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Undergraduate retention in Engineering

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Context

- Participation increased significantly in past decades
 - And retention levels improved considerably
- However, students from diverse backgrounds persist in HE at different rates, and disciplines themselves retain students at different rates

Data

- HEA project on 2010/2011 HESA data
- Only students taking single-discipline programmes
- Disciplinary boundaries and broad subject areas (e.g. STEM) are associated with different retention (and attainment) patterns

Disciplines – student body variation

- Student body varies significantly across disciplines
 - And students bring a variety of characteristics with them to study that increase their vulnerability to withdrawal e.g. being:
 - a man
 - from some BME backgrounds
 - from lower socio-economic background
 - older
 - part-time
- But disciplines also contribute to different patterns of retention, both independently and when interacting with student characteristics

Withdrawal

- Different categories of withdrawal
 - Here focusing on withdrawal without any qualification or without the degree qualification that they were intending to study for

Engineering compared to other disciplines

- Engineering had a retention rate of 93% against the sector average of 94%
 - below some STEM disciplines e.g. Maths & Stats (96%) but above other sciences e.g. Computer Science (91%)

Gender

- Engineering is among the most male-dominated of the disciplines - men account for 86% of Engineering students against a sector average of 43%
 - Men are more likely to withdraw in most disciplines, including **Engineering**

	Biols	Built Envnt	Comp Sci	Engineering	GEES	Maths/Stats	Med/Dent	Phys Sci	Psychology	Vet Med	Sector
Men	6%	7%	10%	7%	4%	5%	2%	6%	6%	4%	7%
Women	5%	6%	8%	5%	3%	3%	1%	6%	4%	4%	5%

Age

- Against a sector average of 40%, Engineering has less mature students (27%) than many disciplines
 - Mature students more likely to withdraw in most disciplines including **Engineering**

	Biols	Built Env't	Comp Sci	Engineering	GEES	Maths/Stats	Med/Dent	Phys Sci	Psychology	Vet Med	Sector
Traditional	5%	6%	9%	6%	3%	4%	1%	5%	4%	5%	5%
Mature	7%	8%	10%	9%	4%	4%	2%	11%	5%	4%	7%

Ethnicity

- Against a sector average of 18% BME students, Engineering has 20% BME students (*not including non-UK domiciled and other 'unknowns'*)
 - Overall 6% of students identifying as 'White' withdraw against 8% of students identifying as BME
 - **Engineering** loses 7% of 'White' students and 9% of BME students

Socio-economic class

- Engineering has 27% of students who identify as from socio-economic classes 1&2 against a sector average of 25%
 - Students from Socio-economic classes 3-9 are slightly more likely to withdraw and this is the case in **Engineering**

	Biols	Built Env't	Comp Sci	Engineering	GEES	Maths/Stats	Med/Dent	Physical Sci	Psychology	Vet Med	Sector
SEC 1&2	4%	5%	8%	5%	2%	4%	1%	4%	4%	3%	5%
SEC 3-9	6%	7%	10%	7%	3%	4%	1%	6%	5%	6%	6%
Unknown	6%	7%	9%	7%	4%	4%	2%	8%	5%	4%	7%

Disability

- Against a sector average of 91% of students with No Known Disability, Engineering has 93% of students in this category, with 4% of those registered as having a disability registered as having a 'Specific Learning Disability'
 - Students with disabilities are no more likely to withdraw in most disciplines, including **Engineering**

Mode of study

- 20% of Engineering students study part-time against a sector average of 31%
 - Part-time students are more likely to withdraw, this is more marked in **Engineering**

	Biols	Built Eenvt	Comp Sci	Engineering	GEES	Maths/Stats	Med/Dent	Phys Sci	Psychology	Vet Med	Sector
Full-time	5%	6%	9%	6%	3%	4%	1%	5%	5%	5%	5%
Part-time	8%	8%	10%	10%	4%	3%	4%	12%	4%	3%	8%

Country of domicile

- Against a sector average of 89%, 77% of students in Engineering are domiciled in UK before they start their degree
 - Non-EU **Engineering** students are slightly less likely to withdraw than the sector average, but EU and UK students have slightly higher rates

	Biols	Built Envnt	Comp Sci	Engineering	GEES	Maths/Stats	Med/Dent	Phys Sci	Psychology	Vet Med	Sector
Non-EU	5%	5%	10%	5%	5%	4%	2%	6%	5%	2%	6%
EU	5%	5%	6%	7%	4%	6%	2%	7%	6%	6%	5%
UK	5%	7%	9%	7%	3%	4%	1%	6%	4%	4%	6%

UCAS points attained

- Overall, students with less UCAS points are more likely to withdraw, and this is more marked in **Engineering**

	Biols	Built Eenvt	Comp Sci	Engineering	GEES	Maths/Stats	Med/Dent	Phys Sci	Psychology	Vet Med	Sector
Above 340 points	4%	5%	7%	4%	2%	3%	1%	3%	4%	3%	4%
Below 340 points	9%	11%	12%	12%	5%	7%	3%	10%	7%	9%	9%
Unknown	5%	6%	9%	6%	3%	4%	1%	6%	4%	4%	6%

Summary - areas of *specific* concern for Engineering

- **Gender** – performing at sector average and doing well against some STEM disciplines e.g. Computer Science, and on transition to professional discipline-related work
- **Age** – Engineering sees slightly elevated levels of withdrawal for Mature students
- **Ethnicity** – Engineering sees slightly elevated levels of withdrawal for BME students

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- **Socio-economic class** – Engineering has slightly elevated levels of students withdrawing from socio-economic classes 3-9
- **Disability** is not associated with increased withdrawal in Engineering
- **Part-time students** in Engineering are more vulnerable to withdrawal than they are across the sector overall
- **Country of Domicile** – Non-EU students slightly less likely to withdraw but EU and UK slightly more likely to

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- **UCAS points** – students with less than 340 UCAS points have elevated levels of withdrawal in Engineering

Reasons for leaving

- Different categories:
 - Personal; Health; Finance; Academic Failure etc.
 - ‘voluntary withdrawal’
 - ‘required to withdraw’
 - the majority of STEM disciplines, as well as the majority of social science disciplines, recorded higher percentages of students leaving for ‘academic failure’ reasons
 - And more likely to ‘require students to withdraw’ – i.e. because of Academic Failure or Exclusion’ - from BME backgrounds, men
 - while the majority of Arts and Humanities disciplines recorded lower percentages of students leaving because they failed to progress
 - And more likely to have students withdrawing for ‘personal’ reasons

	% completed a course	% Acad Fail	% Health	% Finance	% Other personal	% Written off	% Exclusion	% Left for job	% Other
Sector	20	29	2	2	22	5	4	2	14
Built Env't	18	35	1	2	19	4	2	2	16
Comp Sci	20	38	1	2	18	5	4	2	11
Engineering	22	36	1	2	16	4	3	3	13
GEES	14	28	3	3	27	6	9	2	9
Maths/Stats	28	34	2	1	19	1	5	2	8
Phys Sci	27	27	2	1	28	2	2	1	9

Academic failure

- Academic failure can be about
 - Technical nature of subject – and habitual practices around these
 - Some groups not engaging with academic and pastoral support services on offer when they need help
 - Men, BME students, students from SEC 3-9 etc.
 - Cultures and practices within disciplines around ‘non-standard’ or ‘struggling’ students

Whose responsibility is this?

- “Access without support is not opportunity” (Tinto 2008)
- “Higher education must accept that the implications of offering access to non-traditional students do not end, but rather begin, at the point of entry” (Bamber and Tett 2001)

- Mainstreaming message
 - Not a *minority* issues: The majority of initiatives help the majority of students
 - One size does not fit all so vary offer
 - Think about presentation of initiatives

How do we support completion?

■ Focus on First year

- Most students withdraw in year 1
- Estimated 25-45% of students claim they considered withdrawal in Year 1
- Most students cite very early experiences as key in their persistence and satisfaction
 - Research shows sense of ‘belonging’, fostered through ‘engagement’ is key to building early and lasting student satisfaction
- Most effective strategies start pre-entry (‘preparedness’) and/or on Day 1

Belonging and Engagement

- Belonging – students cite a sense of belonging to the course, department, school or university as very important
 - Some ‘non-standard’ students (e.g. BME; Local; Mature; Part-time) find this more difficult to establish
- Research indicates belonging is established through engagement
 - With staff; peers; AND academic work
 - Lack of sense of belonging comes second, as reason for withdrawal, only to disappointment with course

Academic Engagement

- Students cited “stimulating”, “interactive”, ‘real world’, “relevant”, “problem-based”, “enthusiastic” learning and teaching as key
 - Diverse learning opportunities & assessments
- Supportive relationships with staff and fellow students around learning also key
 - Accessible staff – module tutors, personal tutors etc.
 - Prompt responses to contact
 - Clear and transparent criteria for assessments and prompt and constructive feedback
 - Peer learning and assessment opportunities
 - An ‘academic home’

Monitoring

- Monitor:
 - Engagement
 - Attendance and assessment submission
 - Identify at risk students and at risk times for withdrawal
 - Retention and completion – consider exit interviews/focus groups/surveys
- Monitoring data regularly – hard even at national level data patchy and reporting differences suggested e.g. Vet Med no exclusions
 - Ensure data are high quality and utilised fully
- Strategies are more effective if underpinned by data

Key issues for consideration

- Mismatch between knowing and doing
- Mainstreaming message
- Listen to students
- Be proactive in support and keep it going
- Leadership
 - Managers/Leaders to show commitment
 - To recognise and reward capacity in staff
- Is it good enough to match national averages?

Engineering here defined to include the following sub-disciplinary subject areas

- **Engineering**
- (F2) Materials science
- (H0) Broadly-based programmes within engineering and technology
- (H1) General engineering
- (H2) Civil engineering
- (H3) Mechanical engineering
- (H4) Aerospace engineering
- (H5) Naval architecture
- (H6) Electronic and electrical engineering
- (H7) Production and manufacturing engineering
- (H8) Chemical, process and energy engineering
- (H9) Others in engineering
- (J1) Minerals technology
- (J2) Metallurgy
- (J3) Ceramics and glasses
- (J4) Polymers and textiles
- (J5) Materials technology not otherwise specified
- (J6) Maritime technology
- (J7) Biotechnology
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- (J9) Others in technology

Put HEA report link here

- <https://www.heacademy.ac.uk/node/10293>



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