The Changing Futures Project: An Action Research Study

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1. INTRODUCTION

The "Changing Futures Project" aims to directly tackle an issue that has been long discussed in both academic and professional body spheres, that of student failure in Engineering[1,2]. Defining 'failing students' as those who have not reached the standard required so as to pass a summative assessment in a required or optional module on two different occasions, this paper focuses on the experiences and perceptions of undergraduate students studying an engineering or applied science related Bachelors level qualification. The term 'trailing' relates to 'failing' students who have failed a module twice, but who have been allowed to continue onto the following year effectively 'trailing' a module (such students are required to retake the assessment for their failed module during the nominated 'exam' period the following academic year; they are, in effect, on their 'last chance'). All of the students identified in the study were at risk of being asked to leave the University should they not pass the failed modules. Unlike other interventions, this paper does not relate to a single cohort or group of students, instead it encapsulates the perceptions and experiences of students from five different years of study, 8 different subject groups and across 32 different programmes or variations of programmes. It includes male and female students, over half whom are from black and minority ethnic groups, the majority of which have a 'working class background'. Prior to discussing the main project methodology it is important to discuss the context in terms of what is meant by 'student success'. The following section

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discusses this issue, looking at how 'success' is measured and questioning the validity of current discourse in this area.

1.1 Background: Measuring Success – A Game of Chance?

Out of 126 UK Universities, the Case Study University is ranked 23rd for teaching and 32nd overall (Complete University Guide, 2016)[2]. Located in the middle of England, the University is home to over 11,000 students, of whom just under 80% are enrolled on Undergraduate programmes, and 2,300 of whom are enrolled in the School of Engineering & Applied Science. Over the past decade, like many universities, the Case-Study organisation has seen an increase in the numbers of students failing part of the assessment in engineering. Whilst most go on to retake the assessment and pass at a second attempt, some continue to fail and so are forced to either leave university or to change programmes (often enrol on a less scientific programme of study). Although student retention is a matter of concern across many of the STEM disciplines, it is particular problematic for Engineering where low student numbers are augmented by high attrition rates. Figure 1 below shows the percentage of students in each year of study whom the Board of Examiners at the Case-Study University awarded a Pass or a Fail grade in the academic year 2014 / 2015.

Figure 1: Student Progression 2014 / 2015 by Annual Cohort (%)
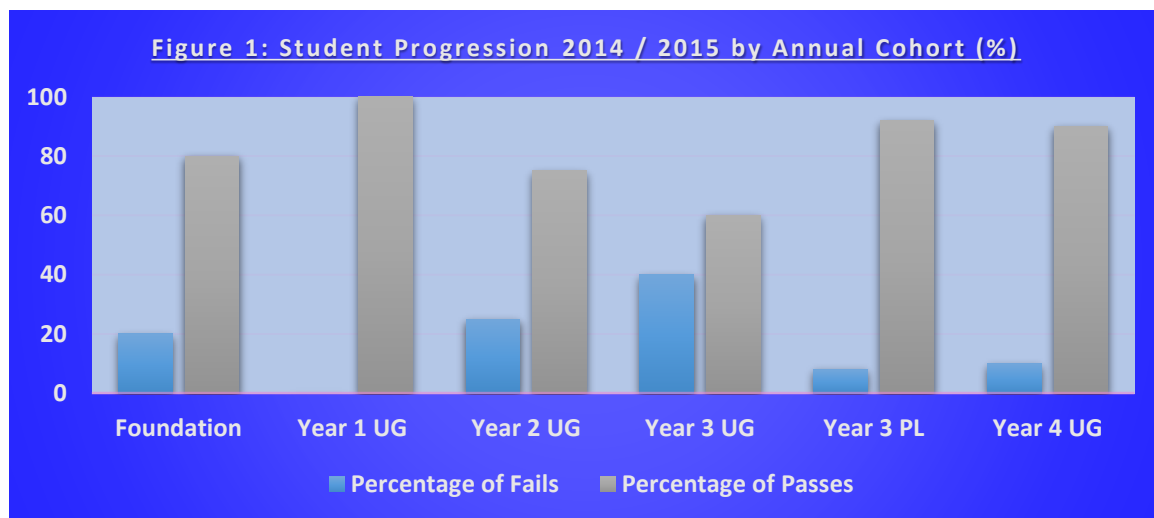
Whilst the numbers of students' passing or failing at each level of study represent one source of information, it is important to note that there are at least 10 different types of statistical information available in the UK for students, parents and policy makers to consult at will. One widely used mechanism for measuring the student experience is found in the UK Higher Education League Tables. Published in a range of different media and by a variety of sources including Government, the Higher Education Sector and the Media, the academic validity and reliability of such data is often disputed. However, whilst some academic colleagues question the methodology used in the 'League Tables', what cannot be ignored is the fact that many students (and possibly even more parents) actively consult such information before finally deciding to study a particular subject at a particular institution. One of the main sources of information available to students is via the UK Combined League Tables. This set of data provides a plethora of information covering all aspects of Higher Education on an Institution by Institution basis. One area which is of particular interest to students is the subject national ranking scale which collates all of the League Tables, providing data on a

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[2] http://www.thecompleteuniversityguide.co.uk/aston

subject by subject basis for each Higher Education Institution. This data is in itself extremely complex in that it is difficult to make a meaningful comparison across institutions; furthermore, little or no attempt is made to inform prospective students about for the wider context on an institutional basis meaning that it is impossible to gain a 'full picture' from the League Tables alone. The picture is further confused by the wider political context in which fees have risen three fold and student numbers increased by around 20% (HESA, 2014)[3]. Students often appear to have become 'more demanding' wanting value for money and in some cases expecting to 'pass because they pay'. Yet, looking at the data that is publically available, it is perhaps not unreasonable to suggest that, from a student perspective, understanding University League Tables is something of 'a game of chance'. Moreover, from an institutional perspective, the fragility of the League Tables is evident; at best such measures only give a limited perspective whilst at worst, they clearly do not reflect the wider context and cannot give a true picture of the uniqueness of each university.

Despite the amount of data available, there are no League Tables available focusing specifically on the underpinning determinants of success or failure. There is however, a significant amount of research looking at this area. It is this body of research that this paper makes a distinctive, albeit small, contribution towards.

1.2 The Wider Context: Literature Review

In seeking to examine the issues behind student failure and success, a relatively substantial corpus of literature pertaining to 'student retention and success' was accessed. Within such literature, the reasons given for student failure vary but mainly focus on educational, social and economic inequities and inequalities evident within contemporary society [3,4]. Other literature suggests that a lack of 'student engagement' is key to individual student failure[5;] whilst the impact that differing institutional settings can have on wider student achievement is also discussed[6,7].

With regards to engineering education in particular, previous studies suggest that weaknesses in the High School curriculum, particular when it comes to the sciences[8,9], represent a major factor influencing the success or failure at UG level for engineering or applied science students. Other literature focuses less on education and draws attention to the impact that demographic factors, including gender and ethnicity can have on student outcomes in university level engineering education[10,11,12]. In seeking to address the negative aspects of engineering education, some studies have focused on the impact that an *'Active Learning'* approach can have in promoting a positive student experience and thereby addressing attrition[13,14].

Despite the fact that much is known about student attrition in terms of the wider social science and pedagogy[15,16,17], the fact remains that very little is known about the underpinning _individual_ aetiology of failure. Indeed, financial and practical restrictions mean that there is little or no time for Personal Tutors, Programme Managers or other academic colleagues to explore on a one-to-one basis why and how individual students find themselves 'failing' their studies and / or 'trailing' individual modules. Activities aimed at addressing and exploring attrition traditionally tend to be offered on a cohort-wide basis often focusing on a particular demographic group under the auspices of

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http://www.universitiesuk.ac.uk/highereducation/Documents/2014/PatternsAndTrendsInUKHigherEducation2014.pdf

'widening participation'. This means that some individual students simply slip through the net, often reaching a crisis point before they are 'noticed' by the system.

In an attempt to introduce a positive, cost-effective and individually-focused support mechanism for failing students the Changing Futures Project was introduced. The following paragraphs describe how the Project identified individual 'at risk' students, putting in place bespoke support mechanisms to support such students. Concurrently an Action Research Project was put into place in an attempt to record and verify the academic validity of the project. It is the findings of this Action Research Study that is the focus of this paper.

2. METHODOLOGY

In seeking to make a positive difference to individual student's study and life-chances, the Changing Futures Project began with a data trawling exercise in which 'at risk' students from the 2nd, 3rd and Final years were identified. In total, the sampling field comprised 1368 students with 96 individuals (7%) identified as being 'at high risk' of failure. Such students had all failed one or more modules twice, and were subsequently in a situation whereby one more failure would result in their either being asked to leave the University, or their ultimate qualification being 'downgraded' to a Single Honours or Diploma (HE) level.

2.1 Study Sample

Of the 96 students identified in the data trawling exercise, 77 were males and 19 females (this is reflective of the wider demographics of the School of Engineering); 73 of the students were from Black or Minority Ethnic backgrounds whilst 23 were of a White British or White European background. All but one of the study sample was aged between 18-21 years upon starting their programme. None of the students were enrolled on the military training programme. The students entered University with a range of different qualifications with the majority (*N = 46)* having undertaken a 'Foundation Year', a course which enables students' without the prerequisite 'GCE 'A' levels in the relevant sciences to qualify to study Engineering or Applied Science at Bachelors level. The next largest group in respect of entrance qualifications related to those students with traditional 'A' levels including Maths, Physics and Chemistry. A total of 34 students fell into this group, of which 5 were identified as 'High Achievers' having had the AAB 'marker' applied.   A breakdown of the sample entrance qualifications is given below in Figure 2.

Figure 2: Entrance Qualifications of the Sample

Qualification	Number of students
Foundation Year	46
GCE 'A' Levels including Maths and / or Physics – Chemistry	29
GCE 'A' Levels including Maths / Physics / Chemistry: High Achievers	5
BTEC / Vocational Qualifications	12
Access Course (Further Education)	3
Previous Degree (BSc)	1

The students were studying a range of different subjects, the main areas of which are depicted below in Figure 3:

Figure 3: Trailing Students by Discipline
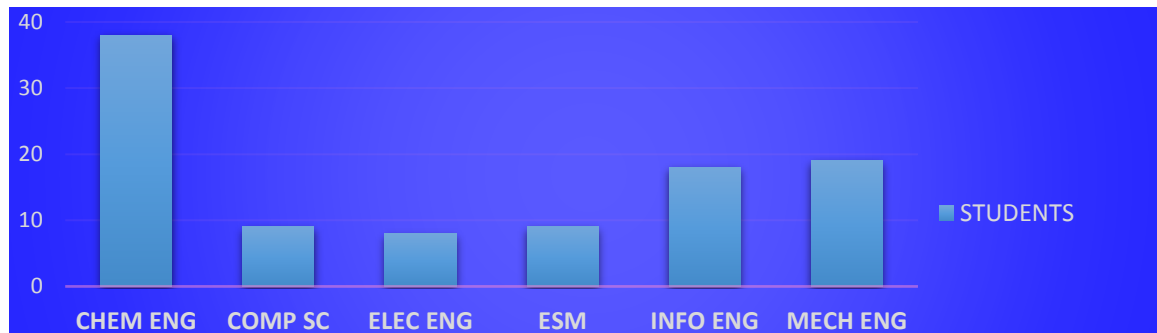
3. FINDINGS

3.1. Working with the Data: Individualisation & Disaggregation

Having verified the validity of the data through a process of disaggregation in which individual student records were examined, it was confirmed that all those within the sample had failed at least one module on two occasions and hence were correctly identified as 'trailing'. A close examination of each student's individual record was made and the following data recorded and analysed as appropriate:

- Programme of enrolment (ie BEng) & Module(s) being trailed
- Any exceptional circumstances reported by the student
- Any physical or learning disabilities reported by the student
- Each student's Personal Tutor

Additionally, an individual analysis of each of the student's captured by the project was undertaken. This analysis involved closely examining every academic profile with the intention of identifying any anomalies in terms the student's overall academic record and history. Individual performance was compared module by module, year by year enabling the researcher to identify any 'anomalies' in terms of academic achievement and patterns of behaviour. Any anomalies were then discussed with each student on an individual basis whereby the student's whole profile was examined and the issues behind any 'failure' brought out into the open.

3.2 Why Did Students Believe They Had Failed?

Following the initial data analysis a number of interventions were put in place, one of which was a one-on-one meeting with their Personal Tutor. Prior to this meeting occurring, a 'Resource Study Pack' was developed comprising engineering-focused advice, guidance and study guides. This was disseminated to all trailing students via their Personal Tutor. Personal Tutors were also asked to meet personally with each 'trailing student' to identify and discuss any underlying issues. At this stage a number of Personal Tutors contacted the researcher and asked for support and help with Personal Tutoring. Such colleagues either reported feeling ill-equipped to carry out the role or stated they were too busy with research to work intensely with individual students. Where necessary Personal Tutors were offered bespoke one-to-one support. At this stage in the Project, the Resource Study Pack was disseminated across the

School (and then the University) enabling the wider student population to benefit from the initiative.

At the beginning of term 2, all 96 trailing students in the School were personally contacted by one of the paper authors and invited to a one-to-one 'support and development meeting'. Of these 52 attended face-to-face or Skype meetings. The purpose of such meetings was to identify any extenuating circumstances that the University was unaware of and to work with the students on a one-to-one basis to identify a way forward. The meetings generally began with each student being invited to discuss why they felt they had failed. Figure 4 gives an overview of the students' perspectives as to why they were failing

Figure 4: Students' Perceptions of Why They Were 'Trailing'
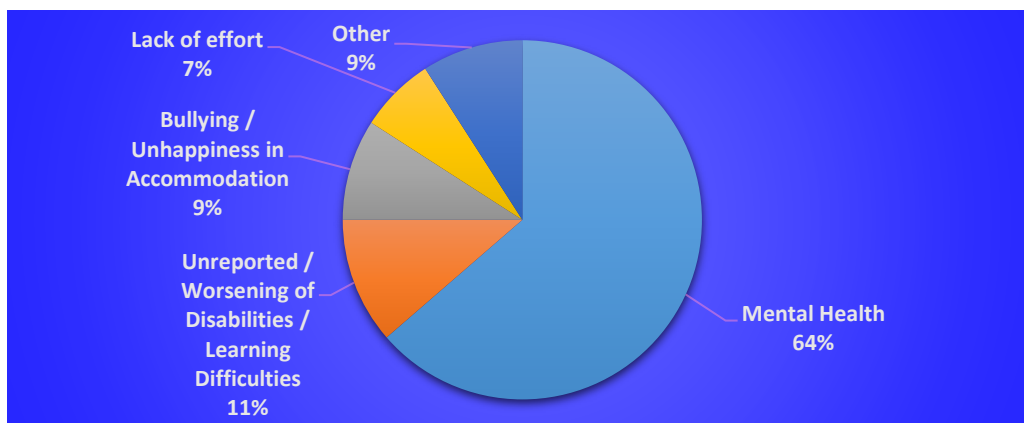
During the meeting with the academic responsible for the Changing Futures Project, each student was encouraged to begin to develop their own 'Study Success Pathway'. Concurrently, individual referrals to other areas of the School & University were made (including counselling, disability support, the Learner Development Centre and the Student's Union). Modules with 'high failure rates' were identified and a separate management intervention put into place to determine the academic reason for this and to work out a positive way forward.

3.3 End of Academic Year: Update

The success of the project is seen in the number of students who have progressed through their difficulties onto the next stage of their academic career. Of the 96 students originally included within the study, 90 passed sufficiently so as to be allowed to progress. Those in the final year graduated in July (one of whom achieved a 1st Class Honours). Of the remaining 6 students, 3 were given an 'Approved Leave of Absence' and will be recommencing study in October. Two are currently being supported through the 'jeopardy process', whereupon they will be given individual counselling to decide upon their future. One student has been granted a year's Leave of Absence to take up an internship with the University Students Union.

4. CONCLUSION & RECOMMENDATIONS

In conclusion, this project is part of an attempt to promote evidence-based practice across the School of Engineering & Applied Science. Adopting an 'Action Research' philosophy has allowed for a proactive, problem-based approach which has ultimately directly impacted on the future prospects of the sample. The study will be repeated

next year with students identified at an earlier stage in the process (ie having failed once, as opposed to twice). Whilst this project has necessitated intensive one-to-one support for many students, there is little doubt that, as part of a much wider student-focused Learning & Teaching strategy, the overall quality of the student experience is beginning to improve. As a consequence of the 'Changing Futures' Project a number of recommendations have been made. These recommendations are not only necessarily relevant for the Case-Study Institution also have important implications across a number of institutional settings and national boundaries.

4.1 Recommendations:

1. **Mental Health Support & Promotion:**

   Just under two-thirds of the students included in the Changing Futures Project reported Mental Health Problems that they had not previously told the University about. This in itself reflects wider concerns about mental health problems in the younger generation and suggests there is a dire need for Higher Education Institutions to put in place additional Mental Health support. **It is therefore recommended that HEI's invest in Mental Health, providing 24 hour resources and support mechanisms. More importantly, Universities need to focus on Health Promotion, identifying where the risk factors are and putting steps in place to address them**.

2. **Personal Tutor Training:**

   Informal interviews with Personal Tutors determined that many feel unable to cope with students who may be experiencing Mental Health problems and so simply ignore them. **Mental Health training needs to become part of the academic portfolio, with colleagues obliged to undertake training, and the matter of 'Mental Health' becoming a key aspect of any teaching qualification. Additionally training needs to be offered in 'how to be a personal tutor'.** Pastoral care is an area whereby colleagues are given a lot of responsibility yet it is an area that is often not supported by any well-known institutional framework or training. This can mean that many colleagues have little or no knowledge of the support mechanisms available for themselves and the students.

3. **Early Identification of Failing Students**

   The digitalisation of student records should, theoretically, make it easy to identify students at risk of failing early on in the academic year. **It is advised that as soon as students fail a piece of assessment, the module tutor should be encouraged to work with them** – making sure that they have done all they can to enable the student to gain sufficient knowledge and know-how to pass.

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