS-levels, the Department for Education (Department for Education, 2013) carried out an analysis of student performance in HE based on GCSE results. This suggested that degree outcomes could be predicted equally well by looking solely at GCSE results, rather than a combination of AS-levels and GCSE results. This was refuted by others who believed that the combination of the two qualifications research to be flawed (Johnson et al., 2014).

The Faculty has a policy that all students must have GCSE Mathematics Grade C or equivalent at the point of entry. The dataset held by Birmingham City University has student GCSE mathematics grades recorded along with the progression decision for their HE studies. The dataset enables a comparison of progression through their degree versus GCSE grades to be undertaken.

From the above discussion, it is proposed that consideration should be given to establish whether a pattern or relationship can be found from the dataset that may identify a potential progression indicator. Is there a link between the GCSE Mathematics grade and student progression? In essence, could the GCSE Mathematics grade be used to evaluate potential progression and to identify students who may need additional support during the early stages of their degree?

2.10 The Problem Statement

The key feature about the data used in this research is that it has already been collected by the University and there is no need to collect any more data. We have an opportunity to use data that is readily available and turn it into useful information to support students. The data will also enable us to monitor the study outcomes and hopefully identify students who may benefit from additional support.

The aim of this research is to find factors that will identify students who are at risk of non-completion or not progressing to their next year of study. In simple terms, there are two driving forces for doing this:

1. The moral imperative to ensure that students, who are investing years of their life, their trust in the University, and of course the student fee and resulting debt, are guided to a successful completion of their studies.
2. The financial needs of the University to ensure a reliable income through the continued payment of fees from students who are fully engaged with their academic studies.

Students can be grouped or defined by their attributes, including their qualification type and grade, gender, whether they are the first in their family to go to university, socio-economic groupings, among others. Is it possible to identify a single attribute or a combination of these attributes that could indicate if they are more likely to succeed or to struggle? Can a possible reason for this be indicated with a view to formulating types of support? Would it be possible to recruit the students that meet criteria for guaranteed success?

This programme of research is seeking to find and understand a relationship between progression and an attribute/factor or combination of attributes/factors. In the hope of identifying a relationship, the attributes/factors have been split into two types: Academic attributes/factors and Non-Academic attributes/factors. A dataset of student attributes taken from the University held information for students entering the degree and foundation year courses in 2014-5 will be used to explore the value and significance of these relationships.

Academic Factors

The requirement for entry to University is usually measured through UCAS tariff points. It may be presumed that higher tariff points indicate students who are more likely to achieve better progression and ultimately better degree results. It is proposed that the following be investigated:

1. The students' UCAS entry tariff and progression;
    a. The Hypothesis is that students with a higher entry tariff have an increased chance of progressing.
2. The qualification types and progression;
    a. The Hypothesis is that students with one type of qualification over another have an increased chance of progressing.
3. The students' GCSE Mathematics Grades and progression.
    a. The Hypothesis is that students with a higher GCSE grade in Mathematics have an increased chance of progressing.

Non-Academic Factors

It can be argued that academic qualifications provide a measure of a student's ability and readiness to enter higher education. However, experience in higher education shows that students leave their chosen degree course for a variety of non-academic reasons. The dataset contains student information about gender, socio-economic grouping, and whether parents have higher education experience. It is proposed that the following be investigated. To identify if there is a significant difference in the progression of:

4. Male and female students;
    a. The Hypothesis is that gender is a contributory factor in progression.
5. Students whose parents have and have not studied in Higher Education;
    a. The Hypothesis is that students whose parents have experience of Higher Education have an increased chance of progression.

6. Students from different socio-economic groupings;
    a. The Hypothesis is that students' socio-economic background is a contributory factor in progression.
7. BAME and Non-BAME students;
    a. The Hypothesis is that students' ethnicity is a contributory factor in progression.

8. Students in the CEBE Academic Schools;
    a. The Hypothesis is that the CEBE Academic School where students are based is a contributory factor in progression.

9. Students who live at home and can be classified as commuters compared with students who live away from home.
    a. The Hypothesis is that students' commuter status is a contributory factor in progression.

10. A combination of some or all of the above hypotheses may impact on progression, therefore the final test is to use statistical techniques to identify if a combination of the above hypotheses can produce a significant outcome.
    a. The hypothesis is that a combination of some or all of these factors contribute to a student's chance of progression.

3 Research Methodology

Bourdieu used several statistical techniques in his social critique of taste, *Distinction* (Bourdieu, 2010). The objective of his research was to identify status information of people from a range of social classes. His analysis included both qualitative and quantitative techniques. Statistical analysis was applied to both his own survey data (Bourdieu, 2010, pp. 528-533) and to secondary data analysis of other survey data (Bourdieu, 2010, pp. 534-537). His use of secondary data analysis provided inspiration to other researchers (Reay & Ball, 1997; Reilly, 2012; Smith, 2014; Smithers, 2015) when examining student performance or participation.

The Higher Education Statistics Agency (HESA) collects a variety of data every year from universities across the UK. HESA provides this data to the UK governments and their higher education funding bodies, in order to support the regulation and funding of UK higher education providers. A full list of their data collection streams can be found on their website: https://www.hesa.ac.uk/overview (Accessed 17/02/2020). Universities are required to deliver these returns to HESA annually and the accuracy of the data is signed off by the University's Senior Executive Team. HESA evaluates the data to identify trends in student participation in higher education. The accuracy of the HESA data and the progression data based upon student performance is important in the analysis carried out here. This institutional data is available on an annual cycle and will provide opportunities for ongoing secondary analysis of new cohorts.

There are advantages of secondary analysis. The data is normally available quickly and cheaply, government data sets are of high quality and repeated on an annual cycle providing opportunities for longitudinal analysis. Strict quality assurance guidelines are developed and verified by the government data specialists. Large datasets permit some subgroup analysis. National datasets are open for further analysis by other researchers who may explore the data in new ways to seek knowledge (Bryman, 2015, p. 310). However, there are limitations of secondary analysis. The researcher may lack familiarity with the data and may not be fully aware of the complexity or have direct insight into the data quality because it was collected by someone else. In addition, key variables may be absent, requiring multi-variable analysis

to provide pointers to the key variables (Bryman, 2015, p. 312). Secondary data analysis has been identified as a rich vein to tap, allowing researchers to analyse data on a scale that would be very difficult for the sole researcher to amass (Gorard, 2012; Smith, 2014).

3.1 The Data Sample

This research uses administrative data and quantitative methods to analyse it. Administrative Data is the set of activities involved in the collection, processing, storage, and dissemination of statistical data from one or more administrative sources. This is the equivalent of a survey but the source of data is administrative records rather than direct contact with respondents. The initial phase of the research established and identified the available quantitative data sets, including specific student registration information captured during admissions and enrolment, and on-going measures of student activity. This research will only consider data that is currently stored within the University. One of the key features of this research is that the data already exists. There is an important distinction between the administrative data that is used in social science research and the data traditionally used in social science research. Social science research is normally based upon "made data" derived from experiments and surveys. Administrative data is characterised as being "found data", that is data that has not been collected for research purposes (Connellya et al., 2016). The dataset in this research is a combination of admissions data and progression data. Secondary data allows researchers to access data on a scale difficult for the sole researcher to amass (Smith, 2011, Gorard, 2012).

For the purposes of this research we are dealing with secondary data. This has clear implications for the research design. This will be explored in the next section.

Data item name	Data Item Description
Dataset Entry No	Unique student identifier code
SESSION	Academic Year (e.g. 2014/15)
GENDER	Male/Female
STUDENT D.O.B	Student Date of Birth

START DATE	Course Start Date (29 – SEP – 14)
AGE ON ENTRY	Age in full years.
AGE BAND	Age Band (18, 19-20, 21-24, 25-29, 30+)
COURSE CODE	Unique Course Code As Defined in the University's Student Database.
COURSE TITLE	Full Course Title Including Award
FEE SPONSOR	Details of who pays the fees. (E.g. SLC)
COURSE YEAR	Student's Year of Study. (0,1,2)
OCCURRENCE	(SEP)
ATTENDANCE	Mode of Study, FT/PT
ACADEMIC SCHOOL CODE	Unique Number (17/18/19/20)
ACADEMIC SCHOOL	School Name
ENROLMENT STATUS	(Enrolled/Withdrawn/Suspended Study)
COURSE LEVEL	Undergraduate (UG)
COURSE MODE	Attendance Mode (FT/PT)
NATIONALITY CODE	Unique Code for Nationality
NATIONALITY	Student Nationality
STR_ETHNICITY CODE (UK Only)	UK Definition Code Stored as String
NUM_ETHNICITY CODE (UK Only)	UK Definition Code Stored as a Number
ETHNICITY (UK Only)	Asian or Asian British - Pakistani; White; Asian or Asian British - Indian; Black or Black British - African; Mixed - White & Black Caribbean; Other Mixed background; Black or Black British - Caribbean; Asian or Asian British - Bangladeshi; Prefer not to say; Mixed - White & Asian; Other Asian background; Other Black background; Other Ethnic background; Chinese; Mixed - White & Black African; Arab; Not known

TERM TIME ACCOMMODATION	Students Term time address Classification: University Halls; Parents/Guardian; Own permanent home (rented/owned); Private Student Halls; Short term rented accommodation
NUM_TERM TIME ACCOMODATION	1 = Own permanent home (rented/owned); 2 = Parents/Guardian; 3 = Private Student Halls; 4 = Short term rented accommodation; 5 = University Halls
FEE STATUS	UK/EU
STUDY LOCATION	On-Campus
YEAR END PROGRESS	PROCEED CONDITIONS; PASS PROCEED; CREDITS COMPLETED; INSUFFICIENT CREDITS; CONTINUING STUDY
NUM Year End Progress	5 = PROCEED CONDITIONS; 4 = PASS PROCEED; 2 = CREDITS COMPLETED; 3 = INSUFFICIENT CREDITS; 1 = CONTINUING STUDY
Pass/Fail	Textural Description of Proceeding to Next Year without Trailing (PASS) Or NOT (FAIL) FAIL = 5 = PROCEED CONDITIONS PASS = 4 = PASS PROCEED FAIL = 2 = CREDITS COMPLETED FAIL = 3 = INSUFFICIENT CREDITS FAIL = 1 = CONTINUING STUDY
HIGHEST ENTRY QUAL	ACCESS HE; BTEC DIPLOMA; BTEC AWARD; BTEC CERTIFICATE DIPLOMA HE; FOUNDATION DEGREE;GCE A LEVELS; HNC INTERNATIONAL BACCALAUREATE; MIXED ACADEMIC VOCATION LEVEL 3; NON EU BACHELORS DEGREE; NON UK LEVEL 3; UK BACCALAUREATE; UK BACHELORS DEGREE; UK LEVEL 3; UK LEVEL 5 (HNC/D)
NUMQual Number	1 = ACCESS HE; 2 = BTEC DIPLOMA; 2 = BTEC AWARD; 2 = BTEC CERTIFICATE; 3 = DIPLOMA HE; 4 = FOUNDATION DEGREE; 5 = GCE A LEVELS; 6 = HNC; 7 = INTERNATIONAL BACCALAUREATE; 8 = MIXED ACADEMIC VOCATION LEVEL 3; 9 = NON EU BACHELORS DEGREE; 10 = NON UK LEVEL 3; 11 = UK BACCALAUREATE; 12 = UK BACHELORS DEGREE; 14 = UK LEVEL 3; 15 = UK LEVEL 5 (HND/C)

DOMI CODE	ENGLAND = 5826; WALES = 6826; NORTHERN IRELAND = 8826
COUNTRY OF DOMICILE	ENGLAND; WALES; NORTHERN IRELAND
UK POSTCODE	Home Post Code
PARENTS HE EXPERIENCE	YES/NO
DISABILITY	Students declaring a disability. The data set contains the following: Blind or serious uncorrected visual impairment Deaf or serious hearing impairment Longstanding illness or health condition Mental health condition NONE Physical impairment or mobility issue Social/communication impairment Specific learning difficulty e.g. Dyslexia; AD(H)D Two or more impairments
SOCIO-ECONOMIC CLASS	UK Social Classification: HIGHER CLASSIFCATION: 1; HIGHER CLASSIFCATION: 2 HIGHER CLASSIFCATION: 3; LOWER CLASSIFCATION: 4 LOWER CLASSIFCATION: 5; LOWER CLASSIFCATION: 6 LOWER CLASSIFCATION: 7
NUM_SE Class	Number Code for Socio-Economic Class 1 = HIGHER CLASSIFCATION: 1; 2 = HIGHER CLASSIFCATION: 2 3 = HIGHER CLASSIFCATION: 3; 4 = LOWER CLASSIFCATION: 4 5 = LOWER CLASSIFCATION: 5; 6 = LOWER CLASSIFCATION: 6 7 = LOWER CLASSIFCATION: 7
NUM_UCAS TARIFF on ENTRY	Standard UCAS Tariff
REASON FOR LEAVING	Text Value
DATE LEFT PROG'	Date format (DD-MMM-YY)

GCSE Maths Points	Numeric Value: A*=140; A=120; B=100; C=80; D=40; E=20

Table 3-1 HESA Data Table

The data items, from the dataset, are identified by the research questions in the Problem Statement. The dependent variable is the Pass/Fail data item. This is the final exam board that records the decision. The data contains five specific values and these have been codified to a binary pass or fail decision. This is the progression variable.

The research has made use of this data to investigate and analyse potential relationships to student progression using both academic and non-academic factors. There are many factors that have been previously investigated, such as disability and maturity. These factors are important and must be dealt with fairly to ensure equality of access and inclusion on the courses and support the widening participation strategy. This thesis is looking at the bigger picture, and considers characteristics that all students possess on entry to higher education, such as their qualifications, parental experience of HE, gender, socio-economic background, ethnicity, where they live and which school they are studying in.

Variables will be tested to identify their significance to the Pass/Fail dependant variable. The research questions are areas of interest and specific data has been identified for each question to be investigated. There are three variable types found in this research: Numerical or continuous, Ordinal, and Categorical. The Categorical variable describes data that is made up of defined categories, for example for this research categories would include gender, ethnicity, qualification type and many more. An Ordinal variable is data where there to be a measure within the categorical data and indicates a ranked measure of quality. For example, in A-level gradings, a grade A is better than a grade E but there is no indication for the grades that A is five time better than E. It simply states that A is better than E. A Numerical variable is data that is recorded by numbers where the number has a value and an order of merit that can be discrete or continuous. Field covers the variable types and their meanings in his book (Field, 2017, pp. 11-13).

Academic Factors

1. The students' UCAS entry tariff and progression.

NUM_UCAS TARIFF on ENTRY recodes the UCAS tariff presented by the students in order to gain entry to the university. This Numeric value is verified by UCAS and BCU admissions staff.

2. The qualification types and progression.

The data item that recodes the entry qualification type is HIGHEST ENTRY QUAL. The item is Categorical and there are fifteen qualification type recorded in this item.

3. The students' GCSE Mathematics Grades and progression.

The GCSE Maths Points data entry provides a clear indication of the GCSE grades. GCSE grades are Ordinal, the grade A* is better than a grade E. To help with data analysis a Numeric value has been applied to each grade. A high value of 140 has been given to grade A* reducing to 20 for a grade E, within the tools used for the analysis an A* is ordered after the A grade.

Non-Academic Factors

4. Male and female students.

The GENDER data entry has been used for this research question. The entry is Categorical and only records a binary classification.

5. Students whose parents have and have not studied in Higher Education.

The PARENTS HE EXPERIENCE data item is Categorical and records a binary value.

6. Students from different socio-economic groupings;

The SOCIO-ECONOMIC CLASS data entry records the student's background and provides seven categories. It is Categorical data.

7. BAME and Non-BAME students;

The ETHNICITY (UK Only) data item has a list of ethic classifications and is used to derive the BAME variable. The data is Categorical.

8. Students in the CEBE Academic Schools;

The faculty's academic schools are recorded in the data set. There were four schools at the time this research commenced. The data is Categorical.

9. Commuter:

Students who live at home and can be classified as commuters compared with students who live away from home. The TERM TIME ACCOMMODATION variable is used to derive the commuter status of the students. It is a Categorical data item.

The dataset used in this study contains the information for one group of students who joined the faculty in the academic year 2014/15. The dataset was taken at the end of that academic year following the completion of the students' first year of study. This group of students was selected as they were timely for the start of this part-time doctoral research, their year of entry and progression results were available, and also it was the first year that GCSE results in Mathematics were systematically recorded in the admissions system. Student GCSE grades in Mathematics has always been an important part of the admissions process for the CEBE faculty. The grades were always checked before an offer to study was made. This was a manual process carried out by admissions staff and, in this and subsequent cohorts, the grades were recorded on the student admissions system. For this research the GCSE results has been included enabling the evaluation of GCSE grades as a predictor of student performance (Benton, 2015; Department for Education, 2013) as was previously out-lined in the literature review.

The addition of the progression results provided a success measure of pass or fail from their 1st year of studies for the student cohort. Full time students are required to pass 120 credits of study per year in a specific number of modules as defined by their course specification. To be successful they are required to pass all the modules that make up the 120 credits. Decisions for pass or fail are taken by an exam board of academic staff and overseen by external examiners. The external examiners formally approve the process of the exam board and appropriateness of the work being assessed at the board. In addition, the external examiners complete an annual report which is submitted to the university's quality assurance departments. Hence a pass or fail decision in this thesis is defined as an outcome of the exam board, and it is this decision that is recorded in the dataset. Students are normally given two

attempts to pass their modules to achieve their 120 credits. The first attempt is usually made during the study period of the module, and referred to as passing “first-time”. Students who are judged to have failed by the exam board process are provided with a second or resit attempt that usually takes place during the summer period. Hence, the dataset contains their admissions information and the pass or fail result from the first year of their studies. The data set includes students joining at Foundation year (or year zero), First year students and Second year students from BSc and BEng degrees in computing, engineering, digital media technology and the built environment. A full list of the degree programmes can be found in Appendix 1. The pass/fail results are taken from the first sit information. Students may have improved their progression rate through the resit process, but as it is preferable to pass first time I have not included this data in the study.

3.2 Ethical considerations

Student data is anonymised to protect confidentiality. Some insight into this is provided by (Mourby, 2018): “The GDPR definition of pseudonymisation differs significantly from the conventional way in which the term has been used. For example, the Anonymisation Decision-Making Framework defines pseudonymisation as: A technique where direct identifiers are replaced with a fictitious name or code that is unique to an individual but does not itself directly identify them.” The student data is stored on the University systems and was collected prior to the GDPR update. Students were and still are informed about the ways that the University uses personal data when they enrol. Research and statistical analysis is brought to their attention in the Arrival Guide (BCU, 2014/5) and acceptance to this is a condition of enrolment. In my role as Associate Dean, I have access to all the information used in this research. I have received formal ethical approval for this research from the Faculty of Health, Education and Life Sciences Academic Ethics Committee see Appendix 2 Ethical Approval.

3.3 Ontology

I was brought up with the mantra: "education can change your life". This has been a core part of my cultural capital. My parents came from very different backgrounds; My mother was

born in the Irish Republic into a middle-class family who initially enjoyed a very comfortable lifestyle, however in 1939 their circumstances changed significantly, and they were forced to emigrate to England. The large family settled in the Birmingham area and the children went to local state schools, and on leaving secondary school at 14 she went to work in the local grocery store. My father was born into a working-class family, living in a 2 up 2 down in Aston, now part of Birmingham. He went to the local state school and having passed the entrance exam for the King Edward VI foundation schools was offered a full book scholarship where his family would only have to buy the uniform. Unfortunately, this was seen as too great a burden for the family to undertake, and he went to the local secondary school. After leaving the secondary school to be an apprentice in a Birmingham-based engineering firm, he attended college and became the factory-based apprentice instructor. From there he became a local college lecturer teaching apprentices and undertook further study on a part-time basis eventually becoming a senior lecturer in the Department of Mechanical and Production Engineering at Birmingham Polytechnic. Having spoken to my parents about their educational backgrounds during my adolescent years it was clear that they believed that their limited education led to reduced opportunities in adult life. In the late 1950s and early 1960s, my father had the opportunity to continue his education and he studied part-time whilst working. My parents strongly advocated taking education as far as you could before starting full-time work. Both of my parents were church going and I recall a biblical quote that my mother would regularly say to me: “To whom much is given, much will be required” (Luke 12:48). If you have heard that line of wisdom, you know it means we are held responsible for what we have. If we have been blessed with talents, wealth, knowledge, time, and the like, it is expected that we recognise and use these to benefit others. The educational encouragement and the biblical guidance are core parts of my cultural capital, whereby in recognising the benefit I experienced through having these opportunities, I believe it is important to help others and recognise the importance that education plays in opening up opportunities to others.

My path through education has not always been smooth, I recall my parents being told by my class teacher that I would never make anything of myself. My mother expressing her anger at this statement and saying how wrong the teacher was and that it was for me to prove him wrong. The following year I went on to a comprehensive secondary school and, as with so

many things, the change of school provided opportunities to succeed. I grabbed the opportunity and had some success in my O-levels. I studied three A-levels in mathematics, further mathematics and physics as I was always happy with mathematic theories and concepts. I really enjoyed music and about this time I started to play the guitar. Music is a large part of my cultural capital to this day. The linkage between music and mathematics has long thought to be present in people (Vaughn, 2000). However, I thought I could breeze through the sixth form in a similar manner to my O-levels whilst having a good time and left sixth form with an E in mathematics and an additional grade E in General Studies, I learned a hard lesson that I would have to work and I remember saying to myself: "I was never ever going to be in this position again". Consequently, I probably learnt one of the greatest lessons in my life that hard work and determination were needed if I was to succeed. My habitus includes getting it wrong and learning what to do after that. It is what you learn from your current situation, which can empower you to go onto maximising your personal effectiveness, and I have endeavoured to pass this message to potential and maybe disappointed students.

3.3.1 Habitus Professional

In 1978, I joined an HND in Electrical and Electronic Engineering at the City of Birmingham Polytechnic. I was a commuter student living at home and travelling daily to the Polytechnic by bus, approximately one hour in each direction. The course required thirty-plus hours a week of class contact and an attendance requirement of 90% of the classes. After each day, we were required to write up laboratory experiments and complete homework from the tutorial classes of the day. These were all part of the summative assessment process. At the end of the year each subject had a three-hour examination paper. This produced students who are very good at completing lots of assessments and passing examinations. The skills of how to learn was never explored in the scramble to complete the assessments. However, I certainly had been trained to complete work in a technical environment.

I passed the HND but was unable to find employment due to the 1980s recession and the collapse of industry in the West Midlands and rising unemployment rates. In 1981 the Unemployment rate was 10.2% (Statistics, 2021). I spent six months trying to find work and I returned to education to Birmingham Polytechnic to studying for the Council of Engineering

Institutions Part Two Examinations (CEIPT). This was different learning experience; the assessment consisted of six externally set and marked examinations with a pass rate of about 15%. There was no requirement for coursework, consequently, instead of writing up laboratory experiments and completing summative tutorial assessments we were now required to learn and understand. The number of contact hours was reduced to 16 per week and I had time to learn. I could review the lectures and tutorials, and analyse what was being presented to me. I found myself looking at worked examples and suggested exercises with a new desire to understand the theories we were studying instead of simply completing the assignments. I passed the course and was supported into employment by one of the lecturers of the time who had a contact in a local company.

I had acquired the skills of producing large amounts of work and in studying the CEIPT I learnt a rigorous approach to knowledge acquisition and a new approach to analysing problems and proposing solutions. Engineers seek certainty in their design approaches to ensure their designs are workable through the use of mathematical models based on scientific knowledge and practice to create positivist solutions to real life problems. In 1988 I returned to the Polytechnic as a research assistant investigating a high precision Nano-technology motion control project funded by the Engineering and Physical Sciences Research Council. I wrote this up to achieve a Master of Philosophy award from the University of Central England, now BCU, in Birmingham. The application of engineering knowledge led to an eightfold improvement in performance of the machines (Handley & Higginson, 1996; Handley & Higginson, 1994). I became a Senior Lecturer in Embedded Systems and Software Engineering in the Faculty of Engineering and Computer Technology and over the next eight years undertook the role of Course Director for BEng Electronic Engineering and subsequently became the Faculty's Director for Academic Partnerships. This latter role included day to day responsibility for managing the admissions process. This is where I strengthened my knowledge of both UK and international qualifications. Throughout my life as an academic I have become increasingly focused upon the recruitment and retention of students.

I have developed a knowledge of entry requirements for Technology and Engineering based courses for home and international applications and for many years made the international admissions decisions for the faculty. I continue to lead the faculty admissions and advise on decisions when questions about entry qualifications arise.

I led on the Faculty's franchise and validated partnerships in the UK and in China with our Chinese partner Nanjing University of Science and Technology (NUST). I was the NUST link-tutor for 15 years and recruited over 950 students through a two-plus-two partnership where the students carry out two years of studies in NUST and then to BCU for the final two years to complete their BCU degree. Managing a project on this scale over such a long period provided many opportunities for review. The module results from Birmingham were used as an indicator to the effectiveness of the prior study in NUST. Through a process of statistical analysis and annual review we were able to modify the study programmes in Birmingham and Nanjing to improve student success.

In 2013, I was promoted to Associate Dean Academic, and presently lead on the student recruitment and portfolio development in the Faculty. This role provides strategic opportunities to influence the development of the Faculty and University experience for students and staff alike. I have been involved in decision making in many past and present University committees, including being the Elected member of BCU Senate, (2007-2011), sitting on the BCU Academic Standards and Quality Enhancement Committee, Faculty Learning Teaching and Quality Committee, Chair of Faculty Academic Standards and Quality Enhancement Committee, Chair of Faculty's Academic Management Group, Member of the Faculty's Senior Leadership Team, Chair of Faculty's Marketing and Recruitment Forum, and a Member of BCU's Strategic Recruitment Group. Since 2006 I have regularly chaired course BCU approval panels and have been and continue to be an external examiner at other universities. Membership of these committees, board and panels provides opportunities to meet with senior university staff and share opinions, ideas and issues that are currently affecting staff and students. My knowledge and studies have been influential in some of the key decisions that affect the student journey to and through university.

Access to student data and recruitment information is crucial to my role and allows me to use numerical analysis to present and analyse student admissions information. It places me in a privileged position that can provide me with a large amount of information about CEBE's individual students. However, for this research it is essential that I only use information from the dataset held on the administrative data base because I want to establish what can be found from data that has is already gathered. This is an attractive proposition because the

additional cost of data collection would be minimised and if any "proofs" of propositions produced outcomes, these can be systematically investigated for future cohorts.

3.3.2 Institutional Habitus

Birmingham Polytechnic received its Royal Charter being granted University status in 1993, becoming the University of Central England (UCE) Birmingham. In 2007 Birmingham City University (BCU) came into being following a name change.

BCU is a large practice-based University of around 25,000 students, that currently comprises four Faculties:

- Art, Design and Media (ADM)
- Business, Law and Social Sciences (BLSS)
- Computing, Engineering and the Built Environment (CEBE)
- Health, Education and Life Sciences (HELS)

In common with many post-'92 Universities, BCU recruits students rather than selecting them from a large pool of applications. Although, there are some courses that do select in the health subjects, these are in the minority. In CEBE, where this research is based, courses are not in the selecting category and we actively run recruiting campaigns every year, and recruit a large number of students through the summer Clearing process.

In 2014, when this research started, CEBE had four Schools:

- Birmingham School of the Built Environment (BSBE)
- School of Computing, Telecommunications and Networks (CTN)
- School of Digital Media Technology (DMT)
- School of Engineering Design and Manufacturing Systems (EDMS)

The data for this research is gathered for these schools. Around 2017, there was a rationalisation of the Schools leading to the formation of two larger schools, the School of Computing and Digital Technology (CDT) and the School of Engineering and the Build Environment (EBE). With a few exceptions the courses from CTN and DMT became part of the CDT and the courses from EDMS and BSBE are now included in EBE.

Birmingham City University is a diverse university. The institution's TEF submission (BCU, 2017b) described a diverse student population that includes 43% BAME, 39% mature and 37%

coming from areas of low HE participation as indicated by POLAR quintiles 1 and 2. In addition 55% of young undergraduates come from areas of high income deprivation as indicated by IDACI quintiles 1 and 2. In terms of Socio Economic background the 47% of students come from NS-SEC classes 4,5,6 and 7. Commuter students make up 61% of the student body and a substantial proportion of these students are the first of their family to enter higher education.

In 2017/8 CEBE reflected the overall institutional diversity position in several key areas with 59% of students coming from a BAME background, 10.3% POLAR quintile 1, 59% IDACI quintiles 1,2 and 3. Around 55% of students presented BTEC vocational qualifications on entry to undergraduate study. A-level students accounted for 33% of the total. This proportion of qualifications has remained consistent over the years and in 2020/21, 59% of students were presenting vocational qualifications on entry whereas A-level students accounted for 32% of entrants. Around 14% of students were female and this has been a steady state for several years and reflects the national average of 17% of female students in technology and engineering.

In my study I wanted to investigate the progress of a group of students in their first year of study. I wanted to use student administrative data that already existed. In essence if there was something in that data that would indicate successful students this could be used as a marker for admissions and induction decisions for future students. Therefore in this study the dataset is the knowledge that exists about the student group. The epistemological concept of knowledge will explore the nature of this dataset.

3.4 Epistemology

Epistemology is about "how we know what we know" (Crotty, 1998). It provides an understanding of the types of knowledge people have and how they ensure that it is legitimate. Bertrand Russell said of knowledge, “the pursuit of knowledge is not, one in which the object is constant while all the adaptation is on the part of the knower. On the contrary both the subject and the object, both the knower and the thing known, are in a continual process of mutual adaption” (Russell, 2004, p. 749) . “Our knowledge of physical objects and of other minds is only by description” (Russell, 1910). Knowledge in this research is the information or descriptors held in the institutional data and provides the recorded attributes of the students. The attributes provide knowledge of a student’s background and some part insight to their habitus. It is not an all-encompassing picture of the student. This institutional data provides a snapshot of them. The key factor here is that the data is collected for all students in the university as a requirement for reporting to HESA and if, by the collation and use of this data it were possible to identify students who are at risk of failing to progress, it may be possible to repeat the analysis for other students and other subject areas, and also provide some predictions for future students.

Crotty believes that this is closely related to ontology. Therefore, if we take a particular epistemological stance, an ontological stance is implied. For example, Crotty suggests, "Realism (an ontological notion asserting that realities exist outside of the mind) is often taken to imply Objectivism (an epistemological notion asserting that meaning exists in objects independently of any consciousness)"(Crotty, 1998, p. 10). Bourdieu’s habitus and field ideas were an attempt to overcome the dichotomies in social theory between objective and subjective theory (King, 2000). “Habitus is the product of the work of inculcation and appropriation in order for those products of collective history, the objective structures (e.g. of language, economy, etc.), to succeed in reproducing themselves more or less in the form of durable dispositions, in organisms (which one can, if one wishes, call individuals) lastingly subjected to the same conditions of existence.” It should be recalled from the research questions that this programme of research is seeking a relationship between a single factor or combination of factors, to identify students who are at risk of failing to progress. The data set has a set of factors or attributes that are ascribed, they are collected upon application,

such as, qualification type and grade, male or female, first in family to go to university, socio-economic groupings and more. There is one achieved attribute, the Pass/Fail measure, which describes the success of their studies during their first year. The achieved attribute will be used to measure the outcome of the students' studies. These attributes do not provide a complete description of the student, there will be more student characteristics that are not captured in the data set, however, this is the place where the analysis can start from.

Using pre-entry qualifications to predict academic success has been fruitful (Benton, 2015; Department for Education, 2013; Johnston et al., 2015; Wharrad et al., 2003). Many universities have academic support structures in place but many students find it difficult to access them and some students are reluctant to draw on these support systems (Lawson, 2019). If it were possible to identify students who may be at risk of not succeeding, and the factors contributing to this, then a programme of support could be introduced for identified students or for groups. It may be possible to design programmes, regulations, and general support that could improve the progression in a systematic way.

However, there are some fundamental assumptions being made about the dataset and the research programme. Firstly, others produce the original data so in gathering the data it has not been contaminated with any personal views around what data should be gathered. The dataset is being accepted as it is and was collated several years ago before this research began.

3.5 Theoretical Perspectives.

From a theoretical standpoint, the paradigm discussion is found in the ontology and the epistemology; it comes from one's beliefs, or perception of truth and the nature of the knowledge. The proponents of either positivist or interpretivist theories often have a very different view of what 'truth" is and how it may be investigated (Onwuegbuzie & Leech, 2005). The positivists see truth as unchanging and as 'a single objective reality'(McMillan, 1989, p. 14). The certainty this provides promotes the fixed reality and does not rely upon humans to know it or understand it (Bettis, 2001). Positivists see this as their epistemological position that confirms the facticity of the world, and can be discovered through scientific methods (Scott, 1999). This view of reality is one that is discovered through scientific,

quantifiable and empirical approaches, leading to the close relationship of positivism and quantitative methods, leading to the experimental domain of planned, structured research that provides for the numerical analysis of observable and measured data (Gall et al., 1996). This leads to the "proof" of propositions and the "predictions" of similar outcomes and predictions for future situations.

The areas of interest explored in the literature review and identified in the problem statement were aligned with the data items present in the student administration data. The dataset was subjected to statistical analysis in order to evaluate the hypotheses and the soundness of the theory. The data was explored from the perspective of professional subject knowledge and initial prototype experiments were carried out.

3.6 Methodology

Methodology: the strategy, plan of action, process and design behind the choice and use of particular method and linking the choice and use of methods to the desired outcomes. (Crotty, 1998, p. 3)

Both Qualitative and Quantitative techniques are considered to be appropriate for the secondary analysis (Onwuegbuzie & Leech, 2005). For numeric secondary analysis, if the quantitative approach or design is considered as a continuum, one end of the spectrum would be an approach where the variables are observed, as the researcher has no control over the variables, while at the other end of the spectrum, the researcher would have a great deal of control over the variables and their relationships. The dataset is cross-sectional, the data was collected during the admissions process and at the end of the first year of study. The aim of this study is to identify student characteristics that are significant to the overall progression performance of the students.

The plan of action was to evaluate the data in order to identify variables or factors that have a significant relationship to the progression for students. This methodology proposes two stages in this process. The first stage is an initial analysis that assumes all of the factors are independent. The second stage is to remove this assumption of factor independence. The

search for significance will be carried out by using research methods depending upon the variable types and the dependence or independence of the variable types.

3.6.1 Independent Variable Testing

In the first phase a group of statistical tests were carried out and reported in Exploring the Data: Two Factor Independence Testing. This allowed the development of an understanding of the various categories of factors that exist in this dataset. The search for significance relies upon the correct choice of test for each factor. An initial evaluation of the factors needs to be the selection of the statistical analysis tool to be employed. Looking at each of the tests required for the hypotheses outlined in the Problem Statement of this thesis lead to the following statistical tools being chosen:

UCAS Tariff:

This factor is a term defined by UCAS. It is a range of values with a higher value indicating "better" results compared to the lower value. There is no proportional relationship between the values: 100 UCAS points is not twice as good as 50 UCAS points. It is an ordinal factor and therefore an analysis of this factor will use the Mann-Whitney test to identify significance.

Qualification type:

The analysis of qualification types identified a range of qualifications presented by students. Many of these qualifications have UCAS tariff points allocated to them and that there is no hierarchy in this allocation. Qualification data is categorical and hence an analysis was carried out using chi-square tests. In addition, the analysis showed that two qualification types were studied by a large number of students (A-Level and BTEC Students). It was decided to concentrate on these two qualifications as 80% of the students fell into this group/category.

GCSE mathematics grades:

This factor was recorded for the first time in the dataset. As with UCAS tariffs there is a hierarchy of grades attributed to the GCSE results. A grade "B" is higher than a grade “C” but there is no scale of how much. The factor is ordinal and was assessed using the Mann-Whitney test to evaluate its influence on the overall progression.

Gender - Male and Female students:

These self-declared values found in this dataset is binary as it is recorded as male or female. At that time there was no option for a non-binary choice. It is a categorical factor and therefore a chi-square test will be used to evaluate this factor against progression.

Students' parental higher education experience:

This factor has several values attributed to it: yes, no, not-known and not-provided. The factor is categorical, and a chi-square test was used to evaluate its significance against progression.

Social economic grouping:

This factor has six categories and is therefore identified as a categorical variable. It will be assessed for significance using a chi-square test.

Student Ethnicity:

There are many ethnic groups recorded in the dataset. Many of these groups are small and provide challenges to the effectiveness of a categorical test. The final factor analysed a simplification of the raw data to create the BAME/non-BAME categorical variable. It was assessed against progression for significance with a chi-square test.

Academic schools:

An analysis of performance across the academic schools was carried out. All the School's entry requirements are similar, and they accept students from a range of qualification types, their UCAS tariff requirements are the same except for engineering degree students who are required to have an A-level in mathematics or similar, but otherwise the entry requirements are the same. There is no hierarchy between the schools and consequently the factor is categorical and was subject to a chi-square test to evaluate significance against progression.

Commuter students:

The categories of Commuter students were derived from the Term Time Accommodation information and is categorical and therefore significance in the progression of students was assessed using a chi-square test.

3.6.2 Binary Logistical Regression

The second stage of methodology removes the assumption that all the factors are independent. There is a need to quantify the effect of several parameters in order to establish the probability of the outcome. Equation 1 is used to calculate the probability of the outcome, in this case it is the probability of passing, P(TRUE).

$$P(TRUE) = \frac{1}{1+ e^{-f(x)}} \quad \textit{Equation 1}$$

Where

$$f(x) = m_1x_1 + m_2x_2 + \cdots + m_nx_n + C \quad \textit{Equation 2}$$

"m" is the regression coefficient and x_i indicates the presence of the "n^{th}" variable.

For this analysis many of the variables are indicator variables (x_n), that is they are only zero or one. For example, they represent cases, "is someone from a BTEC background". Binary Logistic Regression in SPSS can be used to examine multiple variables to establish if cross causality exists.

Therefore, a Binary Logistical Regression analysis (BLR) was carried out. This method of analysis provides a mechanism to bring all the factors together to produce a model and an indication of the significance of the factors in this model, and hence the significance can be calculated for a particular binary factor of pass or fail.

UCAS Tariff:

This factor is recoded to produce a binary variable. It will now show two states, those students who have met the entry criteria, and those who have exceeded the entry criteria.

Qualification type:

This factor is a binary variable because during the first phase of the analysis two qualification types are considered. These are A-level and BTEC. The literature review raised the importance of the level 3 entry qualification type to the ultimate success of students.

GCSE mathematics grades:

For BLR this factor was recoded to provide two states. Students who meet the entrance criteria with a grade C and those who exceed it with a grade B or above.

Gender - Male and female students:

The self-declared values found in this dataset are binary and are recorded as male or female. At that time there was no option for a non-binary choice. It is a categorical factor and therefore a chi-square test will be used to evaluate this factor against progression

Students' parental higher education experience:

This factor has several values attributed to it: yes, no, not-known and not-provided. For BLR this was recoded. The first group contained students who had confirmed parental experience of higher education and the second group held the remaining students who were unable to confirm.

Social economic grouping:

This factor has six categories and is therefore identified as a categorical variable. The groupings used with the HESA UK PI data are classified as 1-3 (Higher SEC) and 4-7 (lower SEC). These two classifications of higher and lower will be used for the BLR tests.

Student Ethnicity

The values found in this factor are recorded as BAME or Non-BAME and is binary.

Academic schools:

An analysis of performance across the academic schools will be available after independence testing. Schools will be evaluated for size and progression to produce a binary variable based upon progression.

Commuter students:

The category of Commuter student is derived from the Term Time Accommodation information and is categorical. It can be coded into the two groups for those who commute from home and those who have a different term-time address.

3.7 Research Methods

Methods: the techniques or procedures used to gather and analyse data related to the research question or hypothesis.(Crotty, 1998, p. 3)

Secondary data has been identified, and initial examination of the dataset shows it to be quantitative, and hence a statistical analysis approach can be used. This approach is scientific and provides a measure of certainty when working with quantitative data using mathematical and probability-based techniques. The statistical tests are used to give a measure of confidence in the data and findings. Analysis techniques can be used to give a measure of the outcomes rather than relying upon impressions. The final output of the tests can be either tabulated or represented graphically. There are many software tools that can be used to aid the analysis and presentation of data. Microsoft Excel and SPSS were used in this analysis. These two tools were used because of their availability within the University Environment and my experience in using them. Excel was used for ordering and codifying the data and SPSS was used as the statistical analysis tool. There are many good reference books for the SPSS tool including Andy Field's "Discovering Statistics Using IBM SPSS Statistics" (Field, 2017).

A staged approach was used to analyse the data (Denscombe, 2014, p. 245).

1. Data preparation: During this stage the data coding took place. The dataset had been created for reporting to HEFCE, the coding was carried in accordance with the

reporting requirements. Additional information such as GCSE results were added through the use of Excel lookup functions.

2. Initial exploration of the data: Data exploration is a key activity in order to extract the knowledge from a data set even if you are unfamiliar with what you are looking for (Idreos et al., 2015). An examination of the data was carried out to look for trends. A review of data and data types was carried out. Classification of variables into categorical and ordinal data types was carried out to aid the selection of methods of analysis. The goal was to identify a relationship between PASS/FAIL and a student factor. A simplistic approach would assume that all the fields were independent. This was unlikely as students will have factors that are influenced by the choices that were available to them. For example, their GCSE grades may well dictate the type or number of level 3 qualifications that they undertake, they may be a commuter student who has a different view of going to university compared to those students who can or do choose to live on campus. There were 43 fields in the data set with many possibilities for the cross dependence between variables.

3. Analysis of the data: Logistic Regression is a technique that is used to create a model for dependent data, and to identify significant factors or variables (Field, 2017, p. 879; Gill, 2018). A variant of this is Binary Logistic Regression (BLR) that is used to consider a binary outcome such as pass/fail (Field, 2017, p. 891). It would be possible to pass all the data collected into a BLR modelling tool, however, concerns have been raised about too many parameters. Hence a range of statistical tests were used to reduce the number of independent variables, as these were needed to evaluate a range of independent variables that are linked to the research questions or hypotheses. In the case of this research Mann-Whitney and Chi-square significance testing was carried out to evaluate the findings (Field, 2017, pp. 286 & 838-839). Factor Analysis was used to establish correlation between the variables. (Field, 2017, p. 798). This provides insight into the significant relationships between the variables.

4. Presentation and display of the data: the results of the analysis stage are presented in tables with a written interpretation of the statistical findings and is presented in the discussion.

5. Validation of the data: the results were compared with external benchmarks such as national statistics. Other explanations were considered to look at alternative views of the findings and raise questions that may need further investigation.

Data Preparation

As previously discussed, the dataset for this research is secondary data. Therefore, much of the coding and categorisation of the data had already been carried out. The data was extracted from the University's student record system by members of BCU's Performance, Planning and Development (PPD) Team. PPD are responsible for the HESA return and therefore have access to all BCU's student data. The ethical considerations for this are provided previously in this thesis. The students agree that their data can be used for reporting and research purposes on enrolment. All data is anonymised. Five of the student records were chosen at random and manually checked to ensure consistency of the content of data.

Initial Exploration of the Data

The data set contains ordinal and categorical variables. The ordinal variables are UCAS tariff on entry and the GCSE grades. Examination of the nominal data for normality was carried out using SPSS to identify the mean value, and three standard deviations in both directions from the normal.

Tests of Normality

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
NUM_UCAS TARIFF on ENTRY	.126	447	.000	.940	447	.000

The Kolmogorov-Smirnov and the Shapiro-Wilk (Field, 2017, p. 248) tests both compare the sample to a normally distributed set of scores with the same mean and standard deviation. If the p value (Sig.) is greater than 0.05 ($p>0.05$) then the sample is not significantly different from a normal distribution. It indicates normality in the sample. However, in both tests on the data the score is $p<0.05$ and therefore doubt is cast on the normality of the data. Parametric tests are therefore not recommended. They can be evaluated with non-parametric tests. In this body of work the Mann-Whitney (Field, 2017, p. 290) test was used to evaluate the ordinal data. The remaining variables are all categorical (nominal) and therefore the non-parametric Pearson Chi-square (Field, 2017, pp. 838-852) test was used to assess this data.

Analysis of the data

In this section, the use of statistical tests and the link to the research questions and hypotheses are considered.

With such a large amount of data there is always the possibility to explore different relationships. In this research the questions stated within the Problem Statement are the focus of the data analysis undertaken and each of the statements is considered individually.

The dataset was inspected and produced in Table 3-2 CEBE Qualification Types to identify the qualification type, the number of students entering with these qualifications and their pass/fail year progression performance in absolute and percentage terms. It was essential that this analysis was carried out first to identify which were the major qualification types to be considered. Fourteen blank or Not known entries were found and these were excluded.

Qualifications	FAIL	Pass	FAIL%	Pass%	Total
ACCESS HE	4	13	24%	76%	17
BTEC AWARD	2	2	50%	50%	4
BTEC CERTIFICATE	3	4	43%	57%	5
BTEC DIPLOMA	84	146	36%	63%	221
DIPLOMA HE	0	4	0%	100%	4
FOUNDATION DEGREE	0	1	0%	100%	1
GCE A LEVELS	46	179	21%	80%	217
HNC	0	2	0%	100%	2
INTERNATIONAL BACCALAUREATE	2	2	50%	50%	4
MIXED ACADEMIC VOCATION LEVEL 3	17	39	30%	70%	56
NON EU BACHELORS DEGREE	0	2	0%	100%	2
NON UK LEVEL 3	1		100%	0%	1
UK BACCALAUREATE	0	1	0%	100%	1
UK BACHELORS DEGREE	0	1	0%	100%	1
UK LEVEL 3	10	18	36%	64%	28
UK LEVEL 5 (HND/C)	0	1	0%	100%	1
Grand Total	169	415	29%	71%	565

Table 3-2 CEBE Qualification Types

From inspection of Table 3-2, there are two main groups and one smaller group of qualification types found in the dataset:

- 38% of the cohort were found to have used GCE A-levels as their entrance qualification;
- 41% of the cohort were found to have used BTEC Diploma/Certificate/Award as their entrance qualification;

- the next largest group were “Mixed Academic Vocational Level 3” with 9.6% of the cohort presenting these qualifications.

Therefore, it was decided that the two largest groups, BTEC and A-Levels, would be evaluated in terms of their qualification group and grades achieved, and then compared with the percentage progression on the degree course. Therefore, the new dataset consists of 447 entries. There was a total of 217 students who entered with A-levels and the remaining 230 were BTEC students. The two groups of students were used for all of the statistical tests that were carried out in this thesis.

Academic factors

1. The students’ UCAS entry tariff and progression.

Firstly, an inspection of the dataset was carried out in order to establish the range of student entry qualifications. The type of qualification and the UCAS tariff were compared against the associated progression which could then be evaluated using an SPSS Mann-Whitney test to evaluate the hypothesis for this ordinal factor.

2. The qualification types and progression.

The calculation of overall progression for the two qualification types was quantified with pass/fail groups for each qualification type and a Chi-square test calculation was carried out using SPSS to evaluate significance with the dependent progression factor. The calculation was recorded and is presented in the results section.

3. The students’ GCSE Mathematics Grades and progression.

The UCAS A-level points were used following on from the progression versus UCAS entry tariff test. GCSE grades are ordinal, grade A is better than grade C, however the SPSS tool interprets the order of letters creating errors, for example the A* becomes a lower grade than the A, therefore to provide a measure of order the GCSE grades were enumerated.

GCSE Grade	Points*
A*	140
A	120
B	100
C	80
D	60
E	40

This too was compared with student progression information and an SPSS Mann-Whitney test was used to evaluate the hypothesis. The results were recorded.

Non-academic factors

4. Male and female students

Firstly, an inspection of the dataset was carried out. The male and female groups were identified. Progression rates for the gender groups was calculated and a Chi-square test calculated to evaluate the hypothesis. The results were recorded.

5. Students whose parents have and have not studied in Higher Education

An inspection of the dataset was carried out. The two groups, parent experience of HE" (HE=YES) and "no parent experience of HE" (HE=NO) were identified. The progression was then compared and calculated to evaluate the hypothesis. Following the calculation of overall progression for each group an SPSS Chi-square was used to provide a comparison of progression between the two groupings and to identify the level of significance.

6. Students from different socio-economic groupings

An inspection of the dataset was carried out. The socio-economic groups were identified and a calculation of overall progression in each group was carried out. Following the calculation

of overall progression for each group an SPSS Chi-square was used to provide a comparison of progression between the two groupings and to identify the level of significance.

7. Ethnicity

The ethnicity of these students is provided in Table 3-3 Ethnicity UK Only. Inspecting the table provides an overview of the extensive ethnic groups in the dataset. There is evidence that Black students appear to have low progression rates or high non-completion rates. Many of these groups are very small. It is questionable as to the value of any conclusions that can be drawn with statistical analysis for such small numbers, thus a decision was made to combine the data into two large groups of BAME and White: students. This is not ideal but does provide two large body of student groupings for further analysis see Table 3-4 Combined Ethnicity Dataset.

ETHNICITY UK Only	FAIL	PASS	Grand Total	Progression	%
Asian or Asian British - Bangladeshi	5	20	25	80%	5.6%
Asian or Asian British - Indian	17	50	67	75%	15.0%
Asian or Asian British - Pakistani	18	32	50	64%	11.2%
Black or Black British - African	18	11	29	38%	6.5%
Black or Black British - Caribbean	8	7	15	47%	3.4%
Chinese	1		1	0%	0.2%
Mixed - White & Asian	2	5	7	71%	1.6%
Mixed - White & Black African		2	2	100%	0.4%
Mixed - White & Black Caribbean	3	5	8	63%	1.8%
Not known	1		1	0%	0.2%
Other Asian background	4	11	15	73%	3.4%
Other Black background	2		2	0%	0.4%
Other Ethnic background		3	3	100%	0.7%
Other Mixed background	1	3	4	75%	0.9%
Prefer not to say	2	3	5	60%	1.1%
White	54	159	213	75%	47.7%
Grand Total	136	311	447	70%	100.0%

Table 3-3 Ethnicity UK Only

Ethnicity UK Only	FAIL	PASS	Grand Total	Progression
BAME	82	152	234	65%
Non-BAME ("White")	54	159	213	75%
Grand Total	136	311	447	70%

Table 3-4 Combined Ethnicity Dataset

A calculation of overall progression in each of the derived categorical groups was carried out. Following the calculation of overall progression, an SPSS Chi-square test was used to provide a comparison of progression between the two groupings and to identify the level of significance. The results were recorded.

8. Students in the CEBE Academic Schools

An inspection of the dataset was carried out. The students from each of the schools were identified and moved into their school groups. A calculation of overall progression in each group was carried out. Following the calculation of overall progression for each group an SPSS Chi-square was used to provide a comparison of progression between the two groupings and to identify the level of significance.

9. Students who live at home and can be classified as commuters.

An initial analysis of the term-time accommodation address data identified five categories that provide evidence of the student's home location are given in Table 3-5 Term-time Accommodation Information.

TERM TIME ACCOMMODATION	Commuter	FAIL	PASS	Grand Total
Own permanent home (rented/owned)	YES	4	5	9
Parents/Guardian	YES	60	15	214
Private Student Halls	NO	5	25	30
Short term rented accommodation	NO	13	10	23
University Halls	NO	54	117	171
Grand Total		**136**	**311**	**447**

Table 3-5 Term-time Accommodation Information

Some of the categories in the data set are easily classified:

- Commuting students:
    - Parents/Guardian and Own permanent home (rented/owned)
- Non-commuting students:
    - Private Student Halls, University Halls
- Short term rented accommodation: For the purposes of this initial analysis this has been added to the Non-commuting students' group. This is a small number of students, less than 5% of the cohort.

Table 3-6 Commuter Student Progression Table uses the above classification and provides the calculated progression for the groups. Following the calculation of overall progression for each group an SPSS Chi-square was used to provide a comparison of progression between the two groupings and to identify the level of significance.

Commuter	FAIL	PASS	Grand Total	Proportion	Progression
NO	72	152	224	50%	68%
YES	64	159	223	50%	71%
Grand Total	**136**	**311**	**447**	**100%**	**70%**

Table 3-6 Commuter Student Progression Table

Presentation and Display of the Data

The output of the research statements was reported using tables and graphs. Tables provide a summary of results making it possible to compare easily between the various investigations that have taken place in seeking to answer each of the NULL hypotheses and correlation. A discussion of each result was given to provide context to the results, see the next section "Validation of the data".

Validation of the data

In the following sections the results are analysed and compared with other findings and external benchmarks. A range of explanations are explored and discussed to consider possible views of the findings. This allows comparison with other datasets such as government and other published information from university websites.

In summary, a themed approach was applied to the final statistical tests carried out. The first group of statistical analyses that explore the data, assumed the data items were independent of each other, and the analysis of the selected data items was carried out on the categorical, numeric and ordinal data items separately. Hence each data item/group used the appropriate test when comparing their significance to the progression variable, which in this research is the ascribed or dependant variable. The tests used were Chi-squared for categorical variable and Mann-Whitney for the numeric and ordinal variables. This provided insight into the data and improved the understanding of the information contained within the data set.

The next set of statistical tests were used to evaluate the interdependency between the variables in order to identify the significance of all the variables together. Binary Logistic Regression was used for this. The same progression variable of pass/fail was used. Building the model using unadjusted variable comparisons. This staged approach individually evaluates the variables that have been converted into categorical data as required for the BLR method. This appears to be very similar to the independent variable testing, however, the reason for doing this is to ensure the variables are suitable for use in the next stage of the BLR process, the Adjusted BLR.

Once the Unadjusted tests have been completed, and have returned values of significance indicating their suitability for inclusion in the adjusted tests, all the variables are brought together and entered into the full Adjusted BLR test. The output is recorded and inspected to identify any significant variables.

The final set of results produced is the Factor Analysis. This identifies the strength of association between the variables or factors. This provides insight into the important variables particularly when there is a strong association identified between them.

In summary the factors from the data set to be explored are in Table 3-7 Data Items for the Initial exploration of the data.

Factor	Comment
Highest Entry Qual	BTEC/ A-Level - Categorical Data
Commuter Students	Yes/No Categorical Data
UCAS Tariff	UCAS Points Ordinal Data
GCSE Mathematics Grades	Ordinal Data
Academic School	Categorical Data
BAME	Categorical Data
GENDER	Categorical Data
Social Economic Groups	Categorical Data
PARENTAL HE Experience	Categorical Data

Table 3-7 Data Items for the Initial exploration of the data

4 Results

4.1 Exploring the Data: Two Factor Independence testing

In the first stage of the Data Analysis it is assumed that two factors are independent and therefore Chi-squared and Mann-Whitney tests were carried out to identify the existence of a significant association between the factors.

The first set of tests relate to level three qualifications. A comparison of the A-Level and BTEC progression performance and the UCAS Tariff Points vs Pass-Fail.

4.1.1 Mann-Whitney Test UCAS TARIFF vs Pass-Fail

SPSS was used to identify the presence of a significant relationship between the UCAS Tariff of students on entry and the factor Pass-Fail. The Ranks table can be found in Table 4-1 Mann-Whitney Ranks Table for UCAS Tariff and Pass-Fail.

Ranks

	Pass-Fail	N	Mean Rank	Sum of Ranks
UCAS TARIFF	Fail (0)	136	214.33	29148.50
	Pass (1)	311	228.23	70979.50
	Total	447		

Table 4-1 Mann-Whitney Ranks Table for UCAS Tariff and Pass-Fail

Test Statistics

	UCAS TARIFF
Mann-Whitney U	19832.500
Z	-1.050
Asymp. Sig. (2-tailed)	.294

Table 4-2 Mann-Whitney Test Statistics Results

4.1.1.1 PASS-FAIL and UCAS TARIFF Analysis Results

The Mann-Whitney Test Statistics Results, shown in Table 4-2, for independence indicated no significant association between NUM_UCASTARIFF And Pass-Fail at the 0.05 level of significance. The probability value (r) is 0.294.

The effect size is calculated to be -0.049 which is very small and well below the 0.3 criteria for a medium size effect.

4.1.2 Qualification Type vs Pass-Fail Chi-squared

An SPSS Chi-squared test was used to identify the presence of a significant relationship between Qualification Type of students on entry and the factor Pass-Fail. The cross tabulation table can be found in Table 4-3.

Qualification Type * Pass-Fail Cross tabulation

			Pass-Fail		Total
			FAIL	PASS	
Qualification Type	BTEC	Count	88	142	230
		Expected Count	70.0	160.0	230.0
	A-Level	Count	48	169	217
		Expected Count	66.0	151.0	217.0
Total		Count	136	311	447
		Expected Count	136.0	311.0	447.0

Table 4-3 Crosstabulation for Qualification Type and Pass-Fail

Qualification Type * Pass-Fail Results	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	13.742	1	.000
Continuity Correction	12.990	1	.000
Likelihood Ratio	13.909	1	.000
N of Valid Cases	447		

Table 4-4 Chi-squared Test Qualification Type and Pass-Fail Results

4.1.2.1 PASS-FAIL and Qualification Type Results

A chi-square test for independence indicated a significant association between Qualification Type and Pass-Fail at the 0.05 level of significance. A result of 0.000 was identified and can be found in Table 4-4 Chi-squared Test Qualification Type and Pass-Fail Results.

4.1.2.2 PASS-FAIL and Qualification Type and UCAS Tariff Discussion

This hypothesis sought to establish if there was a significance in the types of qualifications that students possessed when studying and their degree progression.

The NULL Hypothesis tested stated that the proportion of Pass/Fails would be the same for BTEC and A-Levels, and this has been rejected by the Chi-squared test. Figure 4-1 Progression Comparison BTEC and A-levels illustrates this significant difference. There is a gap in progression of at least 18% at 280-320 UCAS point equivalent to BBC (A-Levels) or DMM (BTEC). The BBC A-level students' progression performance is around 76%, BTEC students achieving a triple distinction (DDD) have a progression rate of 69%, whilst the A-level equivalent students have a progression rate of 90%.

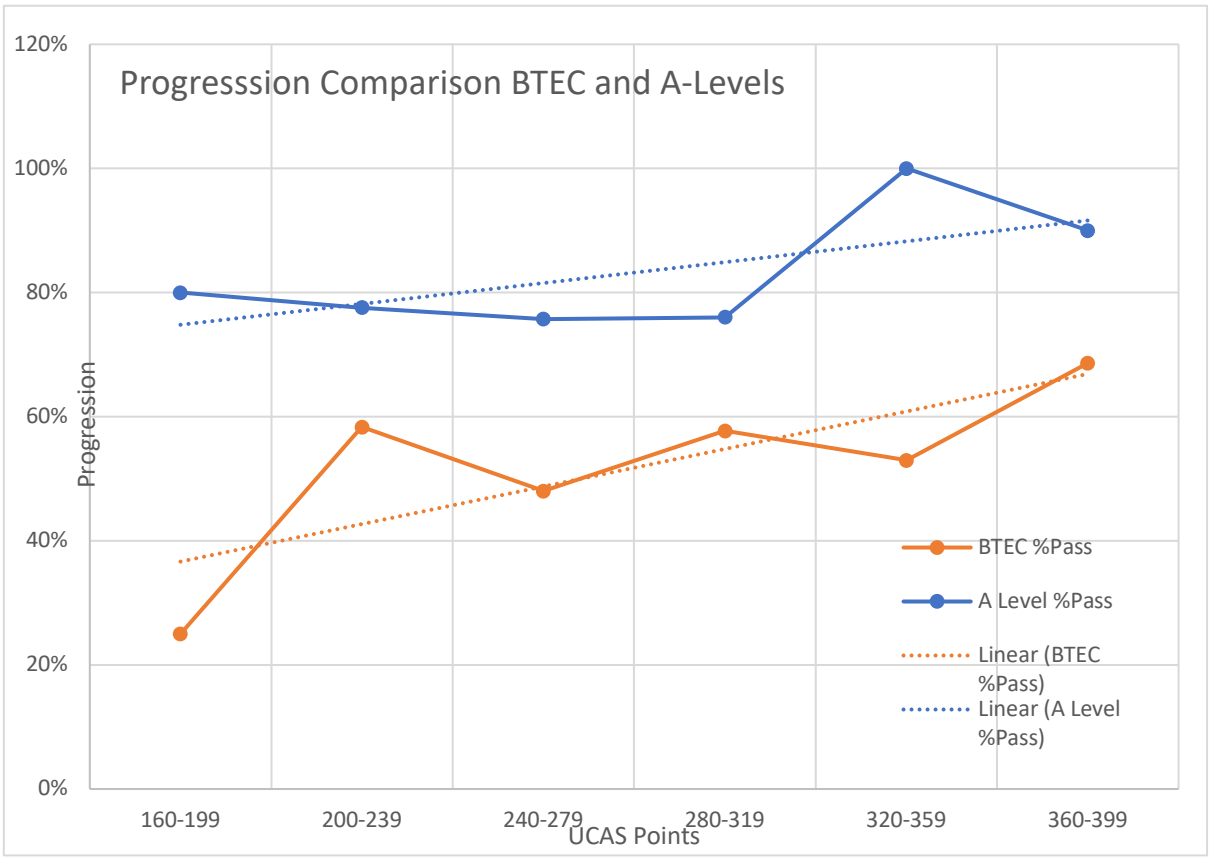

Figure 4-1 Progression Comparison BTEC and A-levels

When considering the equivalence of two qualification types, UCAS commissions qualification groups to evaluate and make recommendations on the allocation of UCAS points to the grading structure of the qualification. This is adopted and becomes part of the extensive database for the UCAS points tariff. In the case of the BTEC award structure (Ramshaw, 2010), this was carried out and became part of the UCAS points tariff in the following year.

The UCAS tariff is, of course, a very useful guide when setting entrance criteria. Many universities standardise their entry requirements by simply stating a tariff, for example 280 UCAS points. The candidate or applicant can then evaluate the likely UCAS tariff that they are expected to achieve against the entrance criteria for the University. However, in a brief survey of 14 UK University websites in September 2017 offering BSc (Hons) Computer Science, the tariff points requested for applicants presenting with A-level qualifications were not always the same as for BTEC applicants. In one case, BTEC students were required to achieve 420 UCAS points (D*D*D*) whereas A-level students were only required to achieve 320 UCAS

points (ABB). See Table 4-5 BSc (Hons) Computer Science entrance requirements (September 2017 for 2018 Entry).

Pre-Post '92	Name	A-level Grades	A-Level Points	BTEC Grades	BTEC Points	Difference	Note
Pre	University of Leicester	ABB	320	D*D*D*	420	100	
Pre	Cardiff University	AAB	340	D*D*D*	420	80	
Pre	Aston University	BBB	300	DDD	360	60	
Pre	Nottingham University	AAA	360	D*D*D*	420	60	
Pre	Brunel University	BBB	300	DDD	360	60	
Pre	University of Birmingham	AAA	360	D*D*A	400	40	A level Mathematics required
Post	Oxford Brookes University	BBC	280	DDM	320	40	
Pre	Loughborough University	AAB	340	D*DD	380	40	
Post	Nottingham Trent University	BBB	300	DDM	320	20	Not possible to have equivalent score
Post	Coventry University	ABB	320	DDM	320	0	
Post	University of Stafford	BBC	280	DMM	280	0	
Post	De Montfort University	BBC	280	DMM	280	0	
Post	Manchester Metropolitan University	BBC	280	DMM	280	0	
Post	Birmingham City University	BBC	280	DMM	280	0	

Table 4-5 BSc (Hons) Computer Science entrance requirements (September 2017 for 2018 Entry)

The table is sorted according to the difference in A-Level/BTEC points tariff requirements. At the top of the table all but one of the entries are pre-'92 universities in contrast to the lower half of the table where all but one are post-'92 universities. The Pre-'92 Universities require higher UCAS points from the BTEC students, indicting they have possibly observed a difference between the students, who came with BTEC and A-Levels, in accessing their courses. Universities have traditionally relied upon UCAS tariff points to provide a measure of equality between all qualifications. However, as demonstrated in the survey detailed in Table 4-5, universities do not always fully embrace the findings of the UCAS qualification groups.

Anecdotally, the Pre-'92 university sector courses require a high degree of independent study skills, and assessment is often biased towards examinations rather than coursework.

4.1.3 Mann-Whitney Test GCSE Maths vs Pass-Fail

A Mann-Whitney test was used to establish a significant relationship between the ordinal factor of GCSE Maths factor and Pass-Fail.

Ranks

	Pass-Fail	N	Mean Rank	Sum of Ranks
GCSE_Maths	Fail	136	192.49	26179.00
	Pass	311	237.78	73949.00
	Total	447		

Table 4-6 Mann-Whitney Ranks table for GCSE Maths and Pass-Fail

The Ranks Table 4-6 in was used to calculate Table 4-7 Mann-Whitney Test statistics for GCSE Maths and Pass-Fail results.

Test Statistics

	GCSE_Maths_cont
Mann-Whitney U	16863.000
Z	-3.604
Asymp. Sig. (2-tailed)	.000

Table 4-7 Mann-Whitney Test statistics for GCSE Maths and Pass-Fail

4.1.3.1 PASS-FAIL and GCSE Maths Analysis Results

A Mann-Whitney test for independence indicated a significant association between GCSE_Maths and Pass-Fail at the 0.05 level of significance. The probability value (p) is 0.000.

The effect size is calculated from:

$$Effect\ Size = \frac{Z}{\sqrt{N}}$$

to be -0.17. The sign indicates the direction of the effect. The absolute value of 0.17 effect is negative and indicates that the means are below the 0.2 criteria for a small sized effect.

4.1.3.2 PASS-FAIL and GCSE Maths Analysis Discussion

As demonstrated in the survey detailed in Table 4-5, universities do not always fully embrace the findings of the UCAS qualification groups. This can also be found in the acceptance of the International Baccalaureate UCAS tariff, where individual Universities have created their own de facto equivalence grading. Having identified that there is a difference in the preparation for higher education received by BTEC and A-level students through their studies, there is some commonality in the qualifications presented by nearly all students from England, Wales and Northern Ireland. Nearly all the students have studied GCSEs. The GCSE subjects are regulated by the national curriculum. Although there are different exam boards, the assessment of GCSEs has a large degree of uniformity and therefore GCSEs may provide some parity in the evaluation of student potential. Inter-board comparability of grade standards in GCSEs, AS and A levels is controlled by Ofqual (OFQUAL, 2018).

Looking into the dataset and extracting the GCSE results for the BTEC and the A-level students, a comparison of the GCSE mathematics grades can be found for qualification groups. This is shown graphically including polynomial curves in Figure 4-2.

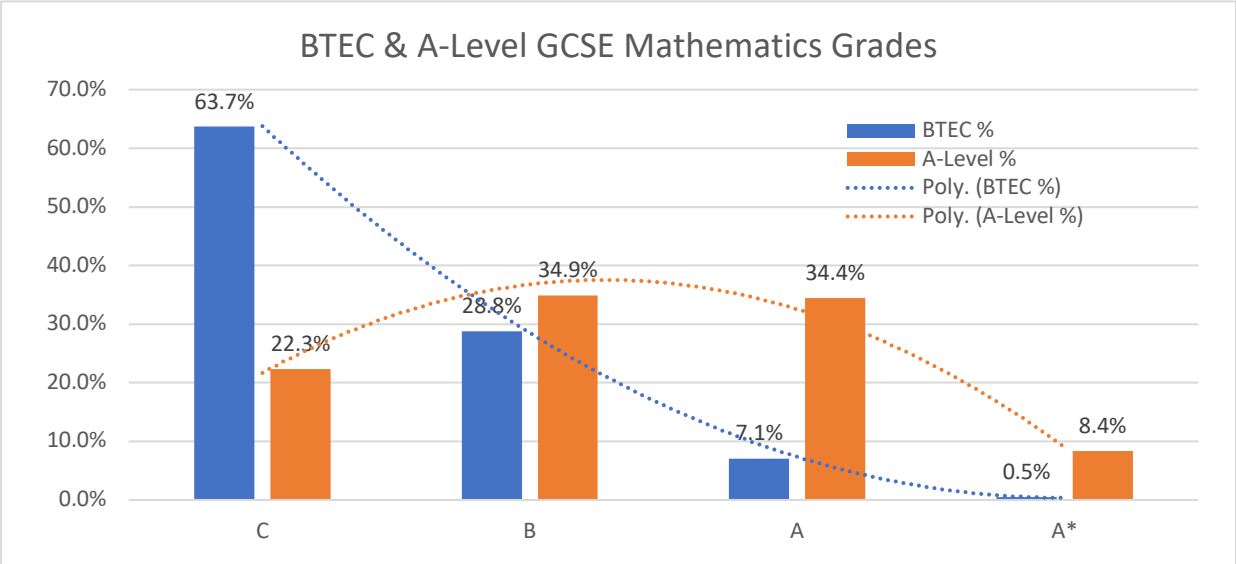

Figure 4-2 GCSE Mathematics grades for BTEC & A-level students

The two qualification groups are similar in size. There are 212 BTEC students and 215 A-level students. However, there is a noticeable difference in the spread of the grades across these groups. Inspection of the graph, shown in Figure 4-2 GCSE Mathematics grades for BTEC & A-level students, shows that 63.7% of BTEC students join with a grade C in GCSE mathematics compared with 22.3% of A-level students. It can be seen that 36.3% of BTEC students have exceeded the minimum entrance criteria, as compared to 77.7% of A-level students who have exceeded the minimum entry criteria of GCSE Mathematics grade C.

Examining the polynomial curves of the graph shown in Figure 4-2 GCSE Mathematics grades for BTEC & A-level students (Poly. %BTEC and Poly. %A-Levels) the A-level students are peaking at grade B, and the BTEC students appear to be peaking at or below grade C. Anecdotally, it has been reported by colleagues that when children are choosing between A-level or BTEC qualifications for sixth-form studies, they are receiving the following counselling: "If your GCSE grades are expected to be an average of grade B then you should consider A-levels, otherwise BTEC is a good option for you." There is a strong sense from the data that A-level students have better GCSE mathematics grades than BTEC students.

As the person currently responsible for student recruitment in the Faculty, I take account of the overall performance of students at GCSE level for borderline admissions decisions. In principle, when a student is presenting a reasonable "B-profile" at GCSE, it can sway the overall decision in their favour. Therefore, this research is supportive of the admissions practice of providing students with a good overall GCSE level of education the opportunity to progress into higher education.

4.1.4 GENDER vs Pass-Fail Chi-squared

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
GENDER * Pass-Fail	447	100.0%	0	0.0%	447	100.0%

GENDER * Pass-Fail Crosstabulation

			Pass-Fail		Total
			FAIL	PASS	
GENDER	F	Count	13[a]	44[a]	57
		Expected Count	17.3	39.7	57.0
	M	Count	123[a]	267[a]	390
		Expected Count	118.7	271.3	390.0
Total		Count	136	311	447
		Expected Count	136.0	311.0	447.0

Table 4-8 Chi-Square Crosstabulation for Gender and Pass-Fail

The cross tabulation in Table 4-8 was used to calculate Table 4-9 Chi-Square Test for Gender and Pass-Fail results.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.791[a]	1	.181		
Continuity Correction	1.402	1	.236		
Likelihood Ratio	1.877	1	.171		
Fisher's Exact Test				.218	.117
N of Valid Cases	447				

Table 4-9 Chi-Square Test for Gender and Pass-Fail

4.1.4.1 PASS-FAIL and GENDER Analysis Results

A chi-square test for independence (with Yates Continuity Correction) did not indicate a significant association between Gender and Pass-Fail at the 0.05 level of significance. Yates Continuity Correction = 0.236 was recorded.

4.1.4.2 PASS-FAIL and GENDER Discussion

The first item of note is that there are 57 female students out of a total 447.

GENDER	FAIL	PASS	Grand Total	Percentage	Progression
F	13	44	57	13%	77%
M	123	267	390	87%	68%
Grand Total	136	311	447	100%	70%

Table 4-10 Summary of Gender Population and Progression Data

This is approximately 13%, which is close to the national average of between 14% and 15%, see Figure 2-5 % Female by Subject Type (2013-14). With regard to the progression, the female students outperformed the male students 77% to 68% respectively. However, the hypothesis that the progression is the same for male and female students was tested and accepted in a chi-squared calculation. Devine and Frenzel, (Devine et al., 2012; Frenzel et al., 2007), have raised concerns that female students do not perform as well as male students where there are a large number of mathematics tests or exams as part of the assessment strategy. This variation in performance is not seen in these results, and agrees with the Office for Students data that females do perform better than males (Students, 2017a). Perhaps this is because the female students have come through a testing system, and their ability to cope with the TA and MA anxiety associated with mathematical and other testing regimes is strong, therefore they will be successful. Effectively female students have been selected through their schooling to be able to cope with STEM based subjects and the associated assessment strategies.

We have benefited from accreditation visits by engineering and technology institutions who measure the soundness of an assessment strategy by the proportion of examinations that exist in the programme. It is these same institutions that are concerned about the small proportion of women who have chosen careers in T&E based subjects. Further investigation is needed to understand the effect that an assessment strategy, that encourages exams or tests, is having upon those who might choose to study in T&E based subjects.

4.1.5 PARENTS' HE EXPERIENCE vs Pass-Fail Chi-squared

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
PARENTS' HE EXPERIENCE * Pass-Fail	447	100.0%	0	0.0%	447	100.0%

PARENTS' HE EXPERIENCE * Pass-Fail Crosstabulation

			Pass-Fail		Total
			FAIL	PASS	
PARENTS' HE EXPERIENCE	NO	Count	64	150	214
		Expected Count	65.1	148.9	214.0
	NOT PROVIDED	Count	3	5	8
		Expected Count	2.4	5.6	8.0
	UNKNOWN	Count	17	30	47
		Expected Count	14.3	32.7	47.0
	YES	Count	52	126	178
		Expected Count	54.2	123.8	178.0
Total		Count	136	311	447
		Expected Count	136.0	311.0	447.0

Table 4-11 Chi-Square Crosstabulation Parents HE Experience and Pass-Fail

The cross tabulation in Table 4-11 was used to calculate Table 4-12 Chi-Square Tests Parents HE Experience and Pass-Fail results.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.073[a]	3	.784
Likelihood Ratio	1.044	3	.791
N of Valid Cases	447		

a. 1 cells (12.5%) have expected count less than 5. The minimum expected count is 2.43.

Table 4-12 Chi-Square Tests Parents HE Experience and Pass-Fail

4.1.5.1 PASS-FAIL and Parents' HE Results

A chi-square test for independence indicated no significant association between Parents' HE and Pass-Fail at the 0.05 level of significance. Pearson Chi-Square = 0.784 was recorded.

4.1.5.2 PASS-FAIL and Parents' HE Discussion

This data was self-declared by students in the UCAS application process. Around 86% of applicants (516 from 598) declared their parental HE experience information. For the CEBE Faculty 56% of the 516 students stated that their parents had no previous experience of higher education.

The progression results for the 447 students in this data set shown in Table 4-13 Parents HE Experience Population and Progression indicate that that this is marginally true, with 71% of students with parental experience of higher education progressing at the first attempt, compared to 70% progression for those students who did not have parents who had previously been in higher education. This 1% difference accounts for 5 students progressing without needing to do reassessments.

PARENTS HE EXPERIENCE	FAIL	PASS	Total	Percentage	Progression
NO	64	150	214	48%	70%
NOT PROVIDED	3	5	8	2%	63%
UNKNOWN	17	30	47	11%	64%
YES	52	126	178	40%	71%
Grand Total	136	311	447	100%	70%

Table 4-13 Parents HE Experience Population and Progression

However, when the significance of this result was tested the results were not significant. The NULL hypothesis "there is no difference in the progression of students whose parents have and have not studied in higher education" was accepted in the chi-squared test.

In this study, the 1% difference in progression between the two groups of students and the acceptance of the NULL hypothesis by the chi-squared indicates that for this group of students the study programmes and support arrangements appear to be providing an equality of opportunity. A longitudinal survey of several cohorts could provide further insight into the progression of first-generation higher education students when compared to non-first-generation students.

4.1.6 Socio-economic Class vs Pass-Fail Chi-squared

An SPSS Chi-squared test was used to evaluate the NULL hypothesis that there is no difference in the progression of students form different Socio-Economic classes.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
NUM_SEClass * Pass-Fail	447	100.0%	0	0.0%	447	100.0%

The crosstabulation in Table 4-14 was used to calculate Table 4-15 Chi-Square Test Socio-economic class and Pass-Fail results.

NUM_SEClass * Pass-Fail Cross tabulation					
			Pass-Fail		
			FAIL	PASS	Total
NUM_SEClass	1	Count	14	52	66
		Expected Count	20.1	45.9	66.0
	2	Count	40	82	122
		Expected Count	37.1	84.9	122.0
	3	Count	11	26	37
		Expected Count	11.3	25.7	37.0
	4	Count	20	32	52
		Expected Count	15.8	36.2	52.0
	5	Count	5	13	18
		Expected Count	5.5	12.5	18.0
	6	Count	31	70	101
		Expected Count	30.7	70.3	101.0
	7	Count	15	36	51
		Expected Count	15.5	35.5	51.0
Total		Count	136	311	447
		Expected Count	136.0	311.0	447.0

Table 4-14 Chi-Square Cross tabulation Socio-economic class and Pass-Fail

4.1.6.1 PASS-FAIL and Socio-economic Class Results

A chi-square test for independence indicated no significant association between Socio-economic Class and Pass-Fail at the 0.05 level of significance. Pearson Chi-Square = 0.589 was recorded.

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	4.651[a]	6	.589
Likelihood Ratio	4.768	6	.574
N of Valid Cases	447		
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.48.			

Table 4-15 Chi-Square Test Socio-economic class and Pass-Fail

4.1.6.2 PASS-FAIL and Socio-economic Class Analysis Discussion

The pie chart below, Figure 4-3 Socio Economic Classification CEBE Students, illustrates the breakdown by SEC. As can be seen 51% of the cohort are from the social groups 4, 5, 6 and 7, while 49% are from social groups 1, 2, and 3. Figure 4-4 CEBE Overall Progression by Socio-Economic Classification provides a breakdown of progression across the SEC.

The overall average for progression of all students is 71%.

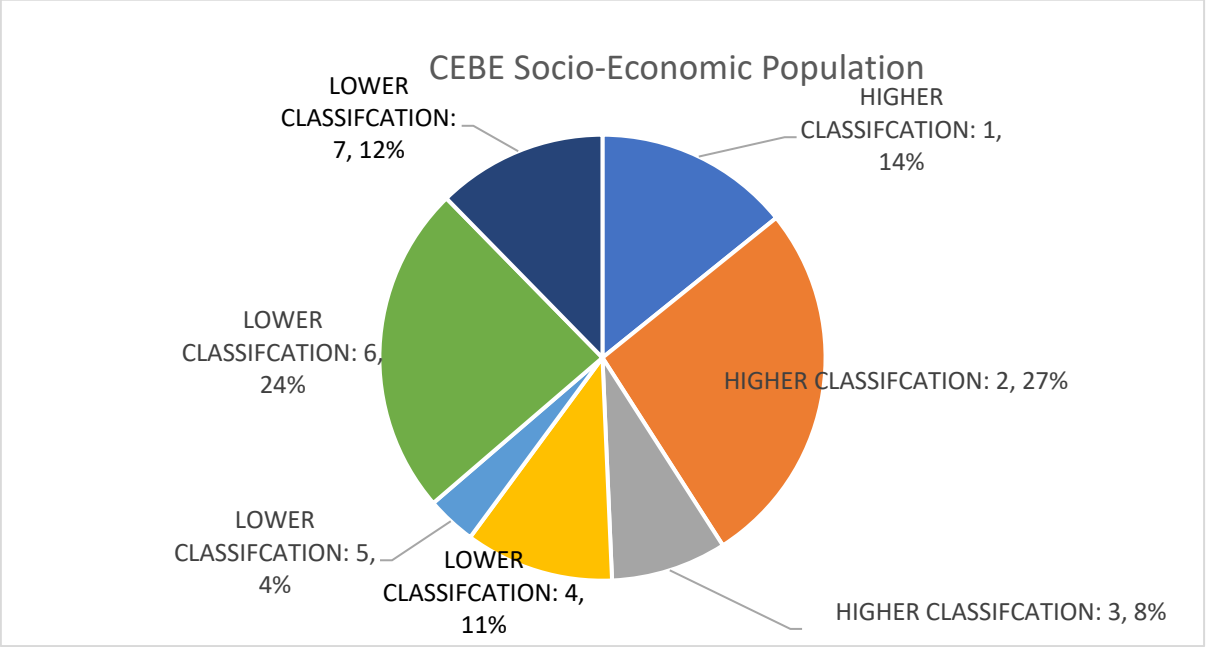

Figure 4-3 Socio Economic Classification CEBE Students 2014-15

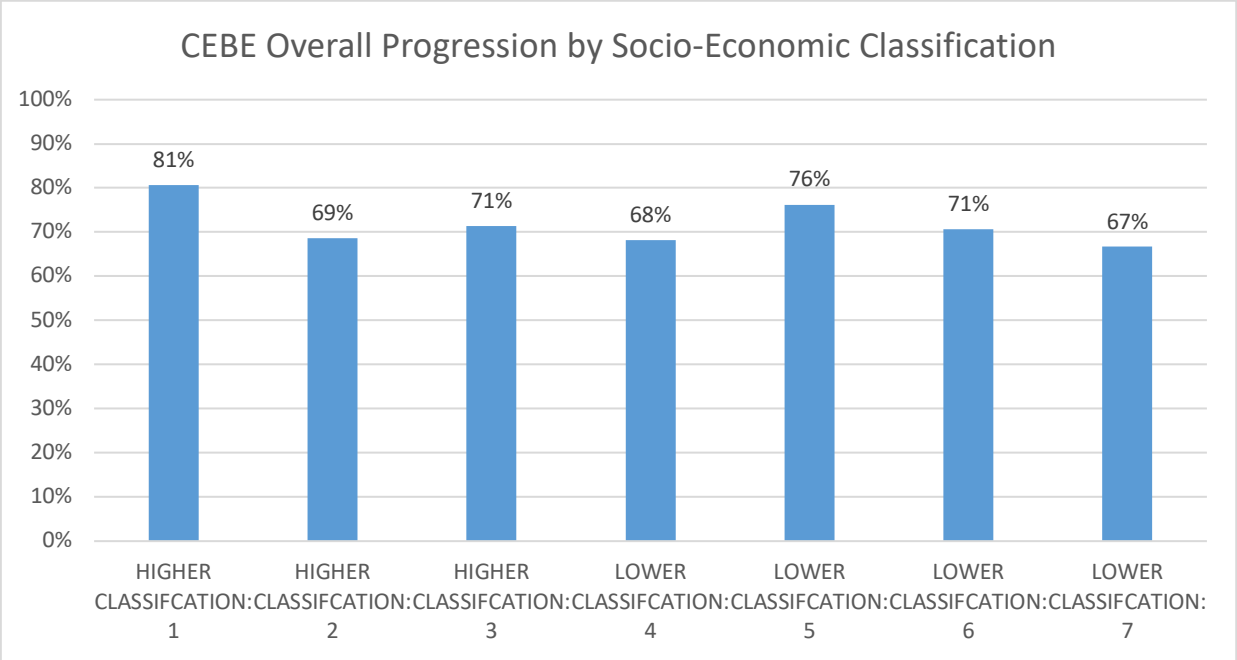

Figure 4-4 CEBE Overall Progression by Socio-Economic Classification

Delving further into the data, Table 4-16 shows the qualification type and progression by socio-economic classification

Socio-Economic Group	% Socio-Economic A-Level Population	% Socio-Economic BTEC Population	A-Level Progression	BTEC Progression
HIGHER CLASSIFCATION: 1	20.4%	10.8%	82.6%	76.9%
HIGHER CLASSIFCATION: 2	26.7%	27.4%	75.0%	62.1%
HIGHER CLASSIFCATION: 3	7.1%	9.1%	81.3%	63.6%
LOWER CLASSIFCATION: 4	9.8%	12.4%	86.4%	46.7%
LOWER CLASSIFCATION: 5	4.9%	2.5%	72.7%	83.3%
LOWER CLASSIFCATION: 6	21.8%	23.7%	75.5%	66.7%
LOWER CLASSIFCATION: 7	9.3%	14.1%	90.5%	58.8%

Table 4-16 Qualification Type and Progression by Socio-Economic Classification

As previously indicated, since starting this research HESA has changed the reporting mechanisms for socio-economic classification. Nevertheless, there is still some useful information that may be examined. As previously reported, in this thesis, CEBE has 51% of students in the lower classifications (4 – 7). The HESA data is reporting 49.7%. This discrepancy may well be explained by the completion rate of the information and rounding errors. Table 2-5 SEC Groups 4-7 on page 35 shows UK sector, BCU, and CEBE information for "Young Full-Time Undergraduate Entrants: % From SEC Groups 4-7". In 2014/15, the UK sector partition rate for HE showed that 33.4% of UG Entrants came from groups 4-7, the BCU participation rate was 47.2% and CEBE 49.7%. Both figures are clearly higher than the UK sector and indicate that BCU and CEBE exceed the UK sector for widening participation.

4.1.6.3 *Exploring the Socio-economic class for BTEC qualifications.*

A chi-square test for independence indicated no significant association between Socio-economic Class and Pass-Fail at the 0.05 level of significance. Pearson Chi-Square = 0.776 was recorded. These tests can be found in Table 4-17 and Table 4-18. It should be noted that there are 14.3% of the cells with an expected count of less than 5. This normally gives some cause for concern however the Pearson Chi-square is 0.397 and not significant at the 0.05 level.

Pass-Fail * SOCIOECONOMICCLASS BTEC Crosstabulation									
			SOCIOECONOMICCLASS BTEC						
			H: 1	H: 2	H: 3	L: 4	L: 5	L: 6	L: 7	Total
Pass-Fail	FAIL	Count	6	24	8	16	2	19	13	88
		Expected Count	9.6	23.7	8.0	11.1	2.7	20.7	12.2	88.0
	PASS	Count	19	38	13	13	5	35	19	142
		Expected Count	15.4	38.3	13.0	17.9	4.3	33.3	19.8	142.0
Total		Count	25	62	21	29	7	54	32	230
		Expected Count	25.0	62.0	21.0	29.0	7.0	54.0	32.0	230.0

Table 4-17 Chi-Squared Crosstabulation for Socio-economic groups and BTEC

Chi-Square results			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	6.239[a]	6	.397
Likelihood Ratio	6.280	6	.393
N of Valid Cases	230		
a. 2 cells (14.3%) have expected count less than 5. The minimum expected count is 2.68.			

Table 4-18 Chi-squared Results for Socio-economic groups and BTEC

4.1.6.4 Exploring the Socio-economic class for A-Level qualifications.

A chi-square test for independence indicated no significant association between Socio-economic Class and Pass-Fail at the 0.05 level of significance. Pearson Chi-Square = 0.776 was recorded. These tests can be found in Table 4-19 and Table 4-20. It should be noted that there are 21% of the cells with an expected count of less than 5. This normally gives some cause for concern however the Pearson Chi-square is 0.776 and not significant at the 0.05 level.

Pass-Fail * SOCIOECONOMICCLASS A-Level Crosstabulation									
			SOCIOECONOMICCLASS AL						
			H: 1	H: 2	H: 3	L: 4	L: 5	L: 6	L: 7	Total
Pass-Fail	FAIL	Count	8	16	3	4	3	12	2	48
		Expected Count	9.1	13.3	3.5	5.1	2.4	10.4	4.2	48.0
	PASS	Count	33	44	13	19	8	35	17	169
		Expected Count	31.9	46.7	12.5	17.9	8.6	36.6	14.8	169.0
Total		Count	41	60	16	23	11	47	19	217
		Expected Count	41.0	60.0	16.0	23.0	11.0	47.0	19.0	217.0

Table 4-19 Chi-Squared Crosstabulation for Socio-economic groups and A-levels

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	3.255[a]	6	.776
Likelihood Ratio	3.496	6	.744
N of Valid Cases	217		
a. 3 cells (21.4%) have expected count less than 5. The minimum expected count is 2.43.			

Table 4-20 Chi-squared Results for Socio-economic groups and A-levels

Chi-squared tests for A-levels and BTEC qualifications show that the proportion of Pass/Fails is the same for all Social Economic Classes for each of the qualification groups considered, and therefore the NULL Hypothesis was accepted.

From the data explored in this research there are no significant differences in progression between the socio-economic groups of the students. For the widening participation agenda, this is a very welcome outcome. Students in the lower socio-economic groups, SEC 4-7, are not being disadvantaged in progressing through their studies. This implies that the support being offered by the University is appropriate to the needs of students from across all the socio-economic groups recruited to the faculty.

The examination of the socio-economic groups provides some interesting information when the groups are split by their qualification type, Table 4-16 Qualification Type and Progression by Socio-Economic Classification provides this information. For A-level students, the three largest populations are in SEC groups one, two and four, with at least 20% of the cohort represented in each group. However, these are not the groups with the highest progression. The highest progression rate of the entire table comes to the A-level students coming from the lowest SEC group with 90.5% of the students progressing to the next year of their studies at the first attempt see Table 4-16.

The new POLAR4 classification should be seen as an opportunity for further investigation into the relationship of students' home background and their access to higher education opportunities.

4.1.7 PASS-FAIL Vs BAME Chi-squared

An SPSS Chi-squared test was used to evaluate the NULL hypothesis that there is no difference in the progression of BAME and NON-BAME students.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
BAME * Pass-Fail	447	100.0%	0	0.0%	447	100.0%

BAME * Pass-Fail Cross tabulation					
			Pass-Fail		Total
			FAIL	PASS	
BAME	BAME	Count	82	152	234
		Expected Count	71.2	162.8	234.0
	NON BAME	Count	54	159	213
		Expected Count	64.8	148.2	213.0
Total		Count	136	311	447
		Expected Count	136.0	311.0	447.0

Table 4-21 Chi-Squared Crosstabulation for BAME and Pass-Fail

The cross tabulation from this test is shown in Table 4-21 was used to produce Table 4-22 Chi-Square Tests BAME and Pass-Fail results.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.947[a]	1	.026
Continuity Correction	4.499	1	.034
N of Valid Cases	447		

Table 4-22 Chi-Square Tests BAME and Pass-Fail

4.1.7.1 PASS-FAIL and BAME Analysis Results

A chi-square test for independence (with Yates Continuity Correction) indicated a significant association between BAME and Pass-Fail at the 0.05 level of significance. Yates Continuity Correction = 0.034 was recorded. Hence the NULL -hypothesis is rejected. See Table 4-22.

4.1.7.2 PASS-FAIL and BAME Analysis Discussion

Examination of the difference between ethnic groups in terms of recruitment and retention is provided in the dataset.

Ethnicity in England was last recorded in the 2011 Census and BAME accounted for 20.2% of the population. In Birmingham, BAME accounted for 46.8% of the population. This had increased from 34.3% in 2001.[6] BCU benefits from a large population of locally based students. In the dataset 53% of the students have classified themselves as part of the BAME group. This is higher than the above figures and indicates that there is a strong ethnic diversity in the faculty. The University is clearly, in recruitment terms, demonstrating Ethnic inclusivity with regard to the Equality Duty as required in the 2010 Equality Act.

However, the progression rates for the BAME grouping was 65% progression with 35% non-completion. Whereas the non-BAME students had a progression rate of 75%.

[6] https://www.birmingham.gov.uk/downloads/file/9741/2018_ks201_ethnic_group

4.1.8 Academic School vs Pass-Fail Chi-squared

An SPSS Chi-squared test was used to evaluate a NULL hypothesis that there is no difference in the progression of students from different academic schools.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
ACADEMIC SCHOOL * Pass-Fail	447	100.0%	0	0.0%	447	100.0%

ACADEMICSCHOOL * Pass-Fail Crosstabulation					
			Pass-Fail		Total
			FAIL	PASS	
ACADEMIC SCHOOL	Birmingham School of the Built Environment	Count	12$_a$	22$_a$	34
		Expected Count	10.3	23.7	34.0
	School of Computing, Telecommunications and Networks	Count	78$_a$	135$_b$	213
		Expected Count	64.8	148.2	213.0
	School of Digital Media Technology	Count	29$_a$	93$_a$	122
		Expected Count	37.1	84.9	122.0
	School of Engineering Design and Manufacturing Systems	Count	17$_a$	61$_a$	78
		Expected Count	23.7	54.3	78.0
Total		Count	136	311	447
		Expected Count	136.0	311.0	447.0

Table 4-23 Chi-squared Table for Academic School and Pass-Fail

The cross tabulation from this test is shown in Table 4-23 was used to produce Table 4-24 Chi-squared Tests for Academic School and Pass-Fail results.

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.539[a]	3	.023
Likelihood Ratio	9.700	3	.021
N of Valid Cases	447		

Table 4-24 Chi-squared Tests for Academic School and Pass-Fail

4.1.8.1 PASS-FAIL and Academic School Analysis Results

A chi-square test for independence indicated a significant association between Academic School and Pass-Fail at the 0.05 level of significance. Pearson Chi-Square = 0.023 was recorded. The Null hypothesis is therefore rejected.

4.1.8.2 PASS-FAIL and Academic School Analysis Discussion

The significant result of the chi-squared test suggests that there are differences in progression rates between the schools related to the schools themselves. Table 4-25 presents the progression rates for each of the schools. It is worthy of note that two schools have similarly low progression and two have similarly high progression. The Birmingham School of the Built Environment (BSBE) has relatively small numbers contained in a dataset with only 34 students and an overall progression of 65%. The School of Computing, Telecommunications and Networks (CTN) is the largest having 213 students in the dataset and an overall progression of 63%. The remaining two schools are larger than the BSBE but smaller than CTN and have better progression of more than 76%. It raises the question that BSBE, with less than 10% of the dataset, could be distorting the progression calculations.

ACADEMICSCHOOL	Grand Total	Progression
Birmingham School of the Built Environment	34	65%
School of Computing, Telecommunications and Networks	213	63%
School of Digital Media Technology	122	76%
School of Engineering Design and Manufacturing Systems	78	78%
Grand Total	447	70%

Table 4-25 School Progression

Looking further into the data for each school may reveal some insight as to why there is different progression. The following tables present breakdown for qualification types, ethnicity and GCSE qualifications.

The breakdown qualification types by school is shown in Table 4-26. The standout feature is that CTN has the largest proportion of BTEC students with 63%. EDMS and DMT have higher proportions of A-level students and also have the best progression. Although BSBE has a higher proportion of A-level students, which is similar to DMT, it has relatively small numbers which may be causing anomalies.

ACADEMICSCHOOL	Qualification	Total	Percentage
Birmingham School of the Built Environment (BSBE)	BTEC	15	44%
	A-LEVEL	19	56%
School of Computing, Telecommunications and Networks (CTN)	BTEC	135	63%
	A-LEVEL	78	37%
School of Digital Media Technology (DMT)	BTEC	55	45%
	A-LEVEL	67	55%
School of Engineering Design and Manufacturing Systems (EDMS)	BTEC	25	32%
	A-LEVEL	53	68%
Grand Total		447	

Table 4-26 School Qualification Type

The breakdown of ethnicity by school is given in Table 4-27. The standout feature is that, with the exception of DMT, all of the schools have at least 59% are BAME students, whereas DMT has only 28% BAME. During recent years I have observed a show of hands, during induction sessions, that have indicated that a large proportion of DMT students are from outside Birmingham. The 2011 Census data for Birmingham indicates BAME makes up 46.8% of Birmingham's population (Council, 2018). The DMT figure for BAME is closer to the recorded figure of 20.2% for England, Table 4-28 Population Ethnicity 2011 Census.

ACADEMIC SCHOOL	BAME	Total	Percentage
Birmingham School of the Built Environment (BSBE)	BAME	23	68%
	NON BAME	11	32%
School of Computing, Telecommunications and Networks (CTN)	BAME	126	59%
	NON BAME	87	41%
School of Digital Media Technology (DMT)	BAME	34	28%
	NON BAME	88	72%
School of Engineering Design and Manufacturing Systems (EDMS)	BAME	51	65%
	NON BAME	27	35%
Grand Total		447	

Table 4-27 School Ethnicity

Ethnic group	Birmingham 2011 %	Birmingham 2011	England 2011 %	England 2011
White British	53.1%	570,217	79.8%	42,279,236
BAME	46.8%	502,828	20.2%	10,733,220
Total	100	1073045	100	53012456

Table 4-28 Population Ethnicity 2011 Census

The breakdown of GCSE mathematics grades by school is given Table 4-29 School GCSE Grades. The standout feature is that DMT and EDMS which have the higher progression rates also have higher proportions of GCSE A and A* students.

ACADEMIC SCHOOL	GCSE Maths Grades	Total	Percentage
Birmingham School of the Built Environment (BSBE)	A* & A	4	12%
	B	14	41%
	C	14	41%
	D	2	6%
School of Computing, Telecommunications and Networks (CTN)	A* & A	36	17%
	B	60	28%
	C	103	48%
	D	10	5%
	E	4	2%
School of Digital Media Technology (DMT)	A* & A	33	27%
	B	37	30%
	C	49	40%
	D	3	2%
School of Engineering Design and Manufacturing Systems (EDMS)	A* & A	35	45%
	B	25	32%
	C	17	22%
	D	1	1%
Grand Total		447	

Table 4-29 School GCSE Grades

4.1.9 Commuter Vs Pass-Fail Chi-square

An SPSS Chi-squared test was used to evaluate a NULL hypothesis that there is a difference in the progression rate between Commuter and Non-commuting students.

The term-time accommodation entries are given below in Table 4-30 Term-time Accommodation Information. For the purposes of this analysis the categories in the data set has been allocated as follows:

- Commuting students:
    - Parents/Guardian and Own permanent home (rented/owned)
- Non-commuting students:
    - Private Student Halls, University Halls, Short term rented accommodation

		Pass-Fail		
TERMTIMEACCOMMODATION	Commuter	FAIL	PASS	Grand Total
Own permanent home (rented/owned)	YES	4	5	9
Parents/Guardian	YES	60	154	214
Private Student Halls	NO	5	25	30
Short term rented accommodation	NO	13	10	23
University Halls	NO	54	117	171
Grand Total		136	311	447

Table 4-30 Term-time Accommodation Information

Commuting students make up 50% of the dataset and their progression is 71%. This is three percent higher than the non-commuting students. See Table 4-31.

Commuter	FAIL	PASS	Grand Total	Percentage	Progression
NO	72	152	224	50%	68%
YES	64	159	223	50%	71%
Grand Total	136	311	447	100%	70%

Table 4-31 Commuting Students Percentage and Progression Information

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Pass-Fail * Commuter	447	100.0%	0	0.0%	447	100.0%

Pass-Fail * Commuter Crosstabulation

			Commuter		Total
			0 (NO)	1 (YES)	
Pass-Fail	FAIL	Count	72	64	136
		Expected Count	68.2	67.8	136.0
	PASS	Count	152	159	311
		Expected Count	155.8	155.2	311.0
Total		Count	224	223	447
		Expected Count	224.0	223.0	447.0

Table 4-32 Chi-squared Table for Commuter and Pass-Fail

The crosstabulation from this test is shown in Table 4-32 was used to produce Table 4-33 results.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.626[a]	1	.429
Continuity Correction	.474	1	.491
Likelihood Ratio	.626	1	.429
N of Valid Cases	447		

Table 4-33 Chi-Square Tests Commuters and Pass-Fail

4.1.9.1 PASS-FAIL and Commuter Analysis Results

A chi-square test for independence (see Table 4-32 Chi-squared Table for Commuter and Pass-Fail) indicated no significant association between Commuter/Non-commuter and Pass-Fail at the 0.05 level of significance. Pearson Chi-Square = 0.429 and the Yates Continuity Correction = 0.491 were recorded. The Null-hypothesis is therefore rejected.

4.1.9.2 PASS-FAIL and Commuter Analysis Discussion

The results show there is no significant difference between the two groups, being a commuter or non-commuter student has no effect on progression rates.

4.1.10 Significant factors identified for the PASS-FAIL factor.

In summary, the independent significant factors found in the above analyses, that assumes the independence of the variables, are given in Table 4-34 Significant Association to PASS-FAIL.

Independent Test	Factor	Probability Value
Chi-squared	BAME	0.034
Chi-squared	Academic School Name	0.023
Chi-squared	NUM_QualNumber	0.000
Mann-Whitney	GCSE_Maths_cont	0.000

Table 4-34 Significant Association to PASS-FAIL

4.1.11 Factor Dependency.

All the factors in Table 4-34 show a significant association with the Pass-Fail factor. The tests carried out assume independence of the factors, but it is necessary to question whether there is cross causality between some or all of the factors. This has been suggested in discussions presented with the bi-variate tests. The next part of the thesis explores the possibility of dependence between the factors through Binary Logistic Regression (BLR).

4.2 Binary Logistic Regression (BLR) Testing

The previous tests carried out in section 4.1,"Exploring the Data: Two Factor Independence testing", assume the independence of the factors, but what if there is cross-causality between some or all of the factors. Using BLR it is possible to quantify the effect of combining factors in order to establish the probability of the outcome. (Field, 2017, p. 891)

The Independence Tests have shown a significant association with certain factors to the Pass-Fail factor. In the BLR results below, "Unadjusted" means independent model building and "Adjusted" means other factors are included in the modelling.

The dependent factors to be considered are all categorical except for the UCAS entry Tariff and the GCSE grades which are ordinal. The categorical factors were evaluated using Chi-Squared tests and the ordinal factors were evaluated with a Mann-Whitney test. To aid the BLR processing, the ordinal factors were converted into categorical factors by creating two population groups, those who exceeded the entry requirements and those that did not. This led to the following:

- The UCAS points tariff factor places those in the exceeded (High) group as having at least 320 UCAS points. The 320 points was chosen as the tariff that BTEC and A-level students will have met or exceeded the entry criteria for degree. Foundation engineering students have also been included here as beating the entry requirement for their course.
- The GCSE Mathematics group had a similar split, with students who achieved at least a grade B categorized as being in the High group having exceeded the entrance requirement of C.

For a full list of the BLR variable factors, see Table 4-35 BLR Variables-Factors

BLR Factor-Variables	Comment
Highest Entry Qual	BTEC/ A-Level
Commuter N/Y	Yes/No
UCAS H-L	320 UCAS Points for degree students or more is high.
GCSE Maths High Low	High-grade is B and above.
CTN	CTN School/NO
BAME	Yes/No
GENDER	Male/Female
SEHIGHLOW	SEHIGH SELOW
PARENT.HE.YN	No /Yes

Table 4-35 BLR Variables-Factors

The factors were redefined to produce binary factors, that is two possible states, for example, being equal to the entrance requirement or exceeding it. There are two stages to the BLR testing. Firstly, the BLR Unadjusted test compares the new binary factors individually with pass-fail, replicating the bi-variate analysis previously carried out. This is essential to ensure that the variables are suitable for inclusion in the Adjusted BLR analysis. BLR tools, such as SPSS, build a model from the variables and thus it is important that the variables are within scope. Secondly, all the factors are brought together to produce the Adjusted BLR test and results.

4.2.1 BLR UNADJUSTED ANALYSIS PASS-FAIL and UCAS Tariff High and Low

We should recall that standard entry requirement was 280-320 UCAS Points. Therefore, the High Tariff group had met or exceeded the entry criteria. The coding information for this variable can be found in Table 4-36 UCAS Tariff High and Low Categorical Variables Codings.

Categorical Variables Codings[a]			
		Frequency	Parameter coding (1)
UCAS H-L	High	182	1.000
	Low	265	.000
a. This coding results in indicator coefficients.			

Table 4-36 UCAS Tariff High and Low Categorical Variables Codings

4.2.1.1 BLR Unadjusted Analysis PASS-FAIL and UCAS Tariff High and Low Results

The results of the BLR Unadjusted Analysis is given in Table 4-37 UCAS H-L Variables in the Equation.

Variables in the Equation						
		B	S.E.	Sig.	95% C.I.for EXP(B)	
					Lower	Upper
Step 1[a]	UCAS H-L(1)	0.283	0.212	0.183	0.875	2.011
	Constant	0.716	0.131	0.000		
a. Variable(s) entered on step 1: UCAS H-L.						

Table 4-37 UCAS H-L Variables in the Equation

4.2.1.2 BLR Unadjusted Analysis PASS-FAIL and UCAS Tariff High and Low Results Discussion

The unadjusted result shows the UCAS Tariff High and Low was not a significant factor with Pass-Fail having an association of 0.183 at the 0.05 level of significance. This is consistent with the Mann-Whitney test in section 4.1.1 on page 91.

4.2.2 BLR UNADJUSTED ANALYSIS Testing QUALIFICATION TYPE VS PASS-FAIL CHI-SQUARE

The coding for this qualification types specifies BTEC and A-Level (GCE A).

Categorical Variables Codings			
		Frequency	Parameter coding (1)
Highest Entry Qual	BTEC	230	1.000
	GCE A	217	.000

Table 4-38 Highest Entry Qualification Categorical Variable Coding

4.2.2.1 BLR UNADJUSTED ANALYSIS PASS-FAIL and Qualification Type Results

Variables in the Equation						
		B	S.E.	Sig.	95% C.I.for EXP(B)	
					Lower	Upper
Step 1[a]	NUM_QualNumber BTEC	-0.78	0.213	0.000	0.302	0.695
	Constant	1.259	0.164	0.000		
a. Variable(s) entered on step 1: NUM_QualNumber.						

Table 4-39 Variables in the Equation Qualification Type

The unadjusted result shown in Table 4-39 Variables in the Equation Qualification Type identifies the Qualification Type to be a significant factor with a significant association of 0.000 with Pass-Fail at the 0.05 level of significance. This is consistent with the Chi -squared test in section 4.1.2 on page 92.

4.2.3 BLR UNADJUSTED ANALYSIS GCSE Maths vs Pass-Fail

An analysis of the GCSE mathematics grades was carried out and the coding is shown in Table 4-40 Categorical Variable Coding for GCSE Maths Grades.

Categorical Variables Codings[a]							
			Parameter coding				
		Frequency	(1)	(2)	(3)	(4)	(5)
GCSEMathsGrades	A	90	1.000	.000	.000	.000	.000
	A*	18	.000	1.000	.000	.000	.000
	B	136	.000	.000	1.000	.000	.000
	C	183	.000	.000	.000	1.000	.000
	D	16	.000	.000	.000	.000	1.000
	E	4	.000	.000	.000	.000	.000
a. This coding results in indicator coefficients.							

Table 4-40 Categorical Variable Coding for GCSE Maths Grades

4.2.3.1 BLR UNADJUSTED ANALYSIS GCSE Maths vs Pass-Fail Results

Variables in the Equation						
		B	S.E.	Sig.	95% C.I.for EXP(B)	
					Lower	Upper
Step 1[a]	GCSEMathsGrades			0.01		
	GCSEMathsGrades(1)	1.128	1.03	0.273	0.411	23.255
	GCSEMathsGrades(2)	1.609	1.183	0.174	0.492	50.831
	GCSEMathsGrades(3)	1.179	1.02	0.248	0.44	24.005
	GCSEMathsGrades(4)	0.525	1.012	0.603	0.233	12.283
	GCSEMathsGrades(5)	-0.251	1.12	0.822	0.087	6.983
	Constant	0	1	1		
a. Variable(s) entered on step 1: GCSEMathsGrades.						

Table 4-41 Variables in the Equation for GCSE Maths Grades

Table 4-40 was used to introduce a binary variable of a high-grade and a low-grade GCSE result. The high-grade label is given to a grade of B and above. All other grades are recorded as a low-grade. The rationale for this is that a grade C (low grade) is the minimum entrance requirement and is the maximum that a student can get when they have been selected to undertake the foundation syllabus by their school. This coding can be found in Table 4-42 Categorical Variable Codings for GCSE Maths High Low.

Categorical Variables Codings			
		Frequency	Parameter coding (1)
GCSEMathsHighLow	H	244	1.000
	L	203	.000

Table 4-42 Categorical Variable Codings for GCSE Maths High Low

The Unadjusted BLR analysis of this produced the following result shown in Table 4-43 Variables in the Equation GCSEMathsHighLow.

Variables in the Equation						
		B	S.E.	Sig.	95% C.I.for EXP(B)	
					Lower	Upper
Step 1[a]	GCSEMathsHighLow(1)	.737	.209	.000	1.388	3.147
	Constant	.451	.144	.002		
a. Variable(s) entered on step 1: GCSEMathsHighLow.						

Table 4-43 Variables in the Equation GCSEMathsHighLow

4.2.3.2 BLR UNADJUSTED ANALYSIS GCSE Maths vs Pass-Fail Results Discussion

The unadjusted result shows the GCSE Maths to be a highly significant factor with a significant association of 0.000 between the GCSE Maths High Low factor and Pass-Fail at the 0.05 level of significance. This is consistent with the Mann-Whitney test in section 4.1.3 on page 96.

4.2.4 BLR UNADJUSTED ANALYSIS GENDER vs Pass-Fail

The categorical variable codings for gender can be found in Table 4-44.

Categorical Variables Codings			
		Frequency	Parameter coding (1)
GENDER	F	57	1.000
	M	390	.000

Table 4-44 Categorical Variables Codings for Gender

4.2.4.1 BLR UNADJUSTED ANALYSIS GENDER vs Pass-Fail Results

Unadjusted BLR analysis of the GENDER factor is provided in Table 4-45 Variable in the Equation for GENDER.

Variables in the Equation						
		B	S.E.	Sig.	95% C.I.for EXP(B)	
					Lower	Upper
Step 1[a]	GENDER(1)	0.444	0.334	0.184	0.81	3
	Constant	0.775	0.109	0.000		
a. Variable(s) entered on step 1: GENDER.						

Table 4-45 Variable in the Equation for GENDER

4.2.4.2 BLR UNADJUSTED ANALYSIS GENDER vs Pass-Fail Results Discussion

The unadjusted result shows the GENDER is not a significant factor with a significant association of 0.184 with Pass-Fail at the 0.05 level of significance. This is consistent with the Chi -squared test in section 4.1.4 on page 99.

4.2.5 BLR UNADJUSTED ANALYSIS PARENTS HE EXPERIENCE * Pass-Fail

The categorical variable codings for Parental Higher Education Experience can be found in Table 4-46.

Categorical Variables Codings					
			Parameter coding		
		Frequency	(1)	(2)	(3)
PARENTS HE EXPERIENCE	NO	214	1.000	.000	.000
	NOT PROV	8	.000	1.000	.000
	UNKNOWN	47	.000	.000	1.000
	YES	178	.000	.000	.000

Table 4-46 Categorical Variable Codings for Parental Higher Education Experience

*4.2.5.1 BLR UNADJUSTED ANALYSIS PARENTS HE EXPERIENCE * Pass-Fail Results*

Unadjusted BLR analysis of the Parental Higher Education Experience factor is provided in Table 4-47.

Variables in the Equation for Parental Higher Education Experience						
		B	S.E.	Sig.	95% C.I.for EXP(B)	
					Lower	Upper
Step 1[a]	PARENTSHEEXPERIENCE			0.785		
	PARENTSHEEXPERIENCE(1)	-0.033	0.222	0.881	0.626	1.496
	PARENTSHEEXPERIENCE(2)	-0.374	0.749	0.617	0.159	2.984
	PARENTSHEEXPERIENCE(3)	-0.317	0.345	0.359	0.37	1.433
	Constant	0.885	0.165	0		
a. Variable(s) entered on step 1: PARENTS HE EXPERIENCE.						

Table 4-47 Variables in the Equation for Parental Higher Education Experience

This has been recoded to facilitate the binary coding. The two categories were created from the data. All data not recorded as YES is taken as a NO response, i.e Not known, No, and Not Provided are all coded as NO. This conversion can be found in Table 4-48 Binary Categorical Variable Codings for Parental Higher Education Experience.

		Frequency	New coding	Frequency
PARENTS HE EXPERIENCE	NO	214	NO	269
	NOT PROV	8		
	UNKNOWN	47		
	YES	178	YES	178

Table 4-48 Binary Categorical Variable Codings for Parental Higher Education Experience

The BLR results for the recoded Parental Higher Educational Experiences are shown in Table 4-49 Variables in the Equation for Binary Parental Higher Education Experience.

Variables in the Equation.

		B	S.E.	Sig.	95% C.I.for EXP(B) Lower	Upper
Step 1[a]	PARENT.HE.YN(1)	-.095	.211	.651	.601	1.374
	Constant	.885	.165	.000		

a. Variable(s) entered on step 1: PARENT.HE.YN.

Table 4-49 Variables in the Equation for Binary Parental Higher Education Experience

*4.2.5.2 BLR UNADJUSTED ANALYSIS PARENTS HE EXPERIENCE * Pass-Fail Results Discussion*

The unadjusted result shows the recoded PARENTS HE EXPERIENCE is not a significant factor with a significant association of 0.651 with Pass-Fail at the 0.05 level of significance. This is consistent with the Chi -squared test in section 4.1.5 on page 101.

4.2.6 BLR UNADJUSTED ANALYSIS Socio-economic Class vs Pass-Fail

The coding for this analysis is based upon the National Statistics-SEC which is an occupationally based classification, but also is regulated to provide coverage of the whole adult population. The information required to create the NS-SEC is occupation coded to the unit groups of the SOC2010 (Office of National Statistics, 2010) and details of employment status.

The version of the classification that has been used for the coding of the students in the dataset has eight classes, as shown in Table 2-4 NS-SEC Analytical Groups on page 34. This was derived from the classification used by the office of National Statistics (Office of National Statistics, 2010).

Socio-Economic Classification is still collected by UK education providers and therefore the data is available from HESA UK Performance Indicators (PI) data, which in the past included NS-SEC classification groups as an indicator for showing widening access. The groupings used with the HESA UK PI data are classified as 1-3 (Higher SEC) and 4-7 (lower SEC). This coded into SPSS as shown in Table 4-50 Socio-Economic High-Low Classification. The two groups are similar in size.

Categorical Variables Codings		Frequency	Parameter coding
SEHIGHLOW	SE_HIGH	225	1.000
	SE_LOW	222	.000

Table 4-50 Socio-Economic High-Low Classification

4.2.6.1 BLR UNADJUSTED ANALYSIS Socio-economic Class vs Pass-Fail Results

The results of the BLR Unadjusted Analysis is given in Table 4-51 Socio-Economic High-Low Variables in the Equation.

Variables in the Equation						
		B	S.E.	Sig.	95% C.I.for EXP(B)	
					Lower	Upper
Step 1[a]	SEHIGHLOW	0.146	0.206	0.477	0.773	1.732
	Constant	0.775	0.144	0.000		
a. Variable(s) entered on step 1: SEHIGHLOW.						

Table 4-51 Socio-Economic High-Low Variables in the Equation

4.2.6.2 BLR UNADJUSTED ANALYSIS Socio-economic Class vs Pass-Fail Results Discussion

The unadjusted result shows that the Socio-economic Class is not a significant factor with a significant association of 0.477 with Pass-Fail at the 0.05 level of significance. This is consistent with the Chi -squared test in section 4.1.6 on page 103.

4.2.7 BLR UNADJUSTED ANALYSIS Tests PASS-FAIL Vs BAME

The categorical variable codings for BAME can be found in Table 4-52.

Categorical Variables Codings [a]			
		Frequency	Parameter coding (1)
BAME	BAME	234	1.000
	NON-BAME	213	.000
a. This coding results in indicator coefficients.			

Table 4-52 Categorical Variable Codings for BAME

4.2.7.1 BLR UNADJUSTED ANALYSIS PASS-FAIL Vs BAME Results

The result of the BLR Unadjusted Analysis is given in Table 4-53 Variables in the Equation for BAME.

Variables in the Equation						
		B	S.E.	Sig.	95% C.I.for EXP(B)	
					Lower	Upper
Step 1[a]	BAME(1)	-0.463	0.209	0.027	0.418	0.948
	Constant	1.08	0.158	0.000		
a. Variable(s) entered on step 1: BAME.						

Table 4-53 Variables in the Equation for BAME

4.2.7.2 BLR UNADJUSTED ANALYSIS PASS-FAIL Vs BAME Results Discussion

The unadjusted result shows the BAME factor to be a significant factor with a significant association of 0.027 with Pass-Fail at the 0.05 level of significance. This is consistent with the Chi -squared test in section 4.1.7 on 110.

4.2.8 BLR UNADJUSTED ANALYSIS Academic School vs Pass-Fail

The categorical variable codings for Academic School can be found in Table 4-54

Categorical Variables Codings					
			Parameter coding		
		Frequency	(1)	(2)	(3)
ACADEMIC SCHOOL CODE	17 BSBE	34	1.000	.000	.000
	18 CTN	213	.000	1.000	.000
	19 DMT	122	.000	.000	1.000
	20 Engineering	78	.000	.000	.000

Table 4-54 Categorical Variable Codings for Academic School

4.2.8.1 BLR UNADJUSTED ANALYSIS Academic School Name vs Pass-Fail Results

The result of the BLR Unadjusted Analysis is given in Table 4-55 Variables in the Equation for Academic School.

Variables in the Equation						
		B	S.E.	Sig.	95% C.I. for EXP(B)	
					Lower	Upper
Step 1[a]	ACADEMICSCHOOLCODE			0.024		
	ACADEMICSCHOOLCODE(1) BSBE	-0.672	0.452	0.137	0.211	1.238
	ACADEMICSCHOOLCODE(2) CTN	-0.729	0.309	0.018	0.263	0.884
	ACADEMICSCHOOLCODE(3) DMT	-0.112	0.347	0.746	0.453	1.765
	Constant	1.278	0.274	0		
a. Variable(s) entered on step 1: ACADEMICSCHOOLCODE.						

Table 4-55 Variables in the Equation for Academic School

This has been recoded to facilitate the binary coding of parameters. It should be noted that the CTN school has a significance of 0.018. It is a large school and has 47% of the student population. A new variable has been created called "CTN" The two categories were created from the data. "CTN" is one group and the remaining schools are coded as "OTHER". This conversion can be found in Table 4-56 Categorical Variable Codings for CTN.

Categorical Variables Codings

		Frequency	Parameter coding (1)
CTN	CTN	213	1.000
	OTHER	234	.000

Table 4-56 Categorical Variable Codings for CTN

The results of the BLR Unadjusted Analysis is given in Table 4-57 Variables in the Equation for CTN.

Variables in the Equation

		B	S.E.	Sig.	95% C.I.for EXP(B) Lower	Upper
Step 1[a]	CTN(1)	-.561	.208	.007	.380	.857
	Constant	1.110	.151	.000		

Table 4-57 Variables in the Equation for CTN

4.2.8.2 BLR UNADJUSTED ANALYSIS Academic School Name/CTN vs Pass-Fail Results Discussion

The unadjusted result shows the Academic School Name factor to be a significant factor with a significant association of 0.024 with Pass-Fail at the 0.05 level of significance. The School of CTN has the most significant association with Pass-Fail of 0.018.

The unadjusted result shows the CTN factor to be a significant factor with a significant association of 0.007 with Pass-Fail at the 0.05 level of significance.

This is consistent with the Chi -squared test in section 4.1.8 on page 113. That indicates there is a significant factor in the Academic Schools.

4.2.9 BLR UNADJUSTED ANALYSIS Commuter Vs Pass-Fail

The categorical variable codings for Commuter can be found in Table 4-58.

Categorical Variables Codings [a]			
		Frequency	Parameter coding (1)
Commuter N/Y	Is Commuter	224	1.000
	No	223	.000
a. This coding results in indicator coefficients.			

Table 4-58 Categorical Variable Codings for Commuter

4.2.9.1 BLR UNADJUSTED ANALYSIS Commuter Vs Pass-Fail Results

The result of the BLR Unadjusted Analysis is given in Table 4-59 Variables in the Equation for Commuter.

Variables in the Equation						
		B	S.E.	Sig.	95% C.I.for EXP(B)	
					Lower	Upper
Step 1[a]	Commuter	0.133	0.206	0.517	0.763	1.710
	Constant	0.761	0.144	0.000		
a. Variable(s) entered on step 1: Commuter.						

Table 4-59 Variables in the Equation for Commuter

4.2.9.2 BLR UNADJUSTED ANALYSIS Commuter Vs Pass-Fail Results Discussion

The unadjusted result shows the Commuter factor is not a significant factor with a significant association of 0.517 with Pass-Fail at the 0.05 level of significance. This is consistent with the Chi -squared test in section 4.1.9 on page 117.

4.3 BLR ADJUSTED ANALYSIS Testing

Following on from the unadjusted analysis, BLR Adjusted analysis puts all the variables or factors into the regression analysis. The coding for this is presented in Table 4-60 Categorical Variable Codings for Adjusted Binary Logical Regression.

Categorical Variables Codings

		Frequency	Parameter coding (1)
GCSEMathsHighLow	H	244	1.000
	L	203	.000
CTN	CTN	213	1.000
	OTHER	234	.000
BAME	BAME	234	1.000
	NOBAME	213	.000
Commuter N/Y	Is Commu	224	1.000
	No	223	.000
Highest Entry Qual Short	BTEC	230	1.000
	GCE A	217	.000
PARENT.HE.YN	NO	269	1.000
	YES	178	.000
UCAS H-L	H	182	1.000
	L	265	.000
SEHIGHLOW	HIGH	225	1.000
	LOW	222	.000
GENDER	F	57	1.000
	M	390	.000

Table 4-60 Categorical Variable Codings for Adjusted Binary Logical Regression

The results of the BLR Unadjusted Analysis is given in Table 4-61 Variables in the Equation for Adjusted Binary Logistic Regression.

Variables in the Equation						
					95% C.I. for EXP(B)	
		B	S.E.	Sig.	Lower	Upper
Step 1[a]	Highest Entry Qual Short(1)	-.845	.271	.002	.253	.730
	Commuter N/Y(1)	.661	.248	.008	1.192	3.149
	UCAS H-L(1)	.677	.255	.008	1.194	3.244
	GCSEMathsHighLow(1)	.579	.243	.017	1.108	2.870
	CTN(1)	-.536	.234	.022	.370	.926
	Constant	.884	.393	.025		
	BAME(1)	-.427	.232	.065	.414	1.027
	GENDER(1)	.351	.351	.316	.715	2.824
	SEHIGHLOW(1)	-.059	.255	.817	.571	1.555
	PARENT.HE.YN(1)	.023	.250	.926	.627	1.670
a. Variable(s) entered on step 1: GENDER, CTN, BAME, Commuter N/Y, Highest Entry Qual Short, PARENT.HE.YN, SEHIGHLOW, UCAS H-L, GCSEMathsHighLow.						

Table 4-61 Variables in the Equation for Adjusted Binary Logistic Regression

4.3.1 Summary of the BLR ADJUSTED ANALYSIS

It appears that when the analysis is adjusted by compounding variables, several things are identified. A higher tariff increases the probability of progression and conversely a lower tariff increases the chances of non-completion. A higher GCSE grade increases the probability of progression and conversely a lower grade increases the chances of non-completion. Being a commuter student increases the probability of completion and conversely those who are University based students have a greater probability of non-completion. This is a change from the independent testing and BLR Unadjusted. Studying a course in the school of CTN increases the probability of non-completion compared to the other schools. Finally, qualification type, having a BTEC entrance qualification increases the probability of non-

completion and conversely gaining entry with A-levels increases the probability of progression. A summary of the significance for the factors used in the BLR Adjusted tests is given in Table 4-62 BLR Adjusted Tests Factor Significance.

BLR Factor	Comment	BLR Adjusted Significance
Highest Entry Qual	BTEC/ A-Level	0.002
Commuter N/Y	Yes/No	0.008
UCAS H-L	320 UCAS Points or more is high	0.008
GCSE Maths High Low	High-grade is B and above.	0.017
CTN	CTN School/NO	0.022
BAME	Yes/No	0.065
GENDER	Male/Female	0.316
SEHIGHLOW	SEHIGH SELOW	0.817
PARENT.HE.YN	No /Yes	0.926

Table 4-62 BLR Adjusted Tests Factor Significance

A full table of the BLR predictions for all combinations of the variables is given in Table 4-63 BLR Predictions for Progression

CTN	commuter	qual	UCASHL	GCSEHL	Progression
NO	YES	A-Level	HIGH	HIGH	94.27%
CTN	YES	A-Level	HIGH	HIGH	90.59%
NO	YES	A-Level	HIGH	LOW	90.22%
NO	NO	A-Level	HIGH	HIGH	89.47%
NO	YES	A-Level	LOW	HIGH	89.32%
NO	YES	BTEC	HIGH	HIGH	87.61%
CTN	YES	A-Level	HIGH	LOW	84.37%
CTN	NO	A-Level	HIGH	HIGH	83.26%
CTN	YES	A-Level	LOW	HIGH	83.03%
NO	NO	A-Level	HIGH	LOW	82.65%
NO	YES	A-Level	LOW	LOW	82.42%
NO	NO	A-Level	LOW	HIGH	81.20%
CTN	YES	BTEC	HIGH	HIGH	80.53%
NO	YES	BTEC	HIGH	LOW	79.85%
NO	NO	BTEC	HIGH	HIGH	78.50%
NO	YES	BTEC	LOW	HIGH	78.23%
CTN	NO	A-Level	HIGH	LOW	73.59%
CTN	YES	A-Level	LOW	LOW	73.28%
CTN	NO	A-Level	LOW	HIGH	71.65%
NO	NO	A-Level	LOW	LOW	70.77%
CTN	YES	BTEC	HIGH	LOW	69.87%
CTN	NO	BTEC	HIGH	HIGH	68.11%
CTN	YES	BTEC	LOW	HIGH	67.77%
NO	NO	BTEC	HIGH	LOW	67.17%
NO	YES	BTEC	LOW	LOW	66.82%
NO	NO	BTEC	LOW	HIGH	64.98%
CTN	NO	A-Level	LOW	LOW	58.61%
CTN	NO	BTEC	HIGH	LOW	54.49%
CTN	YES	BTEC	LOW	LOW	54.09%
CTN	NO	BTEC	LOW	HIGH	52.05%
NO	NO	BTEC	LOW	LOW	50.97%
CTN	NO	BTEC	LOW	LOW	37.82%

Table 4-63 BLR Predictions for Progression

4.4 Comparison of all the results

A comparison of the significance values for all the tests is provided in Table 4-64. It should be noted that significant factors found in the Two Factor Independent Tests (TFIT) and the BLR Unadjusted Tests (BLRUT) are in agreement with each other. However, the BLR Adjusted Test (BLRAT) show some variation from this, for example, the UCAS Tariff is found to be a significant factor in BLRAT and not in TFIT or BLRUT. The opposite is found for the BAME factor. This would appear to be an example of Simpson's Paradox.(Simpson, 1951), where a trend may appear several groups of data but disappears when the groups are combined.

FACTOR	Two Factor Independent tests		BLR Factor	BLR Unadjusted	BLR Adjusted
UCAS Tariff	0.294	In	UCAS H-L	0.183	0.008
Qualification Type	0.000		Highest Entry Qual	0.000	0.002
GCSE Maths	0.000		GCSE Maths High Low	0.000	0.017
Gender	0.236		GENDER	0.184	0.316
PARENTS-HEEXPERIENCE	0.784		PARENT.HE.YN	0.651	0.926
Socio-economic	0.776		SEHIGHLOW	0.477	0.838
BAME	0.034	Out	BAME	0.027	0.065
CEBE School	**0.023** for CTN		CTN	0.007	**0.022**
Commuters	0.491	in	Commuter N/Y	0.517	0.008
Red text indicates significant result at 0.05 level for BLR Adjusted					

Table 4-64 All Test Significance Values

The results demonstrate a change in significance when all are grouped together. The adjusted significant factor shows a change from the unadjusted significant factors. There are three factors changing to and from the 0.05 level of significance. Firstly, BAME moves out of the

0.05 significance measure; secondly, the factor of UCAS HL, the measure of UCAS points being higher than the entry requirements; and thirdly, commuters move into the 0.05 band of significance.

Inspecting the correlations between the factors provides an insight into the complexities of the BLR model. SPSS was used to calculate the correlations between the factors. It provides key information about the importance of the individual factors have with each other and therefore, can be used as a starting point for the discussion. This is shown in Table 4-65 Factor Correlations Table. The Pearson correlation coefficient is defined as:

"a measure of the strength of linear association between two variables, and is denoted by r"….." a Pearson product-moment correlation attempts to draw a line of best fit through the data of two variables and the Pearson correlation coefficient, r, indicates how far away all these data points are to this line of best fit……"

The following guidelines have been proposed [for interpreting the correlation coefficient]

	Coefficient, *r*	
Strength of Association	Positive	Negative
Small	.1 to .3	-0.1 to -0.3
Medium	.3 to .5	-0.3 to -0.5
Large	.5 to 1.0	-0.5 to -1.0

"(Laerd.Statistics, 2019)

4.5 Factor Associations Table

Factors	Pearson Correlation	GENDER	CTN	BAME	Commuter	Qual Type	PARENTSHE	SEHIGHLOW	UCAS H-L	GCSEMathsHL
GENDER	Pearson Correlation	1	0.016	0.052	0.021	0.085	-0.045	-0.004	-0.011	0.028
GENDER	Sig. (2-tailed)		0.742	0.277	0.658	0.073	0.34	0.93	0.82	0.548
CTN	Pearson Correlation	0.016	1	.130**	.334**	.228**	-.136**	-0.074	0.066	-.182**
CTN	Sig. (2-tailed)	0.742		0.006	0	0	0.004	0.12	0.162	0
BAME	Pearson Correlation	0.052	.130**	1	.204**	0.032	-0.084	-.258**	-.139**	-0.061
BAME	Sig. (2-tailed)	0.277	0.006		0	0.497	0.076	0	0.003	0.201
Commuter	Pearson Correlation	0.021	.334**	.204**	1	.204**	-.175**	-.221**	.107*	-.236**
Commuter	Sig. (2-tailed)	0.658	0	0		0	0	0	0.023	0
Qual Type	Pearson Correlation	0.085	.228**	0.032	.204**	1	-0.069	-0.07	.413**	-.436**
Qual Type	Sig. (2-tailed)	0.073	0	0.497	0		0.143	0.142	0	0
PARENTSHE	Pearson Correlation	-0.045	-.136**	-0.084	-.175**	-0.069	1	.424**	0.033	.127**
PARENTSHE	Sig. (2-tailed)	0.34	0.004	0.076	0	0.143		0	0.489	0.007
SEHIGHLOW	Pearson Correlation	-0.004	-0.074	-.258**	-.221**	-0.07	.424**	1	.113*	.136**
SEHIGHLOW	Sig. (2-tailed)	0.93	0.12	0	0	0.142	0		0.017	0.004
UCAS H-L	Pearson Correlation	-0.011	0.066	-.139**	.107*	.413**	0.033	.113*	1	-.149**
UCAS H-L	Sig. (2-tailed)	0.82	0.162	0.003	0.023	0	0.489	0.017		0.002
GCSEMathsHL	Pearson Correlation	0.028	-.182**	-0.061	-.236**	-.436**	.127**	.136**	-.149**	1
GCSEMathsHL	Sig. (2-tailed)	0.548	0	0.201	0	0	0.007	0.004	0.002	

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Table 4-65 Factor Correlations Table

The Commuter Factor is interesting for several reasons. Firstly, in the Adjusted BLR test, the significance value is indicated as 0.008: this is clearly less than the 0.05 significance level Secondly, the factor correlations shown in Table 4-65 Factor Correlations Table ,do not show

a large association between any of the factors. The CTN factor has a medium association (0.329) to the Commuter factor. The rest of the significant factor associations are in the small category with the strongest associations being the Socio-economic (SEHIGHLOW) and GCSE Maths with *r* being -0.226 and -0.240 resp. The next group of factors are again in the small category, these are Qualification Type, BAME and Parents HE with *r* being 0.199, 0.199 and 0.181 resp. The remaining factors' associations are all less than 0.105.

The point of note is that the BLR Adjusted significance value of 0.009 is highly indicated but the Pearson associations are all, with the exception of CTN, shown as being small.

5 Discussion

Summarising the final outcome of the binary logistic regression analysis, it can be seen that the factors of Commuter, CTN, Qualification Type, UCAS high-Low tariff and GCSE Maths High Low have, at the 0.05 measure, been found to be significant factors. This can be seen in Table 5-1.

Test	Factor	Compounding Variable B	Probability Value
Adjusted BLR	Qualification Type	-0.845	0.002
Adjusted BLR	Commuter	0.661	0.008
Adjusted BLR	UCAS H-L	0.677	0.008
Adjusted BLR	GCSE Maths High Low	0.579	0.017
Adjusted BLR	CTN	-0.536	0.022

Table 5-1 Summary of Adjusted BLR Significant Factors

It appears that when the analysis is adjusted by compounding variables a number of associations can be seen.

- A higher Tariff increases the likelihood of progression and conversely a lower tariff increases the chances of non-completion.
- A higher GCSE grade increases the likelihood of progression and conversely a lower grade increases the chances of non-completion.
- Being a Commuter student increases the likelihood of completion and conversely those who are University based students have an increased likelihood of non-completion.
- Studying a course in the school of CTN increases the likelihood of non-completion compared to the other schools.
- Finally, Qualification Type, having a BTEC entrance qualification increases the likelihood of non-completion and conversely gaining entry with A-levels increases the likelihood of Progression.

So, the question is what does this mean? If a student is classified into all of the groups identified in Table 5-1 they have a higher risk of non-completion. From the dataset of 447 students, there are who 38 meet all four elements of the criteria, i.e. they belong to the CTN Academic School, are Commuters, took a BTEC qualification, had less than a grade B in GCSE mathematics and were classified as having a low UCAS tariff.

Table 4-65 Factor Correlations Table provides a guide for the areas of discussion. Each of the Factors identified by the Adjusted BLR process Qualification Type, Commuter, UCAS H-L, GCSE Maths High Low and Academic School and their associations are discussed below.

5.1 Qualification Type

Qualification type was identified as being the most significant by the adjusted BLR. It was found to have significant correlations with the four other factors as shown in Table 5-2 Qualification Type Associations Correlations at 0.01 Level and Figure 5-1 Qualification Associations Type Pearson Correlations at 0.01 Level. Two of the factors' correlations, GCSE Maths HL and UCAS H-L were found to be in the medium category.

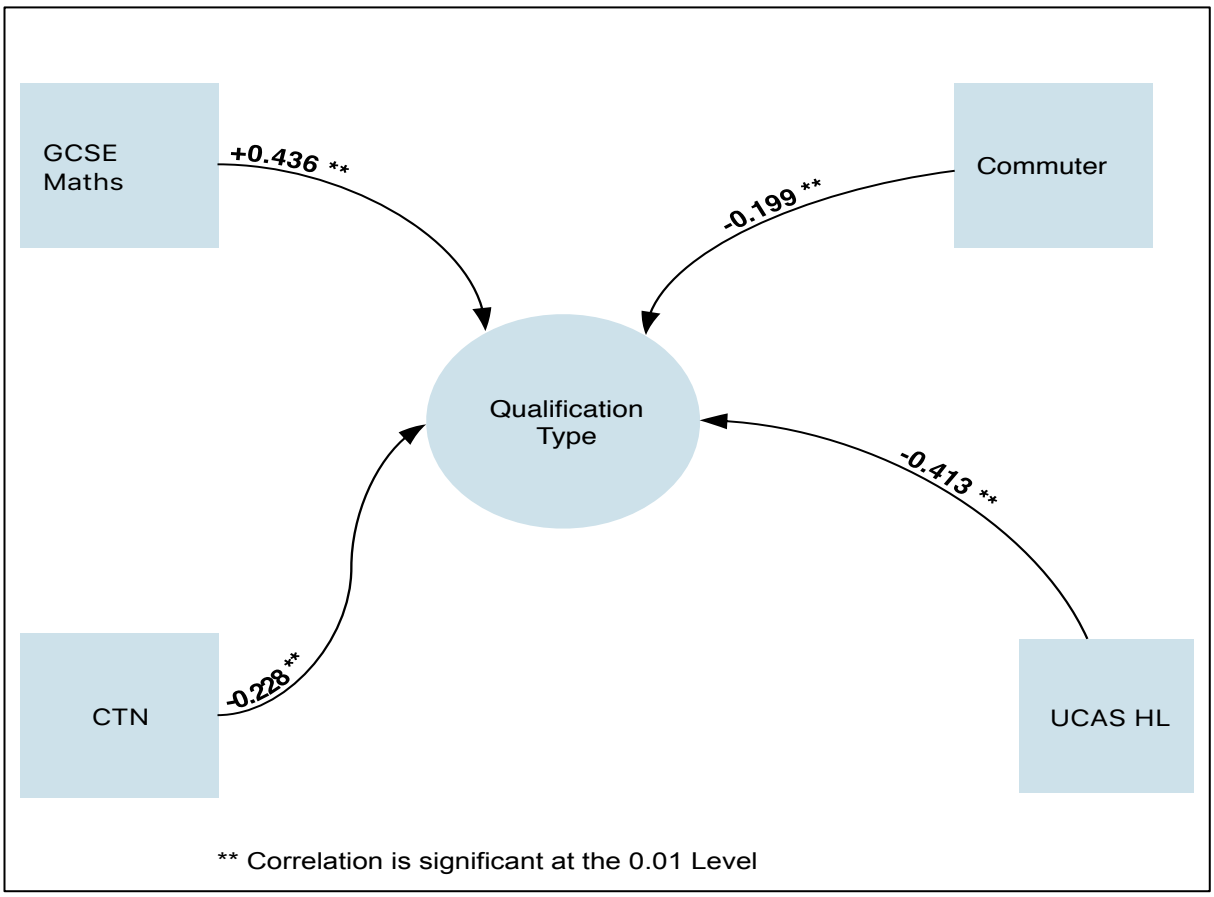

Figure 5-1 Qualification Associations Type Pearson Correlations at 0.01 Level

Correlations at 0.01 level **	test	Qual Type
ACADEMIC SCHOOL CODE	Pearson Correlation	-0.228
Commuter	Pearson Correlation	-0.199
GCSE Maths HL	Pearson Correlation	0.436
UCAS H-L	Pearson Correlation	-0.413

Table 5-2 Qualification Type Associations Correlations at 0.01 Level

Using BLR, Qualification Type was calculated as the most significant factor. The Qualification types included in this research are BTEC and GCE A-Levels. Of the 447 students in this research 217 had A-Levels and 230 had BTEC qualifications. The BTEC students have a progression rate of 62% compared with 78% for the A-level students.

The two largest Pearson correlation values associated with qualification type were GCSE Maths and the UCAS tariff. This was found to be a medium strength of association. The average UCAS tariff for BTEC was 335 points whereas A-Levels was 271 points. It is negatively

correlated implying that the students with the lower scores do better: in this case these are the A-level students with lower grades who nevertheless are outperforming the BTEC students.

The Highest Entry Qualification factor has a highly significant BLR Adjusted "p-value" of 0.002. There are two factors that are showing medium strength associations, UCAS H-L and GCSE Maths High Low with Pearson Correlation Coefficients of -0.413 and 0.436 respectively. The remaining factors are showing small associations. The BLR Adjusted identifies the highest entry qualification as being significant in the passing or failing of students. In addition, there are some interesting associations encountered with the UCAS tariff achieved and the GCSE maths grades presented by the students. The difference in progression associated with Qualification Type has been previously discussed in the analysis of the independent test results, in that the progression rate for the BTEC students is 62%, whilst A-Level students achieve 78%. The BLR model indicated that this is a significant difference between the two qualification types. The two largest between-factor-correlations are the UCAS Tariff Points High Low and the GCSE mathematics High Low. Table 5-3 provides further analysis of the raw data detailing 60% of the BTEC students and 20% of A-Level students recorded as having grades above 320 UCAS points.

Highest Entry Qual Short	UCAS H-L	Total	Proportion
BTEC	H	139	60%
	L	91	40%
BTEC Total		230	
GCE A	H	43	20%
	L	174	80%
GCE A Total		217	
Grand Total		447	

Table 5-3 Highest Entry Qualification and UCAS tariff Population

UCAS H-L is recorded as a negative association (-0.413) for progression. When a comparison of the two UCAS tariff groups' progression for BTEC students is carried out, the following information is found. Shown in Table 5-4. There are 230 BTEC students, 139 have at least

320 UCAS Points (DDM) of these 68% progressed. The remaining 91 BTEC students with less than 320 UCAS Points 53% progressed.

Highest Entry Qual	UCAS H-L	PassFail	Total	Progression %
BTEC	H	FAIL	45	32%
		PASS	94	68%
	H Total		139	
	L	FAIL	43	47%
		PASS	48	53%
	L Total		91	
BTEC Total			230	
Grand Total			230	

Table 5-4 BTEC Highest Entry Qualification, UCAS Tariff and Progression

When the GCE A-level students are considered the following is found.

Highest Entry Qual	UCAS H-L	PassFail	Total	Progression %
GCE A	H	FAIL	4	9%
		PASS	39	91%
	H Total		43	
	L	FAIL	44	25%
		PASS	130	75%
	L Total		174	
GCE A Total			217	
Grand Total			217	

Table 5-5 A-Level Highest Entry Qualification, UCAS Tariff and Progression

Firstly, the 43 students with 320 or more UCAS points have a 91% progression rate and the lower group have a 75% progression rate. It is evident that the overall progression for A-level students is better than the BTEC students' progression cf. 78% with 62%, see Table 5-6 Overall BTEC and A-level Progression.

Highest Entry Qual Short	Pass Fail	Total	Progression %
BTEC	FAIL	88	
	PASS	142	62%
BTEC Total		230	
GCE A	FAIL	48	
	PASS	169	78%
GCE A Total		217	
Grand Total		447	

Table 5-6 Overall BTEC and A-level Progression

The next association to be identified was the GCSE Mathematics grade. This factor introduces some interesting points. The proportion of students recorded as having at least a grade B, the Higher-grade band for this body of work, was 33% for BTEC students, whereas it was 77% for A-level students, see Table 5-7 Highest Entry Qualification and GCSE Maths High Low Banding. This is an interesting reversal of proportions where the students with the better GCSE grades are more commonly studying A-level qualifications. The A-level students are performing better in their first year of study and progressing in higher numbers.

Highest Entry Qual Short	GCSEMathsHighLow	Total	Proportion
BTEC	H	77	33%
	L	153	67%
BTEC Total		230	
GCE A	H	167	77%
	L	50	23%
GCE A Total		217	
Grand Total		447	

Table 5-7 Highest Entry Qualification and GCSE Maths High Low Banding

Further analysis of the data provides more confirmation of the effect that the combination of the Qualification Types, UCAS Tariff and GCSE grades has on overall progression. Table 5-8 Highest Entry Qualification and Significant Associations' Progression breaks this down by the three factors.

Highest Entry Qual Short	UCAS H-L	GCSEMaths HighLow	Pass Fail	Total	Progression
BTEC	H	H	FAIL	9	19%
			PASS	38	81%
		H Total		47	
		L	FAIL	36	39%
			PASS	56	61%
		L Total		92	
	H Total			139	
	L	H	FAIL	13	43%
			PASS	17	57%
		H Total		30	
		L	FAIL	30	49%
			PASS	31	51%
		L Total		61	
	L Total			91	
BTEC Total				230	
GCE A	H	H	FAIL	4	11%
			PASS	32	89%
		H Total		36	
		L	FAIL	0	0%
			PASS	7	100%
		L Total		7	
	H Total			43	
	L	H	FAIL	31	24%
			PASS	100	76%
		H Total		131	
		L	FAIL	13	30%
			PASS	30	70%
		L Total		43	
	L Total			174	
GCE A Total				217	
Grand Total				447	

Table 5-8 Highest Entry Qualification and Significant Associations' Progression

The information from Table 5-8 can be reproduced as Table 5-9 Highest Entry Qualifications and Significant Associations Table of Merit, from the recorded progression, and shows that four of the top five places go to A-level students. The BTEC group had scored highly in UCAS tariff and GCSE Mathematics, emphasising the associations identified by the Pearson

Correlation. It is worthy of note that the high scoring BTEC group with low GCSE Maths grades achieved 61% progression, this is 20% lower than the BTEC group with high UCAS Tariff and high GCSE Maths Grades. This indicates the importance of the GCSE Mathematics grades. However, there appears to be an anomaly in the high scoring A-level students with low GCSE mathematics grades who achieved 100% progression. This is only a small group and a closer inspection does show that they were on less technical courses in the Faculty, such as Construction Management, Business Information Technology and Film Technology, which tend to have a lower mathematical requirement within the course.

Highest Entry Qual	UCAS H-L	GCSE Maths HighLow	Pass Fail	Total	Progression
GCE A	H	L	PASS	7	100%
GCE A	H	H	PASS	32	89%
BTEC	H	H	PASS	38	81%
GCE A	L	H	PASS	100	76%
GCE A	L	L	PASS	30	70%
BTEC	H	L	PASS	56	61%
BTEC	L	H	PASS	17	57%
BTEC	L	L	PASS	31	51%

Table 5-9 Highest Entry Qualifications and Significant Associations Table of Merit

This analysis has identified a significant difference in progression associated with Qualification type. A-level students are more likely to progress than BTEC students. Nationally, in terms of 1st and upper 2nd class degrees awarded, there is a difference of around 20% in favour of those who studied A-level (HEFCE, 2018). A-levels have long been seen as the gold standard of qualifications for University entry, and BTEC qualification are viewed by some universities as unsuitable for entry to degree courses (Savage, 2018). There have been proposals to regrade the BTEC UCAS tariff points awarded (Thomson, 2017), and bridging courses have been suggested to provide an uplift for vocational students going into HE (Gicheva, 2018).

BTECs have been a key part of providing greater access to higher education for many students (Kelly, 2017). Nationally, 22% of students accepted into HE are presenting BTEC qualifications and they are more likely to be from a working class background from routine occupations codified as groups 5,6 and 7 in Socioeconomic levels (Gicheva, 2018).

With 40% of CEBE's cohort presenting BTEC qualifications, this is an opportunity to address course design to facilitate transition from vocational qualifications to the style of independent thinking and review found in university education. The style of teaching and assessment needs careful design, definition and delivery. For example, the subjects taught in CEBE are by nature vocational, we are preparing students for careers in their chosen subject. One of our key drivers is to ensure that student engagement is high through active learning. Course designers must evaluate the educational background of the student cohort and not just rely on the UCAS tariff. For graduates, it has been reported that vocational BTEC, students have higher employment rates than those who entered with A-levels (Conlon, 2013).

During their pre university studies at level 3, BTEC students undertake fewer examinations than A-level students, BTEC assessments are predominantly assignment based. Although recent reforms have introduced more external assessments, BTEC students are still engaged in a continuous assessment regime, with the opportunity to refine their work rather than rely on their ability to recall knowledge in an end of year examination. Therefore, future course approval and review processes must include a requirement for course teams to evaluate curriculum delivery, assessment methods, and opportunities to practice assessments for their student cohort. This can be carried out in conjunction with schools and further education colleges, so there a clear understanding of curriculum, and student learning skills can be developed through collaboration between the HE and FE staff. As a result of this study I have developed proposals for a Faculty Schools and Colleges Advisory Board.

5.2 Commuters

The data analysed showed there were 223 students of the 447 that were classified as commuting to University: this is approximately 50% of the entire cohort.

Considering the commuter factor, it has an adjusted BLR significance of 0.009. It should be noted that the Unadjusted BLR significance value was 0.429. This is a big difference and is worthy of discussion. Inspection of the magnitude of the Pearson correlation coefficients shows that the commuter correlates with six factors of the significant level of 0.01 (**). They are Parent HE, BAME, Qual Type, GCSE Maths HL, SE High Low and CTN. In addition, UCAS HL is found to be significant at the 0.05 level (*), see Figure 5-2 Commuter Associations Pearson Correlations at 0.01 and 0.05 Level of Significance.

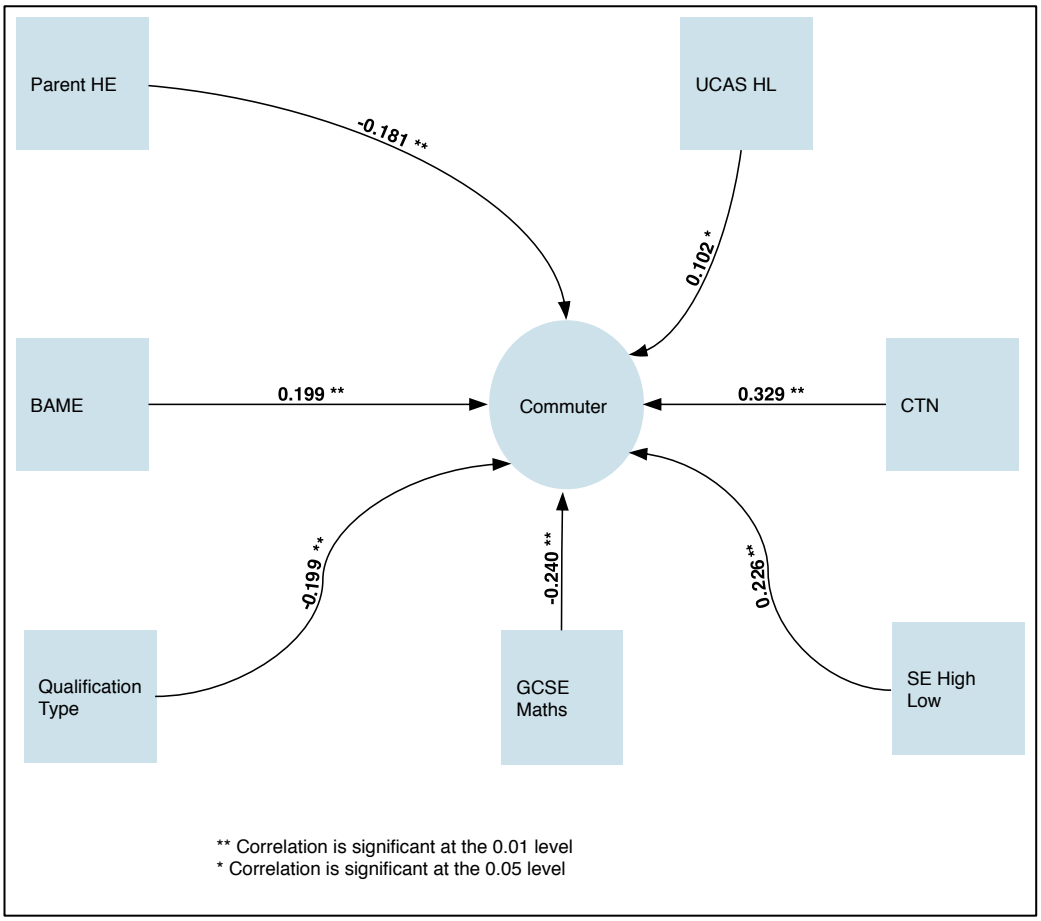

Figure 5-2 Commuter Associations Pearson Correlations at 0.01 and 0.05 Level of Significance

Associations for correlations at the 0.01 level only are to be found in Table 5-10 Commuter Associations at 0.01 level of Significance

Correlations at 0.01 level	test	Commuter
CTN	Pearson Correlation	0.329
BAME	Pearson Correlation	0.199
GCSE Maths HL	Pearson Correlation	-0.24
PARENTS HE	Pearson Correlation	-0.181
Qual Type	Pearson Correlation	-0.199
SE High Low	Pearson Correlation	0.226

Table 5-10 Commuter Associations at 0.01 level of Significance

The Pearson correlation coefficients are all in the Small category but the fact that they are so many and the adjusted BLR significance of Commuter factor itself makes them worthy of further investigation.

Table 5-11 Academic Schools and Commuters provides a breakdown of the Academic School Code and Commuters reveals that 64% of the commuters are in the CTN School.

Commuter N/Y	Academic School Short	Total	Commuter to School %
Is Commuter	BSBE	15	7%
	CTN	144	64%
	DMT	38	17%
	EDMS	27	12%
Is Commuter Total		224	
No	BSBE	19	9%
	CTN	69	31%
	DMT	83	37%
	EDMS	52	23%
No Total		223	
Grand Total		447	

Table 5-11 Academic Schools and Commuters

Taking this further, Table 5-12 provides details of the commuter population of each of the Schools.

School Commuter Population	
BSBE	44%
CTN	68%
DMT	31%
EDMS	34%

Table 5-12 School Commuter Population

CTN has a total of 213 students and 144 of these are commuters. Clearly CTN commuter population is larger than the other schools, and therefore this may explain the association that has been identified. Adjusted BLR analysis has identified CTN as a significant factor at 0.05 level in the with a P value of .025. Table 5-13 Commuters and Ethnicity provides a breakdown of the population of commuters and their ethnicity. The proportion of the commuter and ethnicity population may be expected to be similar in each category, but there is an obvious reversal in the numbers. 63% of commuters are classified as BAME whereas 42% of Non-commuters are BAME.

Commuters and BAME may have an interesting geographical association. BCU recruits many of its students from the Birmingham area. Ethnicity in England was last recorded in the 2011 Census and BAME accounted for 20.2% of the national population but in Birmingham, BAME accounted for 46.8% of the population. It would seem to follow that if BCU recruits locally then the proportion of Commuting BME students would be high, which it is at 63%. The next Census in 2021 should provide some interesting population statistics.

Commuter N/Y	BAME	Total	Proportion %
Is Commuter	BAME	140	63%
	Non BAME	84	38%
Is Commuter Total		224	
No	BAME	94	42%
	Non BAME	129	58%
No Total		223	
Grand Total		447	

Table 5-13 Commuters and Ethnicity

Table 5-14 Commuters and GCSE Mathematics Grades provides a breakdown of the groupings of students who are Commuters and their grades for GCSE Mathematics. The first standout feature is that 43% of Commuters have high grades whereas 66% of Non-commuters have high grades.

Commuter N/Y	GCSEMathsHighLow	Total	Proportion %
Is Commuter	H	96	43%
	L	128	57%
Is Commuter Total		**224**	
No	H	148	66%
	L	75	34%
No Total		**223**	
Grand Total		**447**	

Table 5-14 Commuters and GCSE Mathematics Grades

The previous discussion about the association between Highest Entry qualification and GCSE grades indicated that 33% BTEC Students had higher grade mathematics scores whereas 77% of A-level students had high-grade mathematics scores.

Table 5-15 Commuters and Highest Entry Qualifications demonstrates the association between Commuters and their highest entry qualification and provides further insight into the background of the cohort in the dataset. It is evident that a high proportion of Commuters, 62%, have a BTEC qualification, while for Non-commuters this is 41%. A brief comparison of the two Commuter tables for GCSE mathematics grades Table 5-14 , and highest entry qualifications Table 5-15, show similar proportions of Commuters who achieved the GCSE high grades 43%, and also studied A-levels, 38%. Anecdotally, since A-level selection processes in sixth forms rely on the GCSE grades achieved being higher than grade C, this may be an expected outcome, however it provides insight into the groupings found and how GCSE results may be an influence success.

Commuter N/Y	Highest Entry Qual Short	Total	Proportion %
Is Commuter	BTEC	138	62%
	GCE A	86	38%
Is Commuter Total		**224**	
No	BTEC	92	41%
	GCE A	131	59%
No Total		**223**	
Grand Total		**447**	

Table 5-15 Commuters and Highest Entry Qualifications

We now look at Commuter association with students' Parents and their experience of Higher Education. It is evident from the data set that for Commuters, most of them, 57%, have parents who have no experience of higher education, whereas for non-commuters' parents 39% have no experience of higher education.

Commuter N/Y	PARENTSHEEXPERIENCE	Total	Proportion %
Is Commuter	NO	128	57%
	NOT PROVIDED	4	2%
	UNKNOWN	22	10%
	YES	70	31%
Is Commuter Total		224	
No	NO	86	39%
	NOT PROVIDED	4	2%
	UNKNOWN	25	11%
	YES	108	48%
No Total		223	
Grand Total		447	

Table 5-16 Commuter Parental HE Experience

The figure is a little skewed by the "Unknown" and "Not Provided" groups as can be seen in Table 5-16 Commuter Parental HE Experience. Removing these two groups from the dataset produces a new set of data, see Table 5-17 Declared Commuter Parental HE Experience , which is based on 392 students. This illustrates that a larger proportion of the Commuters' parents have no experience of Higher Education compared with the Non-commuting students.

Commuter N/Y	PARENTSHEEXPERIENCE	Total	Proportion %
Is Commuter	NO	128	65%
	YES	70	35%
Is Commuter Total		**198**	
No	NO	86	44%
	YES	108	56%
No Total		**194**	
Grand Total		**392**	

Table 5-17 Declared Commuter Parental HE Experience

The final part of this Commuter story is the Socio-Economic grouping of the Commuter students. This is shown in Table 5-18 Commuter Socio-economic groupings.

Commuter N/Y	SEHIGHLOW	Total	Proportion %
Is Commuter	SE_HIGH	88	39%
	SE_LOW	136	61%
Is Commuter Total		**224**	
No	SE_HIGH	137	61%
	SE_LOW	86	39%
No Total		**223**	
Grand Total		**447**	

Table 5-18 Commuter Socio-economic groupings

The Commuters and Non-commuters are approximately equal in size with approximately 50% in each group. However, a closer examination of the Socio-Economic grouping reveals 61% of the Commuters are from the low Socio-Economic groupings and the Non-commuters are the opposite proportions with 61% from the high Socio-Economic grouping. The groupings used with the HESA UK PI data are classified as 1-3 (Higher SEC) and 4-7 (lower SEC). This may be accounted for as a lot of Commuters may be restricted to living at home due to financial reasons. The current funding situation is based upon student loans and families may be debt adverse.

The relationship between the parental Higher Education experience and the Socio-Economic groups is interesting. It might be expected that parents with a university education would be in the higher Socio-Economic group. To test this with this dataset would need a null-hypothesis of: "Having experience of higher education makes no difference to your social economic group". A Chi-squared test was carried out to test this on the reduced Parental HE dataset.

SEHIGHLOW * PARENTSHEEXPERIENCE Crosstabulation					
			PARENTSHEEXPERIENCE		**Total**
			NO	YES	
SEHIGHLOW	SE_HIGH	Count	68	136	**204**
		Expected Count	111.4	92.6	**204**
	SE_LOW	Count	146	42	**188**
		Expected Count	102.6	85.4	**188**
Total		Count	214	178	**392**
		Expected Count	214	178	**392**

Table 5-19 Chi-square test for Socio-economic verses Parental HE Experience

The significance was measured and a P value of 0.000 was returned. Therefore, at the 0.05 level the null-hypothesis was rejected. See Table 5-19 Chi-square test for Socio-economic verses Parental HE Experience. It is welcome to see this result as it indicates there are opportunities of increasing your socio-economic status through education. There is a large number of students in this dataset who are first generation in their family to attend university.

In England first-generation students have a lower academic engagement and retention as compared to non-first-generation students. Concerning transition into HE, first generation students reported that they needed more structure to their learning, greater staff contact and clear expectations about what they needed to do for each activity (Leese, 2010). The design of systems and techniques to support student transition has provided staff with a toolset to enhance the performance of non-traditional students (Mutton and Plowden, 2016). Those students who are non-first-generation students come from families with greater educational habitus and are potentially in a better position to receive more support from parents who have experienced higher education. The parents have understanding and experience from which they can support students experiencing difficulties during their studies.

This research has indicated a significant relationship between Commuter students and progression when the Adjusted BLR tests were applied, which were not apparent on initial Chi-squared testing and Unadjusted BLR.

The Adjusted BLR commuter result indicated that, contrary to the expectation that commuter students were disadvantaged by their commuter status, their performance was better than the non-commuters. There is a plethora of research in the subject of commuter students. Liz Thomas, one of the leaders in this area, has made recommendations to improve the success of commuter students.(Thomas and Jones, 2017) The following bulleted items and commentary describe the approach that has been adopted by BCU to support commuter students.

- Interventions to develop 'cohort identity', e.g. weekend school

Although there is no policy on "weekend school" to develop the cohort identity, current practice is for the first-year students to experience small group exercises and assessments from the very beginning of the course. One of our tutors explained "from the very first week students have the contact details of their colleagues and are communicating through WhatsApp". This communication is the start of developing cohort identity for the course but does not focus on the specific needs of commuter students.

- Blocked timetable

There are many positives in this suggestion. As a former commuter student, the idea of travelling for over an hour to come to a one-hour lecture or tutorial is less than inspiring. The Faculty has, for many years, tried to concentrate the course delivery into three days and reduce the gaps between scheduled teaching activities. Many commuter students have part-time jobs to help support their studies and a blocked timetable provides opportunity to seek employment during weekdays (Maguire & Morris, 2018).

- Later start

We have not been able to provide a late start in all cases. The scheduling of teaching activities is throughout the day and normally scheduled from 9:00 am. COVID has removed the possibility of large scale lectures and has provided a form of distance learning in most subject areas. It has been noted during induction week that a number of students have been unable to make the early start later in the week, when we seek to provide some education and subject based activities that are off-site.

- Lecture capture or other ways of 'catching up'.

BCU uses Moodle as its VLE. As would be expected it can be used as a repository for notes and slides, but it can provide much more than that. There are examples of staff using Moodle to support their modules with lecture capture, module quizzes, and links to other materials that enhance the subject and can be accessed at the student's convenience. With the recently experienced COVID 19 out-break, the VLE, and lecture capture, together with Microsoft TEAMS, has been the main method of delivery.

- 'Students as partners' or similar projects

For many years Birmingham City University has operated a student academic partnership scheme. It began in 2008 when the University first worked with the Students' Union to create the BCU Student Academic Partnership Scheme (SAP). (Bovill et al., 2016) Students and academics work together to review the curriculum, the student experience and enhance the learning experience. The key factor was putting trust in our students and, in 2010, the scheme won the Times Higher Education (THE) award for outstanding student support. This partnership working has continued through 2019 and is ongoing.

- 24 hr opening of the library and access to electronic books and journals

Like many universities, the library is open 24 hours a day during the assessment periods. BCU has an extensive library of online texts that are available 24 hours of the day. There is also a helpful 24/7 librarian chat facility where library users are able to contact a duty librarian.

- Software and equipment at home to aid study

At the time these students were studying, the main access to computers and software was through the University desktop and bookable laptop computers. In 2018 the faculty provided access to over 250 fully configured laptops for student use. An automated booking and charging facility allowed students to gain more opportunity to study in groups and in private study areas.

5.3 UCAS H-L

The UCAS HL factor is not as ubiquitous as Commuter; there are three significant correlations at the .01 level. Indicated by **, below. These are BAME, Qual Type and GCSE Maths HL. Figure 5-3 UCAS HL Pearson Correlations at 0.01 Level of Significance shows the associations between the factors.

Correlations at 0.01 level	test	UCAS H-L
BAME	Pearson Correlation	-0.139
GCSE Maths HL	Pearson Correlation	-0.149
Qual Type	Pearson Correlation	-0.413

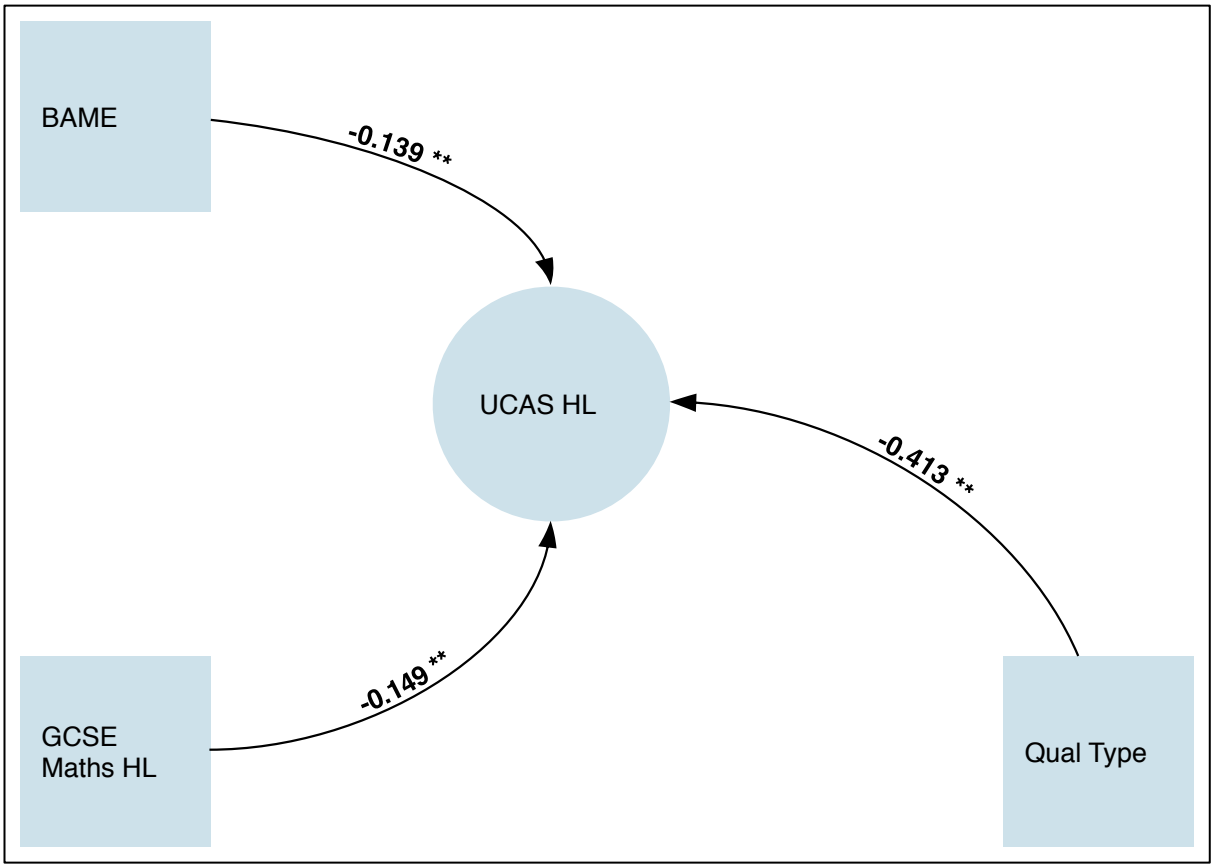

Figure 5-3 UCAS HL Pearson Correlations at 0.01 Level of Significance

The strongest Pearson correlation is with Qual Type which is classified as medium strength correlation. The proportion of BTEC students make 76% of the higher UCAS tariff students whereas for the lower UCAS tariff students GCE A (A-Level) students make up 66% of the group. A full proportional breakdown can be found in Table 5-20 UCAS H-L and Qual Type Breakdown.

UCAS H-L	Qual Type	Total	Proportion %
H	BTEC	139	76%
	GCE A	43	24%
H Total		**182**	
L	BTEC	91	34%
	GCE A	174	66%
L Total		**265**	
Grand Total		**447**	

Table 5-20 UCAS H-L and Qual Type Breakdown

Many students who exceed the entry requirements are BTEC students, but as previously stated the performance of BTEC students is not as strong as A-Level students. The progression rate achieved by the sub-groups reinforces the difference between the two qualification types. See Table 5-21 UCAS H-L and Qual Type Progression.

UCAS H-L	Qual Type	PassFail	Total	Progression
H	**BTEC**	FAIL	45	32%
		PASS	94	68%
	BTEC Total		**139**	
	GCE A	FAIL	4	9%
		PASS	39	91%
	GCE A Total		**43**	
H Total			**182**	
L	**BTEC**	FAIL	43	47%
		PASS	48	53%
	BTEC Total		**91**	
	GCE A	FAIL	44	25%
		PASS	130	75%
	GCE A Total		**174**	
L Total			**265**	
Grand Total			**447**	

Table 5-21 UCAS H-L and Qual Type Progression

BTEC progression is lower in all cases. More interestingly the progression rate of high UCAS tariff student, 68%, is less than the progression rate of A-level students, 75%. This is a strong indication that BTEC students are not as well prepared for University as A-level students. The different study and assessment practices of the BTEC and A-Level study should be looked at to evaluate the possibilities as to why progression should be different for the groups. Course designers should reflect on their expectations of the knowledge and skills BTEC and A-Level students possess on entry, and produce curricular strategies to support and develop the different qualification types.

The UCAS tariff points allocated to BTEC and A-level qualifications are in need of review, as previously discussed in section 4.1.2.2 PASS-FAIL and Qualification Type and UCAS Tariff Discussion on page 93. A number of pre-1992 universities have decided to move away from a standard offer based on purely the UCAS tariff, and applicants who are presenting BTEC

qualifications are required to achieve a higher tariff than applicants with A-levels. There may be other ways of dealing with this apparent disparity of progression between qualification types through careful course design. Early diagnostic testing during course induction may be useful to identify separate pathways or specific support needs.

5.4 GCSE Maths HL

The GCSE Maths HL factor is as ubiquitous as Commuter; there are six significant correlations at the .01 level. These are CTN, Commuter, Parents HE, SEHIGHLOW, Qual Type and UCAS HL. Figure 5-4 GCSE Maths HL Pearson Correlations at 0.01 Level of Significance shows the associations between the factors.

The GCSE Maths HL group was split into two parts, a high sub-group, with 244 students who have a grade B or above, and the remaining 203 who did not achieve a grade B, the low group. The high group have a progression rate of 77% compared with the low group who achieved a 61% progression rate. This is positively correlated, confirming that the high group perform better than the low group. See Table 5-22 GCSE Maths High Low vs Pass Fail Progression.

GCSEMathsHighLow	PassFail	Total	Progression
H	FAIL	57	23%
	PASS	187	77%
H Total		**244**	
L	FAIL	79	39%
	PASS	124	61%
L Total		**203**	
Grand Total		**447**	

Table 5-22 GCSE Maths High Low vs Pass Fail Progression

Using GCSEs as a predictor of degree outcomes has been investigated previously (Education, 2013, Benton, 2015, HEFCE, 2014). The calculation of degree outcomes, based upon GCSE grades, calculated that for students with the equivalent of eight grade B results 52% would achieve a degree classification of 2.1 or above. It was calculated that 33% of students with the equivalent of eight grade C results would achieve the 2.1 or above classification. This represents a 19% gap in the outcome. The results from this dataset is based on progression

alone and not classifications, and it must be recognised that this is purely based on one GCSE result. However, there is a 16% gap between the two GCSE groups.

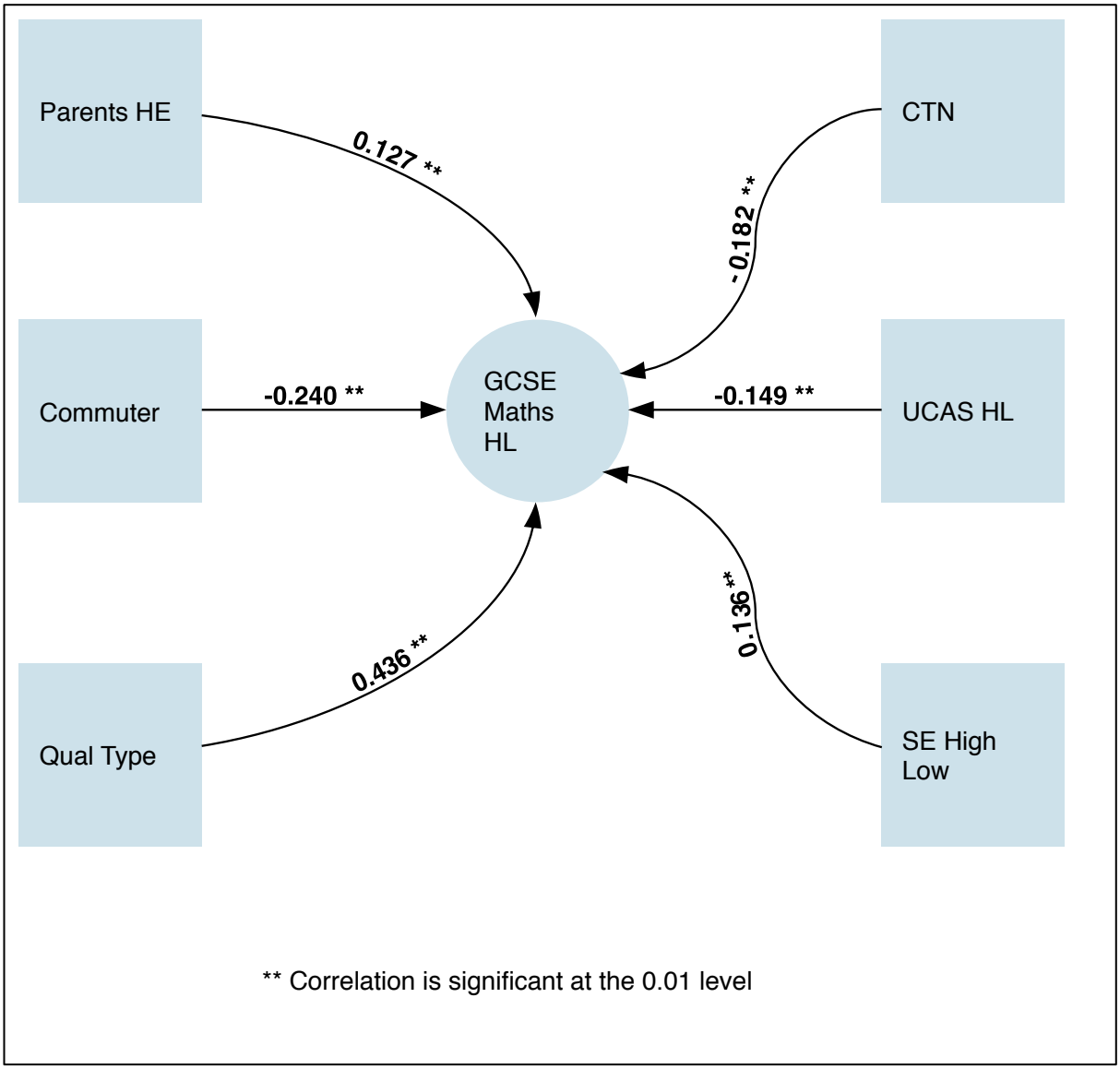

Figure 5-4 GCSE Maths HL Pearson Correlations at 0.01 Level of Significance

Correlations at 0.01 level	test	GCSE Maths HL
Qual Type	Pearson Correlation	0.436
Commuter	Pearson Correlation	-0.24
CTN	Pearson Correlation	0.201
UCAS H-L	Pearson Correlation	-0.149
SE High Low	Pearson Correlation	0.136
PARENTS HE	Pearson Correlation	0.127

The strongest association between the factors for GCSE Maths HL is with the Qualification Type. According to the Association classification's definitions, this association is a medium association and is the strongest association identified in this analysis. This is shown and discussed in section 5.1 Qualification Type. The raw data shown in Table 5-7 Highest Entry Qualification and GCSE Maths High Low Banding, shows that a higher proportion of high-grade GCSE Maths students went on to study A-levels compared to BTEC students. For BTEC students 33% were high-grade GCSEs, whereas 77% of A-level students had a high-grade mathematics grade. As previously stated, this is most likely to be due to the selection processes of schools retaining their most able students for sixth form studies. As to the actual performance of students in the groupings this is shown in Table 5-23 GCSE Maths and Qualification Type Progression.

GCSEMathsHighLow	Highest Entry Qual Short	PassFail	Total	Progression
H	**BTEC**	FAIL	22	29%
		PASS	55	71%
	BTEC Total		**77**	
	GCE A	FAIL	35	21%
		PASS	132	79%
	GCE A Total		**167**	
H Total			**244**	
L	**BTEC**	FAIL	66	43%
		PASS	87	57%
	BTEC Total		**153**	
	GCE A	FAIL	13	26%
		PASS	37	74%
	GCE A Total		**50**	
L Total			**203**	
Grand Total			**447**	

Table 5-23 GCSE Maths and Qualification Type Progression

The progression, achieved by those students who have low GCSE mathematics and went on to study a BTEC, is at least 14% lower than any other group in this study. The choice of BTEC or A-level appears to be a very strong indicator of overall HE performance. All A-level groupings outperform the BTEC groupings. It should be remembered that this is only on the basis of one GCSE grade and the overall decision to choose between A-levels and BTEC would have been made on the full set of GCSEs taken by a student.

In 2011, Michael Gove, the Secretary of State for Education, set a target for all Secondary Schools. The target was that 50% of their pupils would achieve five A-C grade GCSEs. Previously, some 35% of the secondary school students had managed to achieve this. Mr Gove called it "raising the bar".(BBC, 2011) Setting a target like this will have an immediate effect on school management teams as they seek to find strategies to meet this. It has been said school teachers are offering extra help and support to students who were borderline to help them achieve their five GCSE at grade C (Mansell, 2013). This is welcome support for the borderline pupil, however, other pupils, who are predicted to achieve grade Bs, may be achieving their grades without the additional support. There is a risk that some of those who achieved a grade C did so because of the additional help they received, and when the additional support is no longer present, they may well dip below the bar. In my experience of working with schools, they are most likely to advise these pupils to consider BTEC qualifications, whereas a GCSE B-grade pupil will be advised to study A-levels. It should be recalled that BLR identified Qualification Type as the most significant factor (p=0.003) in terms of progression. Consequently, factors that influence the choice of qualification types may provide an insight into the eventual performance of students. There has been some research into the accuracy of pre-university qualifications such as GCSE and AS-levels in predicting degree outcomes. A department of education report (Education, 2013) produced the following:

- *Neither GCSE or AS results predict whether student will get a 2:1 or better with great accuracy (approximately 70% accurate)*
- *GCSE results are marginally better at predicting whether a student will go on to get a 2:1 or above than AS level results (69.5% accuracy compared to 68.4%).*
- *The effect of combining GCSE and AS Level results adds a negligible degree of accuracy to predictions.*
- *Without AS Level results, we can still predict degree performance to a similar level of accuracy.*

How do these statements relate to the progression results presented in this analysis? This research identified that those students who achieved higher GCSE grades achieved a 77% progression rate. They outperformed the lower GCSE grade students by 16%. Therefore, when judging borderline entry decisions from level 3 qualifications, the GCSE results may well be useful in informing the final decision, and a high performing GCSE student may be credited with recognition of their former results.

The remaining significant (at 0.05) associations with the GCSE Maths High Low variable have small Pearson correlation coefficients. Commuter is the next strongest association, with a Pearson correlation coefficient of 0.240. An examination of the proportions shows that there is a greater percentage (63%) of commuters in the lower GCSE grades and conversely there are 61% of GCSE high grade students who are not commuters. This is found in Table 5-24 GCSE Maths and Commuters.

GCSEMathsHighLow	Commuter N/Y	Total	Proportion
H	Is Commuter	96	39%
	No	148	61%
H Total		**244**	
L	Is Commuter	128	63%
	No	75	37%
L Total		**203**	
Grand Total		**447**	

Table 5-24 GCSE Maths and Commuters

The question this raises is, why do commuters have the largest proportion of lower grades? According to the BCU Access and Participation Plan, (BCU, 2019)

> *"Examination of the most recent HESA performance indicators reveals that:*
>
> *- 97.6% of our young full-time undergraduate entrants come from state schools or colleges (above a benchmark of 95.7%);*
>
> *- 13.0% are from low participation neighbourhoods (just below a benchmark of 14.0%).*

Our HESA data shows that our full-time undergraduate population is extremely diverse, with over a third of entrants coming from the most income deprived neighbourhoods (IDACI Q1) in England and half of all entrants from a variety of ethnic minority backgrounds."

It is notable that that around 55% of our students IDACI 1-3 (FSM proxy) areas and the challenges this brings may contribute to the lower grades being achieved in their secondary education. The income deprivation affecting children index (IDACI) factor has provide an insight into the possible overall success rate for BCU students (BCU, 2019):

"…there is a significant difference between young students from the most and least income deprived backgrounds."

In addition, the progression of students across the University was identified as being most affected by pre-entry qualifications:

"…when continuation from Year 1 to Year 2 is interrogated. This indicates that (with the exception of BME students), student demographics are not the main indicator of clean progression: this is instead most affected by pre-entry qualifications."

This agrees with the findings of this research which places the qualification type and GCSE grades in the significant group of factors.

5.5 Academic School (CTN)

The "CTN" factor association consists of five significant correlations at the 0.01 level. They are BAME, Commuter, Parents HE, GCSE Maths HL and Qual Type. Figure 5-5 CTN Pearson Correlations at 0.01 Level of Significance shows the associations between the factors.

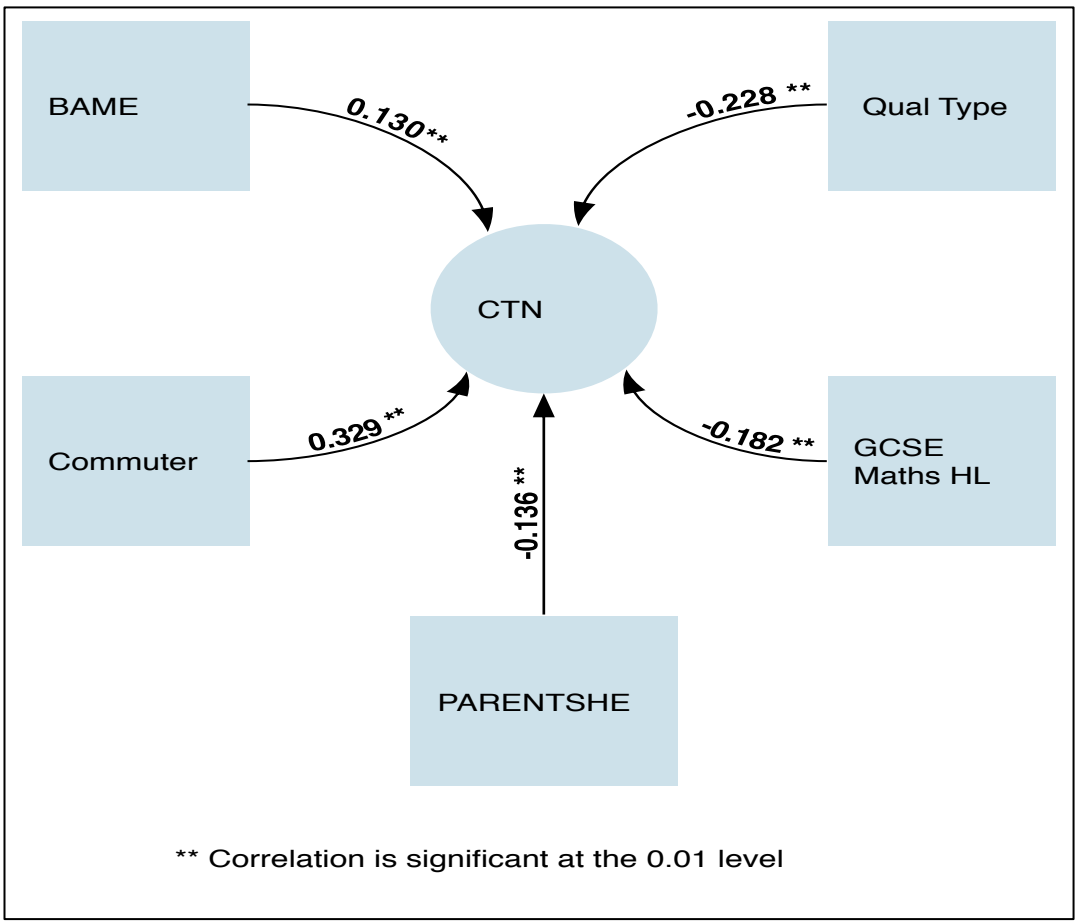

Figure 5-5 CTN Pearson Correlations at 0.01 Level of Significance

BAME has a small but significant association to the Academic school of CTN. An examination of the population is provided in Table 5-25 BAME Population in CTN and Other Schools.

CTN	BAME	Total	%
CTN	BAME	126	59%
	Non BAME	87	41%
CTN Total		**213**	
Other Schools	BAME	108	46%
	Non BAME	126	54%
Other Schools Total		**234**	
Grand Total		**447**	

Table 5-25 BAME Population in CTN and Other Schools

The other schools have a more equal split between the BAME and Non BAME students with 8 percentage point difference in favour of NON BAME students, whereas for CTN there are more BAME students by 18 percentage points.

Commuter has a medium strength significant association to the academic school of CTN. There are 223 students classified as commuting to University. The spread of commuters across the Faculty's Schools is given in Table 5-26. The total number of all students in CTN is 213, with 143 or 64% of commuter students. It may be that this is the reason that the school was identified by the BLR tests as a significant factor.

Commuter Students by Academic School	Commuter Students	%
Birmingham School of the Built Environment (BSBE)	15	7%
School of Computing, Telecommunications and Networks (CTN)	143	64%
School of Digital Media Technology (DMT)	38	17%
School of Engineering Design and Manufacturing Systems (EDMS)	27	12%
Grand Total	223	100%

Table 5-26 Commuter Students by Academic School

Parents HE status has a small, but significant, association to the academic school of CTN. An examination of the population is provided in Table 5-27 Parent HE Experience Population in CTN and Other Schools.

CTN	PARENTHE.YN	Total	%
CTN	NO	143	67%
	YES	70	33%
CTN Total		**213**	
Other	NO	126	54%
	YES	108	46%
Other Total		**234**	
Grand Total		**447**	

Table 5-27 Parent HE Experience Population in CTN and Other Schools

The other schools have a more equal split between the students whose parents had previously been in HE and those who had not, with an 8 percentage point difference in favour of those who had parents with HE experience. In CTN there are more, by 34 percentage points, first generation students compared to students with parental experience of HE.

GCSE Maths HL has a small but significant association to the academic school of CTN. An examination of the population in this grouping is provided in Table 5-28 GSCE Mathematics High Low Grades Population in CTN and Other School.

CTN	GCSEMathsHL	Total	%
CTN	H	96	45%
	L	117	55%
CTN Total		**213**	
Other	H	148	63%
	L	86	37%
Other Total		**234**	
Grand Total		**447**	

Table 5-28 GSCE Mathematics High Low Grades Population in CTN and Other School

The other schools have a larger proportion of students with a high grade GCSE pass, with 26 percentage points difference in favour of higher grades, whereas CTN has more low grade GCSE Mathematics students by ten percentage points. This leads to the next factor of Qualification Type. It has previously been suggested that the selection of level three qualifications is based on the GCSE gradings.

Qualification Type has a small but significant association to the being in "CTN". An examination of the population in this grouping is provided in Table 5-29 Qualification Type Population in CTN and Other School. There are more students with BTEC in CTN by 26 percentage points than students with A-level. The other schools have the reverse situation with 18% more A-level students.

CTN	**Qualification Type**	Total	%
CTN	BTEC	135	63%
	GCE A	78	37%
CTN Total		**213**	
Other	BTEC	95	41%
	GCE A	139	59%
Other Total		**234**	
Grand Total		**447**	

Table 5-29 Qualification Type Population in CTN and Other School

The "CTN" factor has five significant associations at the 0.01 level but none of these are strong associations and, of those, only commuter is a medium association. It may be postulated that the number of the associations is showing an interlinking between the factors and is certainly worthy of further investigation. It may be that the commuter students come from similar Lower Socio-economic areas of Birmingham, which have low achieving schools (Council, 2019) with lower GCSE results then leading to a choice of BTEC qualification. It is known that our student population has a large number of entrants from income deprived areas:

> *"over a third of entrants coming from the most income deprived neighbourhoods (IDACI Q1) in England and half of all entrants from a variety of ethnic minority backgrounds."*
> *(BCU, 2019)*

Typically, BTEC qualifications are technology and vocationally biased. CTN offers computer technology-based courses and hence students from this background are drawn to this school. This being the case the school may need to re-evaluate the entry requirements for their degree courses, or Course teams need to look carefully at the first-year curriculum and ensure that it is suited to the type of students who are being recruited and design strategies to aid the success of their students.

5.6 Closing Thoughts

The CTN school has the highest level of commuter students, at 68%, and the largest proportion of BTEC students in any of the schools, at 63%. See Table 5-30.

School Qualification Type All Students	A-Level	BTEC	%BTEC
Birmingham School of the Built Environment	19	15	44%
School of Computing, Telecommunications and Networks	78	135	63%
School of Digital Media Technology	67	55	45%
School of Engineering Design and Manufacturing Systems	53	25	32%

Table 5-30 School Qualification Type Profile All Students

The UCAS Tariff, Table 5-31 provides an overview showing DMT with the largest proportion of high tariff students closely followed by CTN. EDMS has the largest proportion of low tariff students, this may be attributed to the engineering foundation year that takes students below

the degree entry standard and provides them with an additional year of study to improve their academic potential.

School UCAS Tariff All Students	High UCAS	Low UCAS	% High Tariff
Birmingham School of the Built Environment	11	23	32%
School of Computing, Telecommunications and Networks	94	119	44%
School of Digital Media Technology	58	64	48%
School of Engineering Design and Manufacturing Systems	19	59	24%

Table 5-31 School UCAS Tariff Profile All Students

The concept of a Commuter student is not new. In 1950/51, nationally around 36% were recorded as being students living in a parental home. These numbers declined until the 1980's when the trend started to reverse (Maguire and Morris, 2018). Students were supported by a, now seemingly generous, student grant, and were able to go away to University. In recent years, with the expansion of higher education and the introduction of student loans, students are having to be more circumspect about their finances. Many students' families are unable to support them to live away. The number of Commuter students has been growing over the past 20 years and, as previously stated, 70% of BCU students are Commuter students (BCU, 2019). It is suggested that further work be carried out to establish why commuters are so drawn to BCU and in particular the CTN courses. It would be interesting to undertake a longitudinal study of IDACI grouping by course.

Having identified the risk factors to students' progression, there is a requirement to address the inequalities raised. It is important to ensure that courses are appropriate for the student base identified through the data already held about students. I would suggest the creation of a Schools and College advisory board, with representatives from schools and colleges who could provide input to curriculum design by providing knowledge about the specific content of pre-university study, local students, who may choose to be Commuters at BCU, who can discuss their challenges, and non-commuter students who face different challenges. It would build our knowledge and increase our ability to support teaching and improve progression as we could:

- Develop our core curriculum, facilities and staff expertise to improve and develop student educational experiences.

- Form strategic long-term educational partnerships with local schools and colleges to support the overall BCU objective of being the University *for* Birmingham.

Schools and College Advisory Participation Board Objectives

These would be to:

- Set the agenda for the direction and curriculum activities that integrate and build on the Faculty's course content.
- Highlight and facilitate new subject and course growth opportunities.
- Guide the Faculty towards strategic partnerships with its members.
- Feed into the marketing and communication strategy for the university.
- Advise on future portfolio developments and provide specialist pre-University subject knowledge to support the smooth transition for students into university.

The significant factors identified by the different analyses are of interest and there may other factors which are not recorded in this data that also provide a strong influence on the students' ultimate progression outcome. Following changes to the delivery of courses, there would be the opportunity to revisit the data using the discussed methodology and investigate the impact of the changes.

6 Conclusion

The Problem Statement proposed ten lines of investigation to be explored during this research. The aim was to identify and examine factors that are associated with overall progression. The analysis of the factors looked for inter-relationships and raised the possibility of being able to identify students who were at risk of struggling to progress. The data is already held within the university systems as administrative data so no other information needed to be collected. UCAS Tariff, Qualification type, GCSE mathematics grades, and Academic schools were used. In addition, Students' parental higher education experience, Social economic classification, BAME category, Gender and Commuter status for students were used. This is the data that is routinely collected for all students, so these factors were taken from the dataset and analysed.

Adjusted Binary Logistic Regression was used to combine all the factors, and five factors were identified at the 0.05 significance threshold. The following list presents the highly significant factors in descending order of significance: Qualification Type (0.002), Commuter student (0.008), UCAS Tariff (0.008), GCSE Mathematics (0.017) and the Academic School "CTN" (0.022).

The impact of the significance factors on the progression of students were found to be as follows:

1. Qualification Type- Having a BTEC entrance qualification increased the likelihood of non-completion and conversely gaining entry with A-levels increased the likelihood of progression.
2. Commuter status- Being a Commuter student increases the likelihood of completion and those who are University based students have a decreased likelihood of completion.
3. UCAS Tariff-A higher UCAS Tariff increases the likelihood of progression and conversely a lower tariff increases the likelihood of non-completion.

4. GCSE Grade- A higher GCSE grade increases the likelihood to progress and conversely a lower grade increases the likelihood of non-completion.
5. CTN Course- Those studying a course in the school of CTN had a greater likelihood of non-completion compared to the other schools.

In the original dataset A-level and BTEC students constituted 80% of the cohort in almost equal parts. The fact that 40% of the cohort has an increased likelihood of failing to progress as identified by their entrance qualifications raises the question of what steps must be put in place to support these students and reduce that probability.

The UCAS tariff analysis is arguably the least surprising, in that the model produced by the logistic regression predicts that a student with a UCAS tariff that exceeds the entrance requirement will have an increased likelihood of progression. However, there is still a progression gap of at least 18% between the students with a higher performance at A-Level and the BTEC students. The two groups have a very different learning experience, a different route to the same end. The university course is delivered in the same way to these students thus raising the question as to whether this may contribute to the difference in performance on the degree course.

The GCSE mathematics results were interestingly identified as a significant factor in progress. It was reported that GCSE grades are used by schools and colleges as selection tools when identifying which qualification the students should undertake. The BTEC students who achieved the same entry requirement in UCAS points did not progress as well as the A-Level students with the same UCAS points. Therefore the GCSE grades are linked to the choice of BTEC or A-Level route as the qualification type (TheUniGuide, 2021) which in turn links to the ability to progress.

As discussed in the review of the literature, students arriving at university, while have the appropriate entry requirements, in terms of UCAS points, have a wide range of personal and educational backgrounds. This Habitus affects the way they interact with their world. In order to support these students, the university must be aware of these differences and any difficulties they may present for the student in making the most of their time with us. If the

university can address difficulties in accessing and succeeding in their chosen study then both the student and university may benefit.

Students meeting the entrance requirements are deemed to have the potential to succeed. It is vital for the University quality assurance processes to look at a course and student performance and seek methods to ensure student success. Course teams must identify the course design and assessment methods address that will support the diversity of entry qualifications during their course's approval process. Changes to these will support the different learning experiences of students. Annual monitoring and continued course review can be used to ensure that there is continued analysis of student success related to changes made.

An interesting result was the commuter and non-commuter student analysis. Based upon the research over the past ten years (Pokorny, 2017, Southall et al., 2016, Thomas et al., 2011), it might have been expected that the commuter students would perform less well because of the distractions of homelife and journeying to and from university. However, the results run counter to this. Commuter students were found to be more successful. In BCU there is a large percentage of commuter students, and the University has recognised and been addressing the needs of this student group for over ten years. These include the compression of timetables into blocks, lecture capture and delivery via the virtual learning environment, software toolsets and a laptop loan scheme. It may be that commuter students are more skilled with time management because of their need to juggle their home life commitments, travel and studies. Further investigation into the difficulties experienced by students who are non-commuters needs to be pursued.

CTN has appeared as a school where there is a higher probability of non-completion than in other schools, and this is of concern. I would ask if this is the result of a high number of BTEC students, 26% more than A-level students, studying in the school.

In the University, we already have a lot of data, giving us some information on the habitus of our students, which we could better use to support and inform our interventions to the benefit of our students. Students are the greatest capital of a university and we have a moral

duty to ensure we are investing our knowledge in developing theirs. The key to this has to be turning demographic data into information to support pedagogy.

Analysing the university's administrative data in this way may be an additional route to support the academic process and ultimate success of our students. This research has shown a way of turning data into useful information on the background and habitus of our students, that could influence our practice and increase access to learning thereby benefiting our students.

The advent of the age of Artificial Intelligence will provide even greater opportunities to evaluate student performance characteristics. The University must provide staff with tools to access and analyse the data in a format that is both easy to retrieve and interrogate. To borrow from Winston Churchill's Broadcast on February 9, 1941, London. *"Give us the tools, and we will finish the job."*

6.1 Further work and Recommendations

This EdD began with the idea of investigating student data already gathered to look for identifying factors that may be associated with progression rates. Once identified could these inform the university towards possible opportunities for supporting students with risk factors in their studies. A progression gap between BTEC and A-level students has been identified. It has been accepted by the university that the BTEC assessment "make-good" strategy could be used to narrow this gap and potentially boost the overall progression for all students. The Associate Dean for Student Experience and the Associate Dean for Academic Portfolio and Market Development have agreed to develop this strategy within the faculty and monitor the results to assess the impact of making this change.

The reduced progression of BTEC students has raised interest within the faculty. The data set identifies 40% of CEBE students have BTEC qualifications and will have progressed to university with BTEC assessment regulations that include an assessment "make-good" policy. When the students in the data set came to BCU they were expected to do their resits at the end of the academic year. Following discussions between two of the faculty's Associate Deans, a group of academic staff were brought together to look at ways to improve success rates in student assessment. The group identified opportunities for students to make good as soon as possible the original failure and monitor the impact on progression rates. It is important to stress that this opportunity was made available to all students. I raised a proposition with a fellow associate dean, to provide an in-year make-good policy, who was convinced by evidence. Together we approached the Deputy Vice Chancellor with the proposal to run an in-year "make-good" pilot for the CEBE students. The pilot was successful providing students with an opportunity to improve their work and understanding. The University has now adopted the 'make-good' assessment scheme has been added to current academic regulations as an in-year resit opportunity. This new in-year "make-good" approach may have benefits educationally, by directly and immediately addressing any shortcomings in the assessed work through strategically timed feedback, and financially beneficial for the university. The University, by actively supporting the student to succeed and recognise their personal investment, will in turn benefit from ongoing payment of fees as the student continues to progress to the next year of study. This will benefit the faculty

through increased financial stability, and student satisfaction measures of the Faculty encouraging future applications.

The differences in progression between BTEC and A-level students suggests the need for an intervention beyond the make-good policy. We must ensure that our courses provide equal opportunity for all students no matter what entrance qualifications they have. Faculties would need to support any policy changes through strategic interventions. We need to go beyond simply relying on the UCAS tariff as a measure of readiness to study our degrees. Course curriculum and assessment methods must be appropriate for our students. My research findings have identified there is a significant difference in the progression for students who have different entry qualification. The consequences of this need to be considered. I would propose that this is a two-stage process that requires course designers to demonstrate at approval how the delivery and assessment methods in their course are suitable to the entry qualifications of their future students. Subsequent to approval, annual course monitoring can then be used evaluate the success of the approved delivery and assessment methods. This must include information about the students' progression, academic achievements and their backgrounds. At present this information is held in our data repositories. Course leaders may currently find it difficult to access and assimilate this kind of information in any useful form. Systems in the University need to be developed to provide this information in an accessible form to course and module leaders. The goal of the university courses should be to eliminate factors that are not within the student's control and enable the students to progress on their merit not their background.

Recommendation 1: A review of Course approval processes should require course teams to outline their delivery and assessment strategies based upon the typical input qualifications of their students.

Recommendation 2: An annual review of these assessment strategies should be carried out for annual course health checks. The curriculum modification process could be used to implement required changes.

The student data used in this research provides a view on student characteristics and their ultimate progression performance. It looked back at the students and identified those who may have benefited from some form of support intervention. Going forward, we need to ensure that student information is readily available to tutors and programme leaders so that staff can identify students who may need support interventions. The BCU mySRS portal, a web-based link to the student records system, provides individual student information about the registration and previous performance of the student. This is useful if you are working with an individual student but challenging for cohort analysis.

The mySRS portal was never designed to support pedagogy. It does not provide detailed links into the attendance monitoring system, Moodle activity, or assignment submission that may be used as proxies for engagement. An integrated approach that provided academic and support staff with a view of the registration, pedagogy, and attendance systems could provide opportunities to identify student at risk due to certain factors and also those who are not actively engaging and offer targeted support. The integrated approach of combining data could produce information useful in identifying strategic interventions to support identified students. This could help to maximise the opportunities for them to progress successfully through their studies.

Annual monitoring of students is standard practice in universities, but it is often viewed as being too late for the current cohort. Therefore, we need to be able to access student data in a timelier way using dashboards that can access more student data to promote what is happening in to current students. Dashboards can be used to monitor these students and inform interventions.

Recommendation 3: Course dashboards should be developed and refined to produce student information on the desktop to facilitate timely monitoring of student performance and outcomes.

I propose that we should adopt a policy to ensure course design is fit for purpose through partnership working with BCU's strongest schools and colleges links. Currently in CEBE, we have Industrial Advisory Boards (IAB). The IABs provides insight into the relevance of our courses to industry and feedback about the proposed changes to curriculum as we strive to ensure that the graduate will be suitably prepared for future careers in industry. We are establishing a Schools and Colleges Advisory Participation Board that will ensure that our courses are relevant and appropriate for level three student who will be entering our courses. Another approach that should be strongly considered is the inclusion of BTEC or A-level external advisor from our partner colleges and schools as a member of our approval events panel. This is particularly important in the technology and engineering subject areas where the inclusion of new qualification such as A-level and BTEC computer science is changing the skills and knowledge that many students will already possess when joining the first year of their degree.

Recommendation 4: Close links with schools and colleges such be made the creation of a Schools and Colleges Advisory Partnership Board. This will facilitate awareness of pre-university qualifications, assessment methods and provide a conduit for communication of curriculum developments.

We already have a lot of data, which we could use to support and inform our interventions to the benefit of our students. Students are the greatest capital of a university and we have a moral duty to ensure we are investing our knowledge in developing theirs. The key to this must be turning data into information to support pedagogy. Annual course monitoring reports must refer to and include information about the recruitment of students and their backgrounds

A longitudinal survey or study will provide further insight into some of the findings of this dissertation. This thesis was concerned with a single snapshot from the 2014 intake, looking at the subsequent intakes would provide further information into improving progression by increasing the number of students in the sample and focusing the survey on areas identified.

In this research, there are two distinct groups of students who have come to the University to study in CEBE in terms of students' academic entry qualifications. Course designers must consider the students' academic profile when considering the delivery and assessment of their courses. In order to ensure a greater and on-going understanding of entry qualifications and to develop partnerships with our students' Schools and Colleges.

7 Postscript

The data used in this research is from 2014-15 cohort. There have been some changes since that time. They are detailed below. The School reorganisation was carried in order to reorganise the management structures within the Faculty. There has been a continued growth in the number of BTEC/vocational students joining the faculty. A change that happened as a result of this research provided an in-year resit opportunity. Finally, the Schools and College Partnership Board has been launched to ensure close working relationships with feeder schools and colleges.

1. School reorganisation

In 2016, a CEBE restructure was undertaken. The School of Computing and Digital Technology and the School of Engineering and the Built Environment were created. The former schools were dissolved, and the two new schools took over the staff, students and courses.

2. CEBE Entry Qualifications Profile

Since this research dataset was captured the proportion of vocational students entering CEBE has seen a growth. In 2020, vocational students accounted for 59% of the intake and this change has also seen a steady decline in A-Level students being admitted. See Appendix 1 CEBE Faculty student population profile data for full details.

Year	A-LVL	VOC (BTEC)	Total
2020	32%	59%	91%
2018	29%	55%	84%
2017	33%	55%	88%
2016	36%	54%	90%
2015	36%	56%	92%
2014	38%	41%	79%

3. **In-year-resit introduced**

In 2018 following my initial work, a pilot of in-year resits, especially for 1st year students was introduced. This approach was influenced by the greater understanding of the BTEC qualifications that a large proportion of CEBE's students arrive with. Under this approach, a student who had failed a first semester module was supported in a 'bootcamp' style activity to retake their assessment in March rather than having to wait until July. The bootcamps provided support to prepare those students and increase their confidence. This would apply both to subject content (e.g. fundamental knowledge in, say, networking) and personal skills (time management, prioritisation, writing assignments, revising, etc.).

CEBE wanted to help students pass first-time round, so the bootcamp sessions were offered to students who were beginning to struggle with concepts in the 2nd semester, as they prepared to take the next group of assessments.

The pilot study was suggested by the CEBE team following a review of the BTEC study styles which was a part of this research. In-year retrieval has now been in introduced to BCU's 2020 Academic Regulations.

4. **Schools and Colleges Advisory Partnership Board.**

This now operational and has been instrumental to the faculty's understanding of how COVID measures in schools and college has affected the pre-entry qualifications and student knowledge of core subjects. Covid has impacted on some students more than others and this will affect their habitus and needs to be considered by those delivering courses. We have adjusted the delivery of our mathematics modules by providing additional contact time and individual support through learning support specials in their first year of study.

8 References

Adams, R., & Bengtsson, H. (2017). Oxford accused of 'social apartheid' as colleges admit no black students. *Guardian*. https://www.theguardian.com/education/2017/oct/19/oxford-accused-of-social-apartheid-as-colleges-admit-no-black-students

Anderson, L., & Gilbride, K. (2007). The Future of Engineering: A Study of the Gender Bias. *McGill Journal of Education*, *42*(1), 103.

Ball, S. J., Davies, J., David, M., & Reay, D. (2002). 'Classification' and 'Judgement': Social class and the 'cognitive structures' of choice of Higher Education. *British Journal of Sociology of Education*, *23*(1), 51-72. https://doi.org/10.1080/01425690120102854

Banerjee, P. (2019). Statistical Analysis of National Data Sets: Exploring Demographics, Access and Progression of Students in Higher Education from Vocational Entry Routes. In *Transitions from Vocational Qualifications to Higher Education - Examining Inequalities* (1st ed., pp. 39-58). Emerald Publishing https://doi.org/10.1108/978-1-78756-995-920191003

Banerjee, P., & Myhill, D. (2019). *Transistions from Vocational qualifications to Higher Education*. Emerald Publishing. https://doi.org/10.1108/978-1-78756-995-920191003

Banerjee, P. A. (2016). A systematic review of factors linked to poor academic performance of disadvantaged students in science and maths in schools. *Cogent education*, *3*(1), 1178441. https://doi.org/10.1080/2331186X.2016.1178441

Bates, S. (2008, 1/8/2008). The next director of public prosecutions is a QC with a passion for human rights. *The Guardian*. https://www.theguardian.com/world/2008/aug/01/humanrights.law

Bathmaker, A.-M. (2013). Defining 'knowledge' in vocational education qualifications in England: an analysis of key stakeholders and their constructions of knowledge, purposes and content. *Journal of Vocational Education & Training*, *65*(1), 87-107. https://doi.org/10.1080/13636820.2012.755210

Bathmaker, A.-M. (2015). Thinking with Bourdieu: thinking after Bourdieu. Using 'field' to consider in/equalities in the changing field of English higher education. *Cambridge Journal of Education*, *45*(1), 61-80. https://doi.org/10.1080/0305764X.2014.988683

BBC. (1999). This is the full text of the speech by Prime Minister Tony Blair to the Labour Party conference: . http://news.bbc.co.uk/1/hi/uk_politics/460009.stm

BCU. (2014/5). Arrival Guide 2014. (1/03/2019), 28. https://issuu.com/bcupublications/docs/arrival_guide_2014

BCU. (2017a). *Birmingham City University Mission Statement*. Retrieved 19/10/17 from http://www.bcu.ac.uk/about-us/corporate-information/missions-statement

BCU. (2017b). *Teaching Excellence Framework Provider Submission*. https://www.officeforstudents.org.uk/advice-and-guidance/teaching/tef-outcomes/#/tefoutcomes/provider/10007140

BCU. (2019). *2019-20 Access and Participation Plan*. Retrieved 10/06/2019 from https://www.bcu.ac.uk/about-us/corporate-information/policies-and-procedures/access-and-participation-plan

BCU. (2021). *OFFER MAKING FOR COURSES STARTING IN 2021*. Retrieved 20/11/2021 from https://www.bcu.ac.uk/student-info/university-courses-research/advice-how-to-choose/should-i-go-to-university/offer-making

Benton, T. (2015). Can we do better than using 'mean GCSE grade' to predict future outcomes? An evaluation of Generalised boosting models. *Oxford Review of Education*, *41*(5), 587-607. https://doi.org/10.1080/03054985.2015.1074563

Bettis, P. a. G., J. (2001). The Why of Quantitative Research: Paradigmatic Pragmatic Considerations In M. F. Lanham, E.I. and Rojewski, J.W. (Eds.) (Ed.), *Research Pathways: Writing professional papers, theses, and dissertations in workforce education.* University Press of America.

Birmingham, U. o. (2017). *Access to Birmingham (A2B)*. http://www.birmingham.ac.uk/undergraduate/preparing-for-university/teachers-advisors/reaching-regional/a2b.aspx

Bloom, B. S. (1956). *Taxonomy of educational objectives: the classification of educational goals*. Longman Group Ltd.

Boliver, V. (2013). How fair is access to more prestigious UK universities? *The British Journal of Sociology*, *64*(2), 344-364. https://doi.org/10.1111/1468-4446.12021

Boliver, V. (2016). Exploring Ethnic Inequalities in Admission to Russell Group Universities. *Sociology*, *50*(2), 247-266. https://doi.org/10.1177/0038038515575859

Bolton, P. (2012). *Education: Historical Statistics*. http://dera.ioe.ac.uk/22771/1/SN04252.pdf

Bourdieu, P. (1973). Cultural Reproduction and Social Reproduction. In R. Brown (Ed.), *Knowledge, Education, and Cultural Change* (pp. 56). Taylor Francis.

Bourdieu, P. (1998). *Practical Reason: On the Theory of Action.* (R. Johnson., Trans.). Seuil (Polity). https://monoskop.org/images/a/aa/Bourdieu_Pierre_Practical_Reason_On_the_Theory_1998.pdf

Bourdieu, P. (1999). The Contradictions of Inheritance In *The Weight of the world: social suffering in contemporary society* (pp. 423). Polity Press.

Bourdieu, P. (2010). *Distinction: a social critique of the judgement of taste* (New ed.). Routledge.

Bourdieu, P., & Nice, R. (1977). *Outline of a theory of practice* (Vol. 16). Cambridge University Press.

Bowers-Brown, T. (2006). Widening Participation in Higher Education Amongst Students from Disadvantaged Socio-Economic Groups. *Tertiary Education and Management*, *12*(1), 59-74. https://doi.org/10.1007/s11233-005-4073-4

Brookover, W. B. (1949). Sociology of Education: A Definition. *American Sociological Review*, *14*(3), 407-415. https://doi.org/10.2307/2086890

Bryman, A. (2015). *Social research methods* (Fifth edition. ed.). Oxford University Press.

Buck, P. C. S. (1944). *Psychology for musicians* (1946 ed.). Oxford University Press.

Cheema, J. R., & Kitsantas, A. (2014). INFLUENCES OF DISCIPLINARY CLASSROOM CLIMATE ON HIGH SCHOOL STUDENT SELF-EFFICACY AND MATHEMATICS ACHIEVEMENT: A LOOK AT GENDER AND RACIAL–ETHNIC DIFFERENCES. *International Journal of Science and Mathematics Education*, *12*(5), 1261-1279. https://doi.org/10.1007/s10763-013-9454-4

Chowdry, H., Crawford, C., Dearden, L., Goodman, A., & Vignoles, A. (2013). Widening participation in higher education: analysis using linked administrative data. *Journal*

of the Royal Statistical Society: Series A (Statistics in Society), *176*(2), 431-457. https://doi.org/10.1111/j.1467-985X.2012.01043.x

Colley, H., James, D., Diment, K., & Tedder, M. (2003). Learning as becoming in vocational education and training: class, gender and the role of vocational habitus. *Journal of Vocational Education & Training*, *55*(4), 471-498. https://doi.org/10.1080/13636820300200240

Collini, S. (2012). *What are universities for?* Penguin. http://bcu.summon.serialssolutions.com/2.0.0/link/0/eLvHCXMwbV2xCsIwED1EFzetilaF_oCSJrVtJlGxuilS55KkcXQQHPx779pUQRyTISQh5OVd7t0DEHzJFj93QlkajVirVIyIHlourIxizm0qUq5lRPLn7T6-HKI8W12_vNEoss4gfSrlM9InKsmrtHk6nzKqHZNIkpiTtRye5lO4-URYmEx5IlmtGyfeg2TIFXlq2iRr041HUYUoWQ_apDLoQ8vePbJOdmkWHnTPjbnAawA-VdYO1MMGzyaBApltgA_N9RD8bJ_vjgscuXBBmMLNlI-gjbTejiEoZagQnKNEG0Fl4fFhvyoZw029Ccu0mYD3ZwD_b-8UugjkvA4NzKBzw6Nr59Xa3no0Zso

Conlon, G. (2013). *The outcomes associated with the BTEC route of degree level acquisition*. Retrieved 09/12/2017 from https://londoneconomics.co.uk/wp-content/uploads/2013/05/Pearson-outcomes-associated-with-BTECs-plus-degree-03-May-2013-Final-Report.pdf

Connellya, R., Playfordb, C. J., Gaylec, V., & Dibben, C. (2016). The role of administrative data in the big data revolution insocial science research. *Social Science Research*, *59*. https://doi.org/https://doi.org/10.1016/j.ssresearch.2016.04.015

Council, B. C. (2018). *2018 KS201 Ethnic group*. Retrieved 02/02/2019 from

Council, B. C. (2019). *Annual Education Performance Report*. https://www.birmingham.gov.uk/download/downloads/id/16429/annual_education_performance_report_2019.pdf

Crawford, C. (2014). *Socio-economic differences in university outcomes in the UK: drop-out, degree completion and degree class*. IFS. https://www.ifs.org.uk/uploads/publications/wps/WP201431.pdf

Cronin, C., Foster, M., & Lister, E. (1999). SET for the future: Working towards inclusive science, engineering and technology curricula in higher education. *Studies in Higher Education*, *24*(2), 165-182. https://doi.org/10.1080/03075079912331379868

Crotty, M. J. (1998). *The Foundations of Social Research: Meaning and Perspective in the Research Process*. Sage Publications.

Crozier, G., Reay, D., & Clayton, J. (2019). Working the Borderlands: working-class students constructing hybrid identities and asserting their place in higher education. *British Journal of Sociology of Education*, *40*(7), 922-937. https://doi.org/10.1080/01425692.2019.1623013

Denscombe. (2014). *The Good Research Guide: for Small-Scale Social Research Projects* (4th ed.).

Department_for_Business_Innovation_and_Skills. (2011). *Higher Education: Students at the Heart of the System*. on-line: HMG Retrieved from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/31384/11-944-higher-education-students-at-heart-of-system.pdf

Department_for_Education. (2013). A comparison of GCSE results and AS level results as a predictor of getting a 2:1 or above at university.

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/200903/
GCSE_and_AS_level_Analysis_3_1.pdf
Dept_for_Education_and_Skills. (2003). *The future of higher education*. http://webarchive.nationalarchives.gov.uk/20040117001247/http://dfes.gov.uk/highereducation/hestrategy/pdfs/DfES-HigherEducation.pdf
Devine, A., Fawcett, K., Szűcs, D., & Dowker, A. (2012). Gender differences in mathematics anxiety and the relation to mathematics performance while controlling for test anxiety. *Behavioral and brain functions : BBF*, *8*(1), 33-33. https://doi.org/10.1186/1744-9081-8-33
Education_and_Skills_Funding_Agency. (2021). *Pre-16 schools funding: local authority guidance for 2020 to 2021*. HM GOV. Retrieved 22/06/2021 from https://www.gov.uk/government/publications/pre-16-schools-funding-local-authority-guidance-for-2020-to-2021
Erturan, S., & Jansen, B. (2015). An investigation of boys' and girls' emotional experience of math, their math performance, and the relation between these variables. *European Journal of Psychology of Education*, *30*(4), 421-435. https://doi.org/10.1007/s10212-015-0248-7
Eton, C. (2021). *Fees*. Eton College. Retrieved 22/06/2021 from https://www.etoncollege.com/admissions/fees/
Evans, R. (2009). Chapter 4 – developments in the 20th century. http://technicaleducationmatters.org/2009/08/22/chapter-4-developments-in-the-20th-century/
Field, A. P. (2017). *Discovering statistics using IBM SPSS* (Fifth edition. ed.). SAGE.
Frenzel, A. C., Pekrun, R., & Goetz, T. (2007). Girls and mathematics — A "hopeless" issue? A control-value approach to gender differences in emotions towards mathematics. *European Journal of Psychology of Education*, *22*(4), 497-514. https://doi.org/10.1007/BF03173468
Gall, M. D., Borg, W. R., & Gall, J. P. (1996). *Educational research: An introduction*. Longman Publishing.
Gicheva, N. P., Kathryn (2018). *Vocation, Vocation, Vocation. The role of vocational routes into higher education*. T. S. M. Foundation. http://www.smf.co.uk/wp-content/uploads/2018/01/SMF-Vocation-Vocation-Vocation.pdf
Gill, T. (2018). Preparing Students For University Study: A Statistical Comparison Of Different Post-16 Qualifications. *Research Papers in Education*, *33*(3), 301-319. https://doi.org/10.1080/02671522.2017.1302498
Goddard, H. (2017, Wednesday, 5th July, 2017). *Understanding Barriers to Engagement for Commuter Students* [Conference materials]. HEA Annual Conference 2017, https://www.heacademy.ac.uk/knowledge-hub/student-engagement-context-commuter-students-hea-annual-conference-2017-generation-tef
Gorard, S. (2008). Who is missing from higher education? *Cambridge Journal of Education*, *38*(3), 421-437. https://doi.org/10.1080/03057640802286863
Gorard, S. (2012). The Increasing Availability of Official Datasets: Methods, Limitations and Opportunities for Studies of Education. *British Journal of Educational Studies*, *60*(1), 77-92. https://doi.org/10.1080/00071005.2011.650946

Handley, S., & Higginson, A. (1996). The modelling and automatic commissioning of a high precision co-ordinate measuring machine. *Mechatronics*, *6*, 261-281. https://doi.org/10.1016/0957-4158(95)00075-5

Handley, S., & Higginson, A. M. (1994). *The control and commissioning of high precision mechanical systemsusing advanced digital motion control algorithms*.

HEFCE. (2015). *Higher education student equalities by sex*. hefce. Retrieved 19/03/2017 from http://www.hefce.ac.uk/analysis/eddata/

HEFCE. (2018). *Differences in student outcomes*. https://dera.ioe.ac.uk/31412/1/HEFCE2017_05%20.pdf

Her_Majesty's_Chief_Inspector. (2017). *HMCI's commentary: recent primary and secondary curriculum research*. https://www.gov.uk/government/speeches/hmcis-commentary-october-2017

HESA. (2017). *Higher Education Statistics Agency*. https://www.hesa.ac.uk/data-and-analysis/students

Idreos, S., Papaemmanouil, O., & Chaudhuri, S. (2015). *Overview of Data Exploration Techniques* Proceedings of the 2015 ACM SIGMOD International Conference on Management of Data, Melbourne, Victoria, Australia. https://doi.org/10.1145/2723372.2731084

International, C. (2017). *Cambridge International AS & A levels*. Retrieved 2019/03/15 from http://www.cie.org.uk/programmes-and-qualifications/cambridge-advanced/cambridge-international-as-and-a-levels/

Jenks, C. (2003). *Culture: Critical Concepts in Sociology* (Vol. 3). Taylor & Francis.

Johnson, J., & Hayward, G. (2008). Tariff A level report. *A Levels*(2). https://www.ucas.com/sites/default/files/tariff-a-level-report.pdf

Johnson, R., Jones, K., Manley, D., Hoare, T., & Harris, R. (2014). Replication of government research uncovers shaky evidence on relationship between school and degree performance. http://blogs.lse.ac.uk/impactofsocialsciences/2014/07/30/replicating-government-commissioned-research/

Johnston, R., Manley, D., Jones, K., Harris, R., & Hoare, A. (2015). University admissions and the prediction of degree performance: An analysis in the light of changes to the English schools' examination system. *Higher Education Quarterly*, *70*(1), 24-42. https://doi.org/10.1111/hequ.12067

Jones, J., Fleischer, S., McNair, A., & Masika, R. (2020). The International Foundation Year and first year transition: building capital, evolving habitus, developing belonging, preparing for success. *Teaching in Higher Education*, *25*(1), 36-51. https://doi.org/10.1080/13562517.2018.1541879

Kelly, S. (2017). *Reforming BTECs: Applied General qualifications as a route to higher education*. Retrieved 30/11/2017 from http://www.hepi.ac.uk/wp-content/uploads/2017/02/Hepi_Reforming-BTECs-Report-94-09_02_17-Web.pdf

King, A. (2000). Thinking with Bourdieu against Bourdieu: A 'Practical' Critique of the Habitus. *Sociological Theory*, *18*(3), 417-433. http://www.jstor.org/stable/223327

King_Edward_VI_Colleges. (2021). *Admissions FAQs*. Retrieved 09092021 from https://www.kedst.ac.uk/courses/more-information/admissions-faqs/

Laerd.Statistics. (2019). *Pearson Product-Moment Correlation*. Laerd Statistics. Retrieved 12/08/2019 from https://statistics.laerd.com/statistical-guides/pearson-correlation-coefficient-statistical-guide.php

Lawson, H. (2019). Recommendations for Policy and Practice. In P. A. M. Banerjee, D. (Ed.), *Transitions from Vocational Qualifications to Higher Education - Examining Inequalities*

Emerald Publishing 2019 1st edn. (pp. 139-148). Emerald.

Lizardo, O. (2004). The Cognitive Origins of Bourdieu's Habitus. *Journal for the theory of social behaviour*, *34*(4), 375-401. https://doi.org/10.1111/j.1468-5914.2004.00255.x

Lubienski, S. T., Robinson, J. P., Crane, C. C., & Ganley, C. M. (2013). Girls' and Boys' Mathematics Achievement, Affect, and Experiences: Findings from ECLS-K. *JOURNAL FOR RESEARCH IN MATHEMATICS EDUCATION*, *44*(4), 634-645.

Maguire, D., & Morris, D. (2018). *Homeward Bound: Defining, understanding and aiding 'commuter students'*. https://www.hepi.ac.uk/wp-content/uploads/2018/12/HEPI-Homeward-Bound-Defining-understanding-and-aiding-'commuter-students'-Report-11429_11_18Web.pdf

Maguire, P. (2020, 31/03/2020). *Keir Starmer: The Sensible Radical*. https://www.newstatesman.com/politics/uk/2020/03/keir-starmer-sensible-radical

Mansell, W. (2013). Moving beyond the C/D borderline. *The Guardian*. https://www.theguardian.com/education/2013/oct/14/moving-beyond-c-d-borderline

McCoy, T., & Adamson, D. (2016). Building a house on sand? Are vocational education and training qualifications an (in) equitable stepping-stone to success in higher education? In G. Steventon, D. Cureton, & L. Clouder (Eds.), *Student Attainment in Higher Education: Issues, Controversies and Debates* (pp. p161). Routledge.

McManus, I. C., Dewberry, C., Nicholson, S., & Dowell, J. S. (2013). The UKCAT-12 study: Educational attainment, aptitude test performance, demographic and socio-economic contextual factors as predictors of first year outcome in a cross-sectional collaborative study of 12 UK medical schools. *BMC Medicine*, *11*(1). https://doi.org/10.1186/1741-7015-11-244

McMillan, J. H. a. S., S. . (1989). *Research in Education: A Conceptual Introduction.* (2nd ed.). Glenview: Scott, Foresman and Company.

Morris, J., & Farmer, A. (1999). The predictive strength of entry grades and biographical factors on the academic and clinical performance of physiotherapy students. *Physiotherapy Theory and Practice*, *15*(3), 165-173. https://doi.org/10.1080/095939899307711

Mourby, M. M., E; Elliot, M; Gowans, H; Wallace, S E; Bell, J; Smith, H; Aidinlis, S; Kaye, J. (2018). Are 'pseudonymised' data always personal data?Implications of the GDPR for administrative dataresearch in the UK. *computer law & s e c u r i t y review*, *34 (2 0 1 8)*, 222–233. https://www.sciencedirect.com/science/article/pii/S0267364918300153

Muzyamba, M. C., Goode, N., Kilyon, M., & Brodbelt, D. (2012). Predictors of success in a UK veterinary medical undergraduate course. *Journal of Veterinary Medical Education*, *39*(4), 380-388. https://doi.org/10.3138/jvme.1011.103r1

Nash, R. (1990). Bourdieu on Education and Social and Cultural Reproduction. *British Journal of Sociology of Education*, *11*(4), 431-447. http://www.jstor.org/stable/1392877

Newman, J. H. C. (1907). *The idea of a University* (Kindle Edition.(2010-03-02) ed.). Ignatius Press.

Noden, P., Shiner, M., & Modood, T. (2014). University offer rates for candidates from different ethnic categories. *Oxford Review of Education*, *40*(3), 349-369. https://doi.org/10.1080/03054985.2014.911724

Nuffield_Foundation. (2020). *First in family university students need more guidance navigating education system*. Nuffield Foundation. Retrieved 31-07-2021 from https://www.nuffieldfoundation.org/news/first-in-family-university-students-need-more-guidance-navigating-education-system

Nunez, A. M., & Cuccaro-Alamin, S. (1998). *First-generation students: Undergraduates whose parents never enrolled in postsecondary education (NCES 1998-082)* (null). (null, Issue.

OCR. (2011). GCSE 2012 Mathematics A Specification J562 Version 2 July 2013. In. https://www.ocr.org.uk/Images/83249-specification.pdf.

Office_for_National_Statistics. (2011). *Ethnicity and National Identity in England and Wales: 2011*. https://www.ons.gov.uk/peoplepopulationandcommunity/culturalidentity/ethnicity/articles/ethnicityandnationalidentityinenglandandwales/2012-12-11

Office_For_Students. (2019). *Degree outcomes: overall results*. Retrieved 15/03/2019 from https://www.officeforstudents.org.uk/data-and-analysis/differences-in-student-outcomes/degree-outcomes-overview/

Office_of_National_Statistics. (2010). *SOC2010 volume 3: the National Statistics Socio-economic classification (NS-SEC rebased on SOC2010)*. Retrieved 22-May-2017 from http://webarchive.nationalarchives.gov.uk/20160105160709/http://www.ons.gov.uk/ons/guide-method/classifications/current-standard-classifications/soc2010/soc2010-volume-3-ns-sec--rebased-on-soc2010--user-manual/index.html

OFQUAL. (2017). *Get the facts: AS and A level reform*. HM Government. Retrieved 19-09-2017 from https://www.gov.uk/government/publications/get-the-facts-gcse-and-a-level-reform/get-the-facts-as-and-a-level-reform

OFQUAL. (2018). *Inter-board comparability of grade standards in GCSEs, AS and A levels*. Retrieved from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/764153/Inter_board_comparability_-_FINAL6461.pdf

OFQUAL. (2019, Updated 6 September 2017). *Grade descriptors for GCSEs graded 9 to 1*. Retrieved 1/03/2019 from https://www.gov.uk/government/publications/grade-descriptors-for-gcses-graded-9-to-1

Ofsted. (2019). *School inspection update January 2019 Special edition*. Ofsted. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/772056/School_inspection_update_-_January_2019_Special_Edition_180119.pdf

Ogg, T., Zimdars, A., & Heath, A. (2009). Schooling effects on degree performance: A comparison of the predictive validity of aptitude testing and secondary school grades at Oxford university. *British Educational Research Journal*, *35*(5), 781-807. https://doi.org/10.1080/01411920903165611

Onwuegbuzie, A. J., & Leech, N. L. (2005). On Becoming a Pragmatic Researcher: The Importance of Combining Quantitative and Qualitative Research Methodologies. *International journal of social research methodology*, *8*(5), 375-387. https://doi.org/10.1080/13645570500402447

Oxford_Reference. (2021). *Cultural Capital*. Retrieved 22/05/2021 from https://www.oxfordreference.com/view/10.1093/oi/authority.20110803095652799
Pearson. (2016). BTEC Level 3 National Extended Diploma in Computing. In (pp. 283).
Pokorny, H., Holley, D. & Kane, S. 2017, "Commuting, transitions and belonging: the experiences of students living at home in their first year at university", Higher Education, vol. 74, no. 3, pp. 543-558. (2017). Commuting, transitions and belonging: the experiences of students living at home in their first year at university. *Higher Education*, *74*(3), 543-558.
Ramshaw, G., Skerrett, R., & Spencer, R. (2010). *Edexcel BTEC level 3 certificate, subsidiary diploma, diploma and extended diploma (QCF); NPTC city & Guilds level 3 certificate, subsidiary diploma, diploma and extended diploma (QCF); OCR level 3 certificate for Young Enterprise Edexcel BTEC et al QCF T*. https://www.ucas.com/sites/default/files/BTEC%20QCF%20report_0.pdf
Rawlinson, K. (2018). Windrush: 11 people wrongly deported from UK have died – Javid. *The Guardian*. https://www.theguardian.com/uk-news/2018/nov/12/windrush-11-people-wrongly-deported-from-uk-have-died-sajid-javid
Reay, D., & Ball, S. J. (1997). 'Spoilt for Choice': The Working Classes and Educational Markets. *Oxford Review of Education*, *23*(1), 89-101. http://www.jstor.org/stable/1050659
Reay, D., Crozier, G., & Clayton, J. (2010). 'Fitting in' or 'standing out': Working-class students in UK higher education. *British Educational Research Journal*, *36*(1), 107-124. https://doi.org/10.1080/01411920902878925
Reilly, D. (2012). Gender, Culture, and Sex-Typed Cognitive Abilities. *PLOS ONE*, *7*(7), e39904. https://doi.org/10.1371/journal.pone.0039904
Richardson, J. (1986a). THE FORMS OF CAPITAL Pierre Bourdieu. In *Handbook of Theory and Research for the Sociology of Education* (pp. pp. 241–258). Greenwood.
Richardson, J. (1986b). *THE FORMS OF CAPITAL Pierre Bourdieu.Handbook of Theory and Research for the Sociology of Education*. https://www.socialcapitalgateway.org/sites/socialcapitalgateway.org/files/data/paper/2016/10/18/rbasicsbourdieu1986-theformsofcapital.pdf
Russell, B. (1910). Knowledge by Acquaintance and Knowledge by Description. *Proceedings of the Aristotelian Society*, *11*, 108-128. http://www.jstor.org/stable/4543805
Russell, B. (2004). History of western philosophy. In ([New ed.] ed.). London ;: Routledge.
Sanders, L. D., Annette. (2013). Building a successful foundation?: The role of Foundation Year courses in preparing students for their degree. *Widening Participation and Lifelong Learning*, *Special Issue/ Winter 2012-13*(Special Issue/ Winter 2012-13), pp. 42-56(15). https://doi.org/https://doi.org/10.5456/WPLL.14.S.42
Savage, M. (2018, 28 Jan 2018). Top universities accused of BTEC snobbery. *The Observer*. https://www.theguardian.com/education/2018/jan/27/universities-btec
Scott, D. a. U., R. (1999). *Researching Education: Data Methods and Theory in Educational Enquiry* (2nd ed.).
Shields, R. M., Alexander. (2018). False equivalence? Differences in the post-16 qualifications market and outcomes in higher education [Article]. *Educational Review*, *70*(2), 149-166. https://doi.org/10.1080/00131911.2017.1293614
Smith, E. (2014). *Using Numeric Secondary Data in Education Research*. Retrieved 02 Nov 2017 from https://www.bera.ac.uk/researchers-resources/publications/using-numeric-secondary-data-in-education-research

Smithers, A. (2015). Social Disadvantage and Widening Access to Universities. https://www.researchgate.net/profile/Alan_Smithers/publication/283578002_Social_Disadvantage_and_Widening_Access_to_Universities/links/5640a6ac08aec448fa5ff5d2.pdf

Soria, K. M., & Stebleton, M. J. (2012). First-generation students' academic engagement and retention. *Teaching in Higher Education*, *17*(6), 673-685. https://doi.org/10.1080/13562517.2012.666735

Southall, J., Wason, H., & Avery, B. (2016). The transition to Higher Education for non-traditional, commuter students-a synthesis of recent literature to enhance understanding of their needs. *Student Engagement and Experience Journal*, *5*(1). https://eprints.kingston.ac.uk/34742/1/Southall-J-34742-VoR.pdf

Statistics, O. f. N. (2021). *Unemployment rate (aged 16 and over, seasonally adjusted)*. Retrieved 2-12-2021 from https://www.ons.gov.uk/employmentandlabourmarket/peoplenotinwork/unemployment/timeseries/mgsx/lms

Students, O. f. (2017a). *Differences in student outcomes*. Retrieved 01/05/2021 from https://www.officeforstudents.org.uk/data-and-analysis/differences-in-student-outcomes/educational-disadvantage/

Students, O. f. (2017b). *Topic briefing: Black and minority ethnic (BME) students*. https://www.officeforstudents.org.uk/media/145556db-8183-40b8-b7af-741bf2b55d79/topic-briefing_bme-students.pdf

Taylor, R. (2011, Mon 18 Apr 2011). University cities thrive on students. *The Guardian*. https://www.theguardian.com/education/mortarboard/2011/apr/18/university-cities-students

The_Equality_and_Human_Rights_Commission. (2019). *Public Sector Equality Duty*. The_Equality_and_Human_Rights_Commission. Retrieved 14/10/2019 from https://www.equalityhumanrights.com/en/advice-and-guidance/public-sector-equality-duty#h3

TheUniGuide. (2021). *GCSEs determine the qualifications you take next*. Retrieved 6-11-2021 from https://www.theuniguide.co.uk/advice/gcse-choices-university/how-important-are-my-gcse-grades

Thomas, L., & Jones, R. (2017). Student engagement in the context of commuter students. *London: The Student Engagement Partnership*.

Thomson, D. (2017). *The equivalence of A-Levels and BTECs*. Retrieved 20/12/2019 from https://ffteducationdatalab.org.uk/2017/02/the-equivalence-of-a-levels-and-btecs/

UCAS. (2017a). *Filling in your UCAS Undergraduate application*. Retrieved 15-05-2017 from https://www.ucas.com/ucas/undergraduate/apply-and-track/filling-your-ucas-undergraduate-application

UCAS. (2017b). Tariff Table. https://www.ucas.com/file/63541/download?token=Pl0wqM1c

UCL, U. C. L. (2017). Widening Participation. http://www.ucl.ac.uk/prospective-students/widening-participation/eligibility

University, O. (2016). *Oxford University Student Statistics:Ethnicity of Final Acceptances Academic Year 2016*. HEIDI. Retrieved 23.10.2017 from https://public.tableau.com/views/UniversityofOxford-StudentStatistics/YearlySnapshotSummary?:embed=y&:display_count=yes&:showTabs=y&:showVizHome=no

Vaughn, K. (2000). Music and Mathematics: Modest Support for the Oft-Claimed Relationship. *Journal of Aesthetic Education*, *34*(3/4), 149-166. https://doi.org/10.2307/3333641

Wharrad, H. J., Chapple, M., & Price, N. (2003). Predictors of academic success in a bachelor of nursing course. *Nurse Education Today*, *23*(4), 246–254. https://doi.org/10.1016/S0260-6917(02)00116-8

Wolf, A. (2011). Review of Vocational Education – The Wolf Report. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/180504/DFE-00031-2011.pdf

Wolf, A. (2015). *Review of vocational education, 2011 The Wolf Report: recommendations final progress report*. E. Department of. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/405986/Wolf_Recommendations_Progress_Report_February_2015_v01.pdf

9 Appendices

9.1 Appendix 1 CEBE Faculty student population profile data

Academic year: **2020/1**
Population: **4,046** *(2019/0: 3,727)*
Full-time: **3,618** Part-time: **428**
Full-time UG: **2,624** Part-time UG: **242**
Full-time PG: **994** Part-time PG: **186**
Non-UK domiciles (Full-time only): **1,069 (29.5% of FT population)**

India	495	46.3% of non-UK domiciles
Nigeria	162	15.2% of non-UK domiciles
Pakistan	105	9.8% of non-UK domiciles

UK Full-time First Degree entrant profile: personal characteristics

	2016/7	2017/8	2018/9	2019/0	2020/1
UK FTFD Entrant population	916	905	793	784	809
Under-represented/disadvantaged groups					
POLAR quintile 1 neighbourhoods [young only]	14.0%	10.3%	11.7%	11.7%	16.0%
IMD(2019) quintile 1 neighbourhoods	47.6%	45.2%	49.4%	49.3%	48.9%
IDACI Decile 1-3 (FSM proxy) [young only]	55.0%	50.4%	56.6%	55.8%	56.6%
Ethnic minority backgrounds	59.7%	59.1%	65.6%	67.2%	64.6%
Declared a disability	10.4%	9.3%	10.7%	11.6%	10.6%
Disabled students – Mental health condition	15.8%	15.5%	25.9%	23.1%	19.8%
Disabled students – Cognitive disability	46.3%	44.0%	38.8%	37.4%	29.1%
Mature (21 and over)	17.5%	16.1%	19.8%	20.9%	17.8%
Female	15.8%	13.9%	14.3%	14.4%	15.3%
Care experienced (Headcount)	7	12	6	8	6
Average UCAS tariff [young only]	122.1	119.7	117.9	110.9	110.8
HQE: BTEC or BTEC mix % [young only]	57.9%	56.9%	58.5%	59.4%	58.5%

UK Full-time First Degree entrant profile: Geographic region

Region/authority	% of entrants	Headcount
Birmingham	40.4%	327
Other WMCA[1] (excl. Bham)	24.8%	201
Total WMCA	**65.3%**	**528**
Other West Midlands region (excl. WMCA)	11.9%	96
Total West Midlands region	**77.1%**	**624**
Other England	21.9%	177
Other UK	1.0%	8

1: West Midlands Combined Authorities

2020/1 UK Full-time First Degree entrant profile: Geographic region by IMD (2019) quintile

Region/authority	IMD Q1	Q2	Q3	Q4	Q5
Birmingham	70.9%	19.6%	5.5%	2.1%	1.8%
Other WMCA[1] (excl. Bham)	47.3%	16.9%	12.4%	11.4%	11.9%
Total WMCA	**61.9%**	**18.6%**	**8.1%**	**5.7%**	**5.7%**
Other West Midlands region (excl. WMCA)	17.0%	14.0%	20.0%	24.0%	25.0%
Total West Midlands region	**54.8%**	**17.7%**	**10.1%**	**8.7%**	**8.7%**
Other England	28.4%	18.8%	19.3%	12.5%	21.0%
Total England	**48.9%**	**17.9%**	**12.2%**	**9.5%**	**11.4%**

9.2 Appendix 2 Ethical Approval

Address for Correspondence
Dr Merryl E Harvey
Reader in Nursing, Department of Midwifery and Child Health
Bevan House, room 226
School of Nursing, Midwifery and Social Work Professions
City Campus South
Faculty of Health, Education and Life Sciences
Birmingham City University
Westbourne Road
Birmingham B15 3TN
Tel: 0121 331 6172
Email: merryl.harvey@bcu.ac.uk

12th January 2015
Simon Handley
Faculty of Computing, Engineering and the Built Environment
Birmingham City University

Dear Simon

Re: An investigation into the practicalities of engagement monitoring to inform the need for strategic interventions to improve student success

Thank you for the additional information you have provided about your study. I am happy to take Chair's action and issue a favourable opinion which means that you may begin your research.

The Committee's opinion is based on the information supplied in your application. If you wish to make any substantial changes to the research please contact the Committee and provide details of what you propose to alter. A substantial change is one that is likely to affect the

- safety and well-being of the participants;
- scientific value of the study;
- conduct or management of the study.

The Committee should also be notified of any serious adverse effects arising as a result of this research. The Committee is required to keep a favourable opinion under review in the light of progress reports.

I hope the project goes well and wish you every success. I look forward to hearing from you.

Yours sincerely,

MEHarvey

Merryl E Harvey

Deputy Chair, Faculty of Health, Education and Life Sciences Ethics Committee

List of Tables

List of Figures