Retention and Widening Participation in the Faculties of Sciences and Engineering, University of Glasgow

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Executive Summary

Key findings

- We explored the relationship between entry qualifications and first year progress in certain Science and Engineering courses, as well as other background characteristics such as socio-economic status, underrepresentation, age and gender, within the agendas of retention and widening participation. In order to identify underrepresented students who have the ability to succeed but whose potential could be missed we examined the progress of first year students over the past three academic years in five courses in the Faculties of Sciences and Engineering. *We found varying levels of progress across the five courses with pass rates ranging between 56% and 83%.*

- Over the three years examined 8% of the three thousand students admitted to the five courses had below the minimum advertised entry requirements. One third of these failed to achieve a satisfactory level in first year courses as opposed to one quarter of all other students examined. In other words, *two thirds of those admitted below the entry thresholds made at least satisfactory progress.*

- *We found there was an association, albeit statistically weak, between previous entry qualifications and first year progress.* First year progress, across the board, was poorer in the three mathematically based courses examined than in the two 'soft' Science courses. We discovered an association between a higher level of previous Maths qualification than stated entry requirements and first year progress.

- *The advantage of advanced level school qualifications (good A-level or Advanced Higher) in relevant subjects was highlighted in both quantitative and qualitative analysis*. Students who stayed on at school for sixth year in Scotland after qualifying in fifth year achieved better first year grades. Not only did this afford them the opportunity to study to advanced levels but may also have allowed them to develop the emotional maturity required for independent study.

- *Non-standard entrants within the agenda of widening participation are at greater risk of withdrawal than standard entrants.* Students with non-standard entry qualifications are a diverse group from a variety of backgrounds. Those who do persist show a high level of commitment to their studies, they can and do achieve high grades.

- *Widening participation students, as identified by three separate measures, are as well qualified as the general body of students and yet make somewhat poorer first year progress*. With each measure we saw disadvantaged students slightly under-performing but not overly represented in the failing students category.

- *Pre-entry preparation courses appear to benefit first year students.* Widening participation students who undertake certain access courses, summer schools and school-based outreach programmes are more likely to achieve satisfactory grades.

- Other background characteristics known to be 'risk factors' for withdrawal (Patrick, 2004) were examined in relation to first year progress: Age; Gender; part-time employment; distance to travel to University. Consistent with the national trend female students are somewhat outperforming males. However, it is age on entry, not gender, which we saw as influencing non-progression. *Students over 21 are twice as likely to be failing to pass the first year courses*. We also noted trends between increased hours of part-time work reported or longer commuting time to University and first year progression.

- *Students who show clear signs of motivation out perform less committed students.* Students with a clear degree course in mind; who studied an average of ten or more hours per week outside class contact; who mentioned determination to succeed and the importance of good attendance consistently outperformed others.

- *Students gaining higher grade point averages have more accurate expectations of subject content and workload than others.* The most common expectations that weren't met involved levels of contact with academic staff and lack of opportunities to socialize with classmates. Those who had thought of leaving were more likely to quote multiple aspects of their courses not meeting their expectations.

- *The importance of attending lectures and reviewing notes were repeatedly stressed as important learning strategies.* Advice to new students from returning students was mainly about time-management; regular attendance and keeping up with the work throughout the year, balancing studies and social life.

- Students gaining higher grade point averages on course not only showed academic commitment in terms of time spent studying but also were likely to have more friends on their course. *The balance between academic and social integration is fundamental to success in first year.*

- *For those who had considered leaving, the overwhelming reason for staying was determination.* We asked the returning students if they knew why their peers had left and it was thought that few had left due to financial issues, the most common reasons were related to wrong choice of course or inability to cope with the work. Those who had considered leaving had faced similar issues but they expressed strong determination to succeed.

- We recommend retention strategies addressing our key findings. (see table 4)

Acknowledgements

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We are extremely grateful to the students who responded to our request for information about their first year experiences in surveys and focus group interviews.

Introduction

This project aimed to examine retention rates in line with the rationale behind the Universities UK's report *Fair Enough?* (2003), the Admissions to Higher Education Steering Group report *Fair Admissions to Higher Education* (2004) and the key objective of The Sutton Trust. These aim to assist in the identification of underrepresented students who have the ability to succeed but whose potential could be missed.

We examined the progress of first year students over the past three academic years (sessions 2003/04 to 2005/06) in courses in the Faculties of Sciences and Engineering at the University of Glasgow. The project expands on a pilot carried out with students from the Department of Chemistry (Walker, 2005). Five courses were chosen for the variety of retention issues they may face as well as for the potential comparisons we may find. We worked with the course coordinators to determine problems and existing retention and support strategies. We then analysed data available from the University student records database with respect to first year progress and also information provided in response to a questionnaire administered to the most recent cohort of first years (2005/06). Qualitative data from the student's perspective was obtained by answers to open-ended questions and during focus groups. Returning students were surveyed in an attempt to discover how they succeeded despite the fact they may have the same background and have faced the same pressures as their peers who had not progressed through first year.

The Universities UK's report *Fair Enough?* (2003) found that 27% of students from lower occupational groups participate in higher education in comparison to 50% of those from higher occupational groups. In the courses studied at the University of Glasgow we found a similar ratio of 20% participation by Socio-economic groups 4-7 compared to 45% groups 1-2. There is still a perception amongst the general community that admitting larger numbers of underrepresented students will reduce standards in higher education (McGoldrick, 2005) and certainly whilst the University of Glasgow outperforms its counterparts in the Russell Group by admitting more students from state

schools and from low participation neighbourhoods our retention rates are amongst the poorest. The implication being that underrepresented students will be less well qualified on entry. We set out to explore the relationship between entry qualifications and first year progress, as well as other background characteristics such as socio-economic status, underrepresentation, age and gender, within the agendas of retention and widening participation.

Student retention has become a major issue across the higher education (HE) sector (not in the least due to its influence in positioning institutions in League Tables), and the complexities of the factors involved (Lowe & Cook, 2003; Thomas, 2002; Tinto, 1975; Walker, 1999; Yorke & Longden, 2004) and therefore strategies required to improve retention particularly in first year (Johnston, 2001; Harvey and Drew, 2006) are widely acknowledged. Many of the current theories on student retention are based on a model of academic and social integration developed by Tinto. Tinto stresses the importance of the 'degree of fit' between the student and the institution (Tinto, 1973, 1993). More recently, in a review of student retention research and practice, Tinto has stated that the focus now needs to be on a model of strategies for retention in practice, putting theories into action (Tinto, 2006).

This report describes the results of the project and concludes with implications of the findings for retention of students at the University of Glasgow and elsewhere, with particular focus on underrepresented students. The increasing diversity of students, with a move away from the student deficit model of our traditional institution, brings a need to review learning and teaching strategies and student support systems to both engage and empower the modern student. We make recommendations for retention strategies based on our findings and examples of good practice in the literature. We are continuing the work by piloting some of these in the Faculty of Engineering at the University of Glasgow.

Methodology

This large scale study involves over three thousand students from five first year courses across the Faculties of Sciences and Engineering over three academic years. The courses included were: -

Mechanical Engineering Level 1
Electronics and Electrical Engineering Level 1 (EEE)
Computing Science Level 1 programming course (CS-1P)
Biology-1
Science Fundamentals-1

Background information on students and their first year results were obtained, where available, from the University's central student records database.

Returning students from the 2005/06 first year were contacted during Semester 1 to complete a questionnaire retrospectively on their first year experience and were invited to join focus group sessions. 143 online questionnaires were completed, representing approximately 15% response rate. Students were asked to give their registration number to enter a prize draw and to allow collection of further background data and qualitative responses and comments. The answers given by respondents were analysed for: -

1. General trends across all the first year courses.
2. Trends in students gaining lower grades in comparison to those with higher grades.
3. Trends in students who said they had thought of leaving University during first year. 25% of respondents gave this answer, comparable to 30% in the first year experience survey reported by Yorke and Longden (2007).
4. Problems identified particular to individual courses. Information was fed back to Course Coordinators for action by Departments.

Students who didn't re-enroll were not contactable, and therefore it was not possible to determine individual reasons for leaving. However, much research has been undertaken on student withdrawal, particularly in first year (Harvey & Drew, 2006). Recently within the University of Glasgow Patrick (2004), in attempting to produce a predictive model of student success, identified a number of risk factors and yet his main substantive finding is that commitment is the most important variable and has the strongest association with persistence. Elsewhere, Yorke and Longden (2004) follow a descriptive model of student attrition and offer a list of four categories of reasons, these are: - flawed decision making; experience of the programme and institution generally; failure to cope with the demands of the programme; and events that impact on students' lives outside the institution. It is now often considered that there is much of value to be learned from students who succeed.

Results

The levels of progress across the five courses ranged from 56% to 83% of students passing. First year progress, across the board, was poorer in the three mathematically based courses, Mechanical Engineering, Electronics and Electrical Engineering and Computing Science, compared to the two 'soft' Science courses.

Science Fundamentals is a non-progressing course which is nevertheless a requirement to pass for progress to Biology Level 2 courses. It is taken as an alternative to Chemistry-1 for those who don't have adequate previous chemistry qualifications. It replaced General Chemistry -1 in 2004 and provides a broad understanding of mathematics, physics and chemistry. It, therefore, naturally has a high number of the less well qualified Science entrants. However, in order not to duplicate students' results as the majority of the class are also doing Biology-1 (and others possibly Computing Science) we disregarded it when combining course results for the overall progress of all students, or 'everyone'.

We identified 246 of 3113 students with below the advertised minimum entry requirements (approximated as 2 SQA Highers in Science subjects at B or 1 Science A-level at B) across the four courses (not Science Fundamentals). Figure 1 is a graph of their progress in comparison to the whole student population ('everyone'). Progress is given as GP(A) which is grade point in a single course (CS-1P) or grade point average across the 2 or more courses that make up Level 1 curriculum for that subject: Grade A is equivalent to 16 points, Grade B is 14 points, Grade C is 12 points, Grade D is 10 points, Grade E-G are 8 to 2 points. GP(A) 10 or above is considered a pass. The students with less than GP(A) 10 may have achieved less than the satisfactory grade for progression by completing some or all of the course assessments. GP(A) of 0 has been awarded due to early withdrawal or no credit because of poor attendance or non-submission of course work or exam papers.

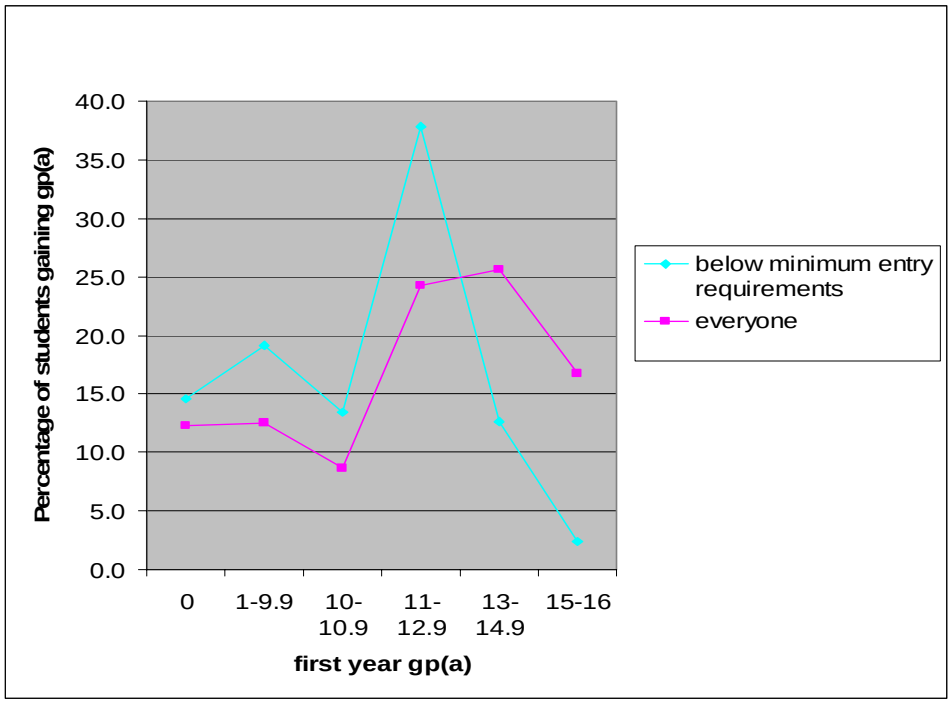

Figure 1 First year progress of students with below minimum entry requirements.

Students with below minimum entry requirements are clearly performing less well than the population as a whole. They are more likely to achieve the lower grades of GP(A) 1 to 12.9 and much less likely to achieve the higher GP(A)s in their first year courses. However, they are only marginally more likely to get GP(A) 0.

A relationship between qualifications on entry and first year progress

On further investigation into the previous qualifications of the failing students we observed a trend with level of qualifications on entry and first year grade. However, 8% of even the very well-qualified students don't achieve a pass ('Excellent' qualifications on Figure 2 below). This is in comparison with 33% of the least well qualified students ('below minimum'). This does however indicate that two thirds of students with below minimum entry requirements do achieve at least a satisfactory pass in their first year courses, implying that students with potential (even if without apparently suitable grades on entry) can and do succeed. Patrick (2004) argues that commitment is the key to success and that it can counteract poor previous qualifications. He found an apparent trade-off between entry point score, academic effort, help and feedback.

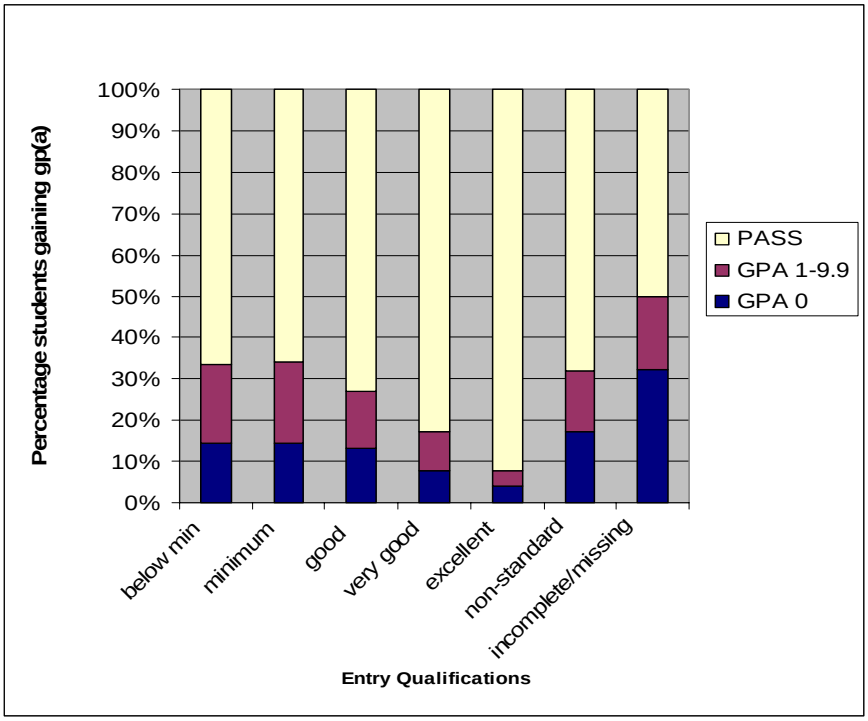

Figure 2 First year progress by entry qualification

Cramer's V is a statistic measuring the strength of association between two categorical variables on a scale of 0 to 1. For each course Cramer's V for GP(A) by entry qualification category is around 0.25 implying that there is an association between entry qualifications and first year progress in all courses, albeit statistically weak.

We looked at the influence of qualifications in individual school subjects. Full records of previous qualifications were not available in every case so there are some students in the category of missing/incomplete. Those with non-standard qualifications, that is, not UK school exam results, were grouped together separately. The relevant Science subjects were generally recorded much more reliably and so analysis had to be restricted to these.

We found trend between better Maths qualification on entry and achievement of higher first year GP(A). Figure 3 clearly shows this for Mechanical Engineering. We found the same association based on Cramer's V for Maths qualification in the other Engineering course and Computing Science. For Science Fundamentals the trend was less obvious and for Biology far less so. The values of Cramer's V for qualification categories for each course are in Table 1.

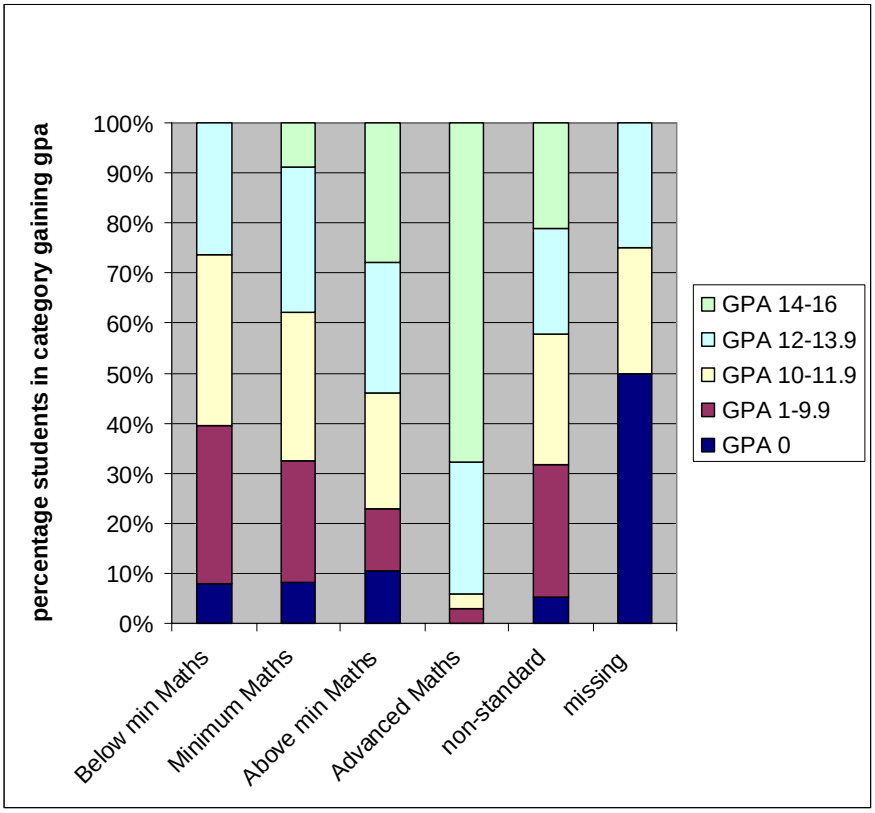

Figure 3 Mechanical Engineering GPA by Maths entry qualification.

	Science subjects	Maths	Physics	Computing	Biology
Mechanical Engineering	0.24	0.29	0.32		
EEE	0.25	0.30	0.29		
Computing Science	0.26	0.25		0.20	
Biology	0.25	0.16			0.23
Science Fundamentals	0.25	0.22			

Table 1 Cramer's V statistic for standard entry qualifications by course.

Physics qualification was also weakly associated with progress in Engineering courses and appears to be as important as Maths, based on the value of Cramer's V in Table 1.
Qualifications in Computing Studies (or Information Technology) showed less of an association with Computing Science-1P than Maths qualification.
Biology qualification showed the strongest association with Biology-1 progress, appearing to be slightly more important than either Chemistry or Maths.

From the comments in questionnaires and interview sessions we know that students do find the Maths aspects of courses demanding. It was acknowledged to be stretching but the students we spoke to found good teaching by first year lecturers helped them get through.

The advantage of advanced level school qualifications (good A-level or Advanced Higher) in the most relevant subjects was highlighted in both quantitative and qualitative analysis.

"I wish I had known how useful advanced highers would be – I only took higher maths and physics and found it hard to keep up with a class which had mostly done A levels or advanced highers" (Mechanical Engineering student)

Although some were negative comments about the repetition of school work, the better qualified students were, in general, happy to have less challenging subject matter during their first year because of the four (or five) year Scottish degree system. This allowed them to focus on the courses for which they were less well prepared or to deal with all the other challenging aspects of starting University, including first experiences away from home for some, coping with domestic chores; or settling in to the social life:

"A LOT less [study] time needed than other courses…; this however came as a blessing because it allowed me to concentrate on my other subjects which were a lot more demanding" (Science Fundamentals student)

"it was a good way of breaking us in to University life as there's so many other aspects and work wasn't really an issue to start with for those of us who had done it [Advanced Higher]… the first month of Uni hasn't really got a whole lot to do with studying" (Mechanical Engineering students)

"first year [Maths] was mostly revision… it was good as I had enough to contend with just coming to University, to another city and everything" (Mechanical Engineering students)

"The stuff itself was quite easy… as had done at school and that was good for me as I had a year, sort of, to learn to study in English… and to come to another city" (overseas Biology student)

"The work isn't difficult, its more getting used to a totally new way of doing things and new friends that is hard. Also living away from home" (Biology student)

Students from Scottish schools may be offered a place at University after their Scottish Qualifications Authority Higher results in 5th year. In 6th year at school further Highers or Advanced Highers can be taken.

When looking at first year progress by entry route we found: -

- SQA students who entered University from 6th year but had met their entry requirements in 5th year and A-level students had the most successful first year progression across all courses;
- SQA students who came directly from 5th year, those who qualified in 6th year, or did not come to University direct from school do less well;
- Students with school qualifications from outside the UK tend to do slightly better than this second group of Scottish students. Of the 124 overseas students those from countries in the European Union did slightly better than International students;
- Students with non-standard entry routes, that is have been admitted to University on the basis of something other than their school qualifications, do least well overall.

The students who achieve their entry requirements at first sitting of Highers (qualify in 5th year) differ somewhat in their level of progress depending on whether they stay on for 6th year at school. This may be further evidence for the benefit of taking Advanced Highers, whether or not they achieve a pass at a high grade. It is also possible that the extra year to develop maturity and life skills to cope with the transition from school to University, academically and otherwise, is an important factor in successful progression. As students who qualify in 6th year or have taken some time away from studying don't do so well it seems there may be a balance between academic focus and emotional maturity required.

Widening Participation

1. **Non-standard entry qualifications**

The category of students with non-standard entry made up around 10% of our cohort. This includes students with college or other higher education qualifications, and students from a range of access or foundation programs. We found that the progress made by these students varied widely. Looking more closely at the breakdown of their qualifications: -

- Of the 120 students with Higher National qualifications (HNC or HND) the majority had an HNC (note that HND qualifications may allow direct entry to Level 2 in some courses, these students were not included in this study of Level 1 courses). Around 43% of those with an HNC fail to achieve GPA 10 compared to 35% of those with an HND;
- The University of Glasgow's Department of Adult and Continuing Education runs Access courses from which students can enter the Honours programs in Sciences and Engineering. These students have mixed fortunes – in Computing Science and Electronics and Electrical Engineering both students had GPA 0, however the student in Mechanical Engineering achieved GPA 11. In Biology nine students articulated via this route, four got GPA 0 while five passed, some achieving the highest grades;
- Other Access courses are run by the Scottish Wider Access Programme (SWAP), or by other providers. No students articulated into the Engineering courses from these. The two students in Computing Science got GPA 0 whilst some of the thirty-two in Biology did very well. In general, the students from Access courses not directly linked to the University faired least well;
- Over 50% of students from a range of 'other' foundation programs failed to pass first year.

Students with non-standard entry qualifications are a diverse group from a variety of backgrounds. Attempting to identify trends by qualification is not particularly useful as further categorization splits them into very small numbers and they will have been admitted to the University of Glasgow on the basis of individual merit. It is interesting to note however that students in the non-standard category appear to progress less well than their 'standard' contemporaries. So although individuals can and do progress well as a group they appear to be vulnerable and 'at risk' at our traditional institution (also noted by Patrick, 2004)

Widening participation students were identified by a further three separate measures:

2. Socio-Economic Indicator

The socio-economic group based on the National Statistics Socio-economic Classification (familial occupation codes) had been recorded in our records system for 90% of the students.

These are:-

- Group 1 Higher managerial and professional occupations
- Group 2 Lower managerial and professional occupations
- Group 3 Intermediate occupations
- Group 4 Small employers and own account workers
- Group 5 Lower supervisory and technical occupations
- Group 6 Semi-routine occupations
- Group 7 Routine occupations
- Group 8 Never worked and long-term unemployed
- Group 9 Unclassified

In line with national averages the participation of students from Groups 4-7 is much less than the higher socio-economic Groups 1&2, 19% compared to 43% in the courses studied. Figure 4 shows the progress made across the first year courses by students grouped by Socio-economic indicator.

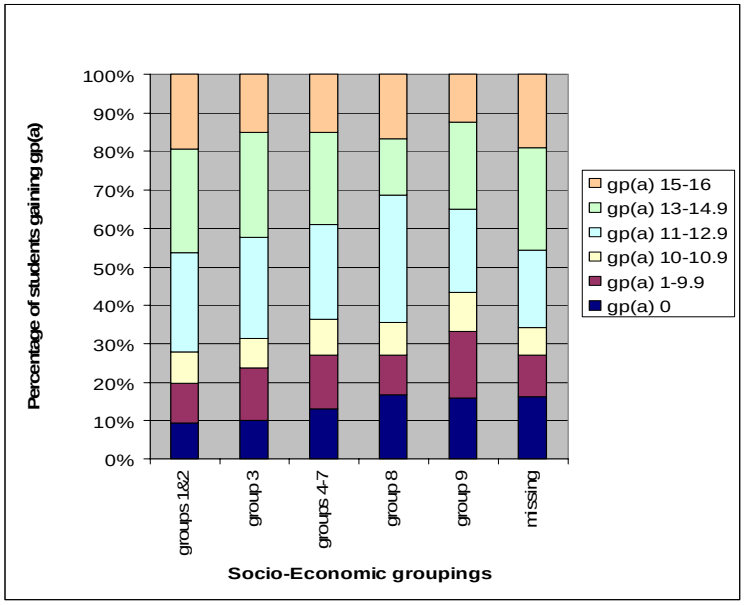

Figure 4 Progress across all courses by Socio-Economic Classification

It can be seen that 27% of Groups 4-7 don't achieve GPA 10 or above compared to 20% of Groups 1&2. And 15% of Groups 4-7 achieve the top grades compared to 19% of Groups 1&2.

Therefore, the lower socio-economic groups achieve a pass rate of 73% in the first year courses studied, representing a good average compared to the overall pass rates of 56%-83%. These widening participation students appear to be just slightly underperforming in comparison with their peers, Figure 5.

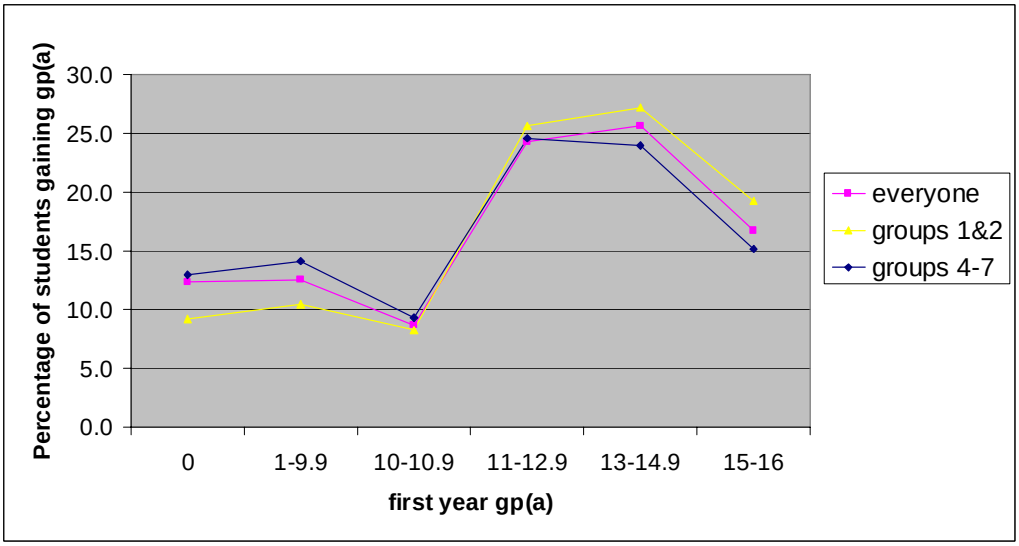

Figure 5 First year performance by low participation Socio-Economic groups 4-7

The students in the lower socio-economic groups were not overly made up of those with 'below minimum' or even 'minimum' entry qualifications when compared to Groups 1&2 or all students, as shown in Figure 6. They are slightly less likely to have the highest entry qualifications which may explain the slight trend of underperformance noted. It is however likely that this in part relates to the additional challenges in transition to University reported by students like these who are often the first in their family to participate in higher education (Thomas, 2002).

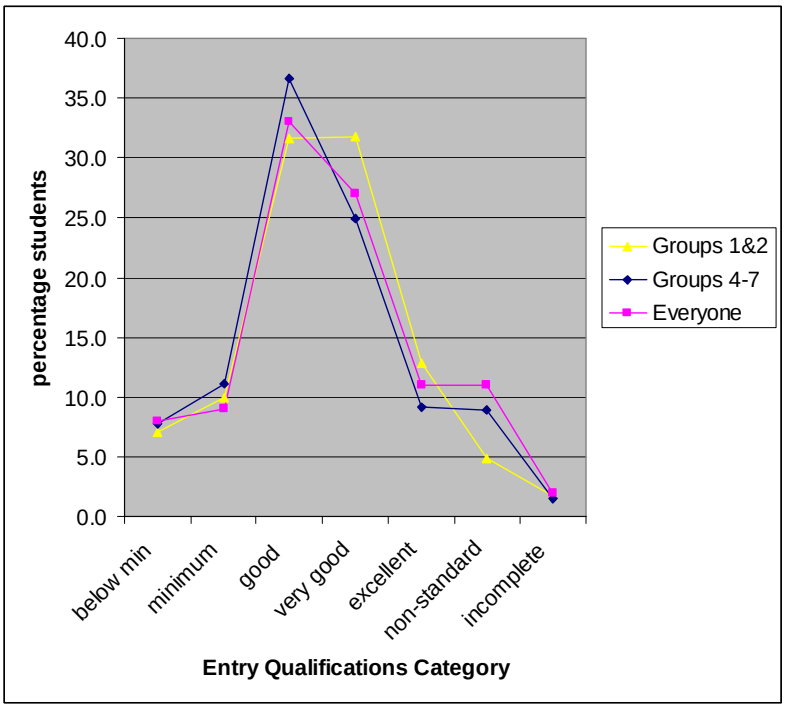

Figure 6 Entry qualifications of students in Socio-economic groupings

3. Widening Access Premium postcode areas

Students from the local postcode areas with traditionally low participation in HE, those used to calculate the HE Widening Access premium, represented only 3% of our cohorts.

Figure 7 shows that these widening participation students are more likely to achieve the lower GP(A)'s and less likely to achieve the highest in their first year courses. They are however not more likely to get GP(A) 0 and 69% achieve at least a satisfactory pass.

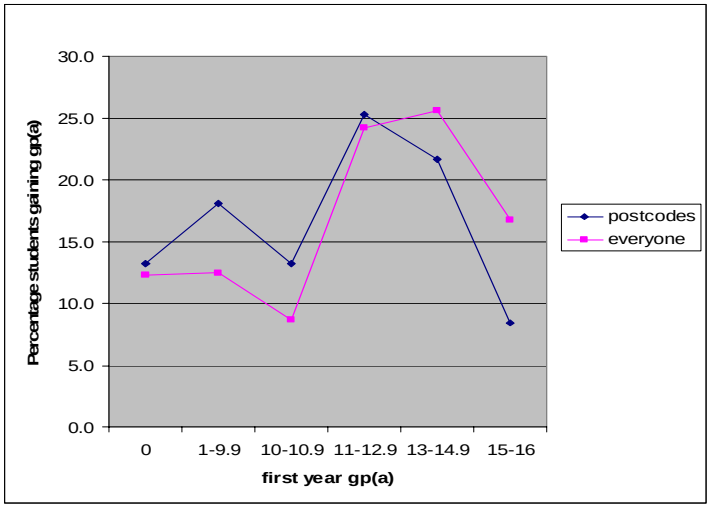

Figure 7 Progress of students from Widening Access premium postcode areas.

4. Low Participation Schools

43 secondary schools in the region are involved in the GOALS project (Greater Opportunity of Access and Learning with Schools) run by the West of Scotland Wider Access Forum (WestForum) in conjunction with their partner education providers. The project incorporates a range of initiatives aiming to increase aspirations, opportunities and success in higher education in pupils from schools with traditionally low rates of participation in higher education. Over the 3 years 123 students on the courses came from GOALS schools. Figure 8 plots their progress relative to 'everyone'.

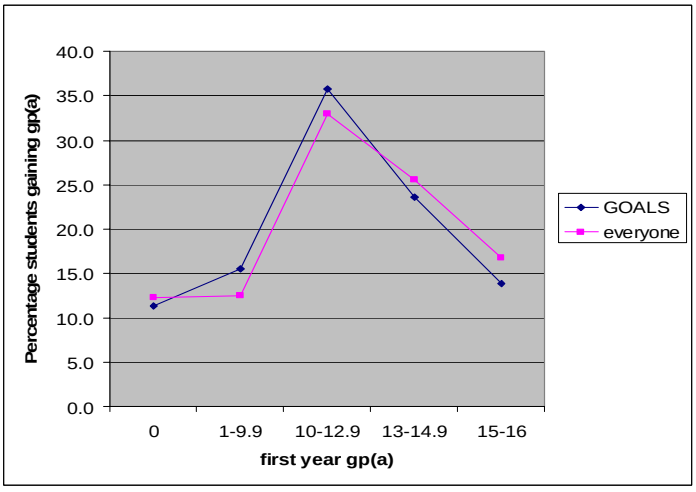

Figure 8 Progress of students from GOALS schools compared to all students

It can be seen that students from low participation schools are underperforming slightly in comparison to their peers. However, they are not more likely to get GP(A) 0 and 73% achieve a pass of GP(A) 10 or above.

In conclusion, it appears that widening participation students, identified by the three separate measures of Socio-economic group, Widening Access Premium postcode area and attendance at low-participation schools, are consistently slightly underperforming in first year in the courses examined in comparison with their less disadvantaged peers. Despite being similarly qualified on arrival widening participation students may differ from their peers in lower aspirations, lack of confidence, institutional habitus (Thomas, 2002)

Other background characteristics known to be 'at risk' factors for non-progression

Despite the acknowledged complexity of factors involved in student attrition and retention (Walker, 1999), particularly in the first year (Harvey and Drew, 2006), there are a range of background characteristics that may indicate a student is 'at risk' of non-progression or withdrawal. From previous studies of students at the University of Glasgow (Patrick, 2004; Carney et al, 2005) and from many studies in the literature on retention (Harvey and Drew, 2006; Woodley et al, 1992), these include age, gender, residence and part time work as well as attitudinal characteristics related to confidence and commitment to their studies.

1. **Age and Gender**

In a comparison of age and gender by first year GP(A) students were separated into four categories - Older (21 or over on entry) Males; Young Males; Older Females; Young Females. The mathematically based courses were combined due to smaller class sizes and under-representation of females. The softer Sciences conversely have more females than males. The following trends were noted across all courses: -

- Females were seen to be outperforming males in that they were more likely to achieve the highest grades, consistent with current national findings in academic progress;
- Older students were twice as likely to have GP(A) 0.

It seems therefore, that although gender influences level of achievement, it is age on entry that appears to be an 'at risk' factor for non-progression in these courses.

2. Part time work commitments

50% of the students who responded to the questionnaire said they had part time employment during their first year, a reasonable representation of the student population as a whole (Carney et al, 2005). 40% of respondents worked 8 hours per week or more. When asked about external factors affecting their studies 73% of these students with large part time work commitments said it was an adverse factor affecting their studies. Respondents achieving the lower first year grades were more likely to have part time jobs than those getting the higher grades.

Part time employment is necessary or desired for many modern students to supplement their income despite the acknowledgement that it can and often does affect their ability to study and their subsequent grades.

3. Commuting time to the University from residence

Around 50% of the University's student population comes from within 30 miles of Glasgow, and many of the new undergraduates will stay at home during their first year at least. We found: -

- 20% of students reporting more than a 30 minute journey to University got the lower grades in comparison with 12% of students living within walking distance

or a 30 minute journey to University. Students with lower grades were almost twice as likely to spend 30 minutes to 1 hour traveling;

- 34% of students reporting more than a 30 minute journey to University had thought of leaving during their first year in comparison with 16% of students living within walking distance or a 30 minute journey to University.

With a long commute to University the students surveyed were twice as likely to think of leaving. Daily travel was also the most frequently cited external factor that adversely affected their studies. It may well be a factor in the decision to leave of many students for several reasons, including the barrier to social integration:

"We all go to the library and we all help each other out…people who lived at home definitely missed out on a lot of things… [they] probably didn't get to know so many people on their course and that's probably got a knock on effect like if you're going to study with people… I can imagine if you've got no pals [on the course] the course would be a lot harder" (Mechanical Engineering students)

The impact of preparation courses

1. GOALS Top-Up Programme

The most common preparation course taken by our students is the Top-Up Programme, one of the final elements of the GOALS project. Pupils between the ages of 10 and 18 partake in some elements of the GOALS project, designed to encourage pupils from under-represented areas to aspire towards further study and to prepare them for the transition from school. The Top-Up Programme is run by the University of Glasgow and provides advice, experience and skills as pre-entry preparation for pupils planning or considering entering higher education as the final element of the GOALS project. Top-Up is a rigorous, academic programme that introduces students to the new learning methods and environments, as well as equipping them with the key critical skills they will need to be successful learners. 74% of students who attended under-represented

schools and took part in the Top-Up Programme passed their first year course although they were less likely to achieve the highest grades.

The large majority of GOALS school students in the 2005/06 first year cohort who completed the questionnaire said they learned their main study skills on the Top-Up Programme.

2. Pre-University Summer School

The pre-entry Summer School run by the University of Glasgow is a nine week full-time preparation course that introduces students to lectures in the subjects they intend to study at University level as well as Information Technology and Study Skills. Students are introduced to University life academically and socially to ease the transition from school. It is prepares students for what to expect when they arrive.

Students who don't meet their conditional offer can have their application to the University reconsidered on the strength of their Summer School performance. This includes school leavers and other applicants who do not meet the entry standards but who have evidence of life skills. Over the three years Summer School results allowed 5 students entry into Science courses (no Engineers) and they mostly faired well, with 3 students (60%) achieving good first year passes.

The questionnaire responders who got the lower grades are 12% more likely to say they didn't learn their main study skills until after starting at University. Similarly those who thought of leaving during first year were more likely to give this answer than those who never thought of leaving.

These findings appear to confirm that there is a link between pre-entry preparation and progress (Lowe & Cook, 2003). This can be improved by attendance of a good preparation course (Walker et al, 2001, 2004).

Expectations

Pre-entry preparation will have some influence on a student's expectations of University and the course. When asked their main source of pre-entry information most Engineering students relied just on the Prospectus. However, those achieving the highest GP(A)'s appeared to have more accurate expectations from information supplied by the Department or visiting at the University Open Day. Those with the lower GP(A)'s were more likely to say they relied on information on the website.

All students were asked to choose any aspects of the course which were not as they expected. Less contact with academic staff than expected and fewer opportunities to socialize with course-mates were the most frequently mentioned. Table 2 shows rankings.

	Students responding
Level of contact with academic staff was less than expected	52
Fewer opportunities to interact socially with course-mates	46
Subject content	35
Teaching style (lectures, labs, tutorials)	27
Workload was heavier than expected	17
Other	14

Table 2 Aspects of the course which were not as expected

Respondents with lower GP(A)'s were more likely to say subject content and workload were not as they expected.

Students who had thought of leaving mentioned all aspects except teaching style more often. They were much more likely to choose three or more aspects that were not as they had expected.

Student's perceptions of why their peers left the course were often thought to be due to wrong choice of course;

"they didn't enjoy the course, the content of the course, and wanted to go to Uni at home instead" (Biology student)

"A lot of people in first year got a bit mixed up about what engineering actually was. They were wanting to work something more like… in the workplace, manually. I spoke to a couple of people last year and that's why they left" (Mechanical Engineering student)

Or that they couldn't cope with the demands of the course, the workload or effort required to pass;

"course was too difficult and they were not prepared to put the effort in" (Mechanical Engineering student)

"they were struggling in their subjects" (CS1P student)

"couldn't be bothered working – didn't turn up to lectures" (EEE student)

Simpson (2003) also found 'wrong choice of course' was a common cause of attrition and reiterates the importance of realistic expectations, advocating intervention in the course choice process to improve student retention.

Learning strategies

Students were asked to rate how useful study techniques and learning resources were for their first year courses. Table 3 shows the average rank by all respondents with '1' being most useful and '5' least useful.

	Rating (1 = most useful)
Good attendance	2.2
Ability to work to deadlines	2.3
Regular review of lecture notes	2.4
Effective exam techniques	2.4
Ability to cope well with pressure	2.4
Active participation in tutorials	2.5
Online resources	2.6
Confidence to ask questions	2.6
Good essay/report writing skills	2.6

Time management	2.7
Reviewing past papers	2.7
Textbooks	2.9
Peer support	3.0
Library resources	3.2
Learning Advisers	3.2

Table 3. How useful study techniques and learning resources were for first year courses.

Those with lower grades were less likely to rate exam technique, meeting deadlines, coping with pressure, good attendance and regular review of lecture notes as helpful. But they were more likely to rate library resources highly. This seems to indicate that these students are somewhat less committed to the course whilst not focusing on the more successful learning strategies employed by those gaining the higher grades

Frequently reiterated in the qualitative data collected from students was the need to attend lectures and keep up with the notes. When asked what advice they would give new first year students over a quarter of responses were on time management issues such as these:

"go to lectures and tutorials, keep up the work, don't slack off too much. It is all about time management, don't leave tutorial questions, lab books etc all to the last minute." (EEE student)

"you should be willing to work hard but also to plan your time right from the start so that you get the most out of the teaching in the course and also have time for other interests and social interaction." (Biology student)

"[I wish I'd known] how much missing one assignment /lab /tutorial knocks you behind and causes issues" (CS1P student)

Here the quotes from students appear to reinforce the literature where Patrick (2004) argues that commitment is the key to success. Further, Tinto (1975, 1993) suggests that academic and social integration lead to subsequent and long-term commitment to the institution and to the goal of graduation which leads to increased persistence.

External factors adversely affecting studies

When asked about factors which adversely affected University experience and studies the most frequently mentioned were daily travel, social life, part time work commitments, as shown in Figure 9.

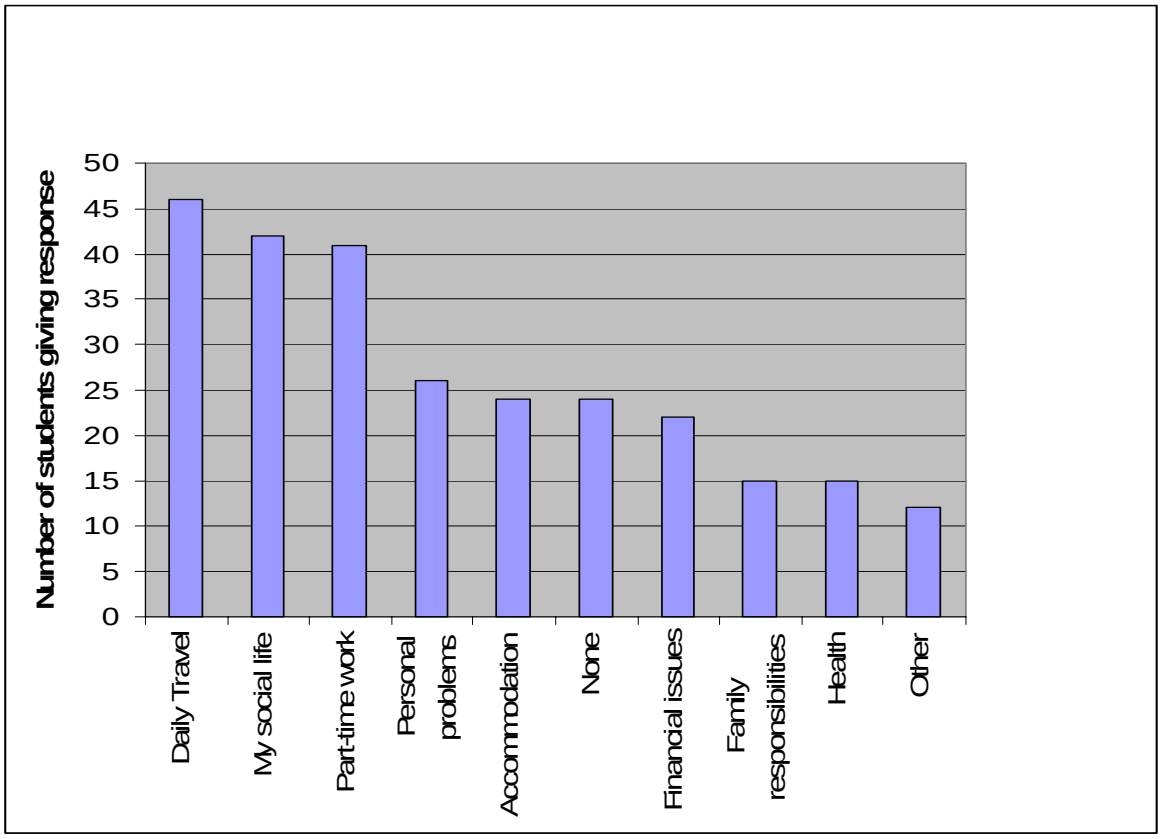

Figure 9 Factors which adversely affected first year experience and studies

The impact of daily travel and part time work commitments have been examined earlier in this report. The frequency of the answer 'My social life' reflects the acknowledged importance of getting the balance right between academic work and taking advantage of the other opportunities at the University and outside at this stage of life.

Characteristics of under achieving students

Student's responses to the questionnaire were compared by their first year grades: 21 students had GP(A) of less than 10.5, that is equivalent to Grade D or below, and 121 achieved GP(A) of 10.5 or above. Notable differences between groups included characteristics of the under achievers, who are: -

- less likely to strongly agree that they chose the course with a clear degree or career in mind;
- more than twice as likely to study less than 5 hours per week on average (83.3% compared to 35.7% of those with GP(A) 10.5 or above);
- less likely to disagree that feedback on assessments and course work is satisfactory, they are more likely to give a 'neutral' non-committal answer;
- less likely to socialize with friends on their course, more likely with friends from home or school;
- much less likely to say there were no adverse factors affecting their studies, they are more likely to mention one or two factors;
- more likely to say subject content and workload was not as they had expected;
- more likely to have learned their main study skills only after starting University;
- less likely to rate as highly the most useful learning strategies highlighted by those with the higher grades, such as exam technique, meeting deadlines, coping with pressure, good attendance and regular review of lecture notes.

This builds a picture of a student who is less motivated and less well integrated both academically and socially. They appear to be less committed and were less prepared before they arrived than the students achieving the higher grades.

Characteristics of students who thought of leaving but persisted

35 students responded yes when asked whether they had thought of leaving University during first year. This is 25% of the all respondents and is comparable to the 30% of responses to the question in the student experience survey of 2005 reported by Yorke and Longden (2007). Comparing responses to the 75% who didn't think of leaving those who thought of leaving but persisted are: -

- less likely to say they were confident in approaching academic staff if they needed help;
- more likely to strongly disagree that feedback was prompt, detailed and useful;
- much more likely to have three or more aspects of the course not as they had expected including; less contact with staff, workload and fewer opportunities to socialize with classmates;
- less likely to socialize with friends on their course, more likely with friends from interests outside of University;
- much more likely to find two or more factors which adversely affected their studies;
- likely to express a strong determination to succeed. Figure 10 shows the main reasons for staying given by the students who had thought of leaving University.

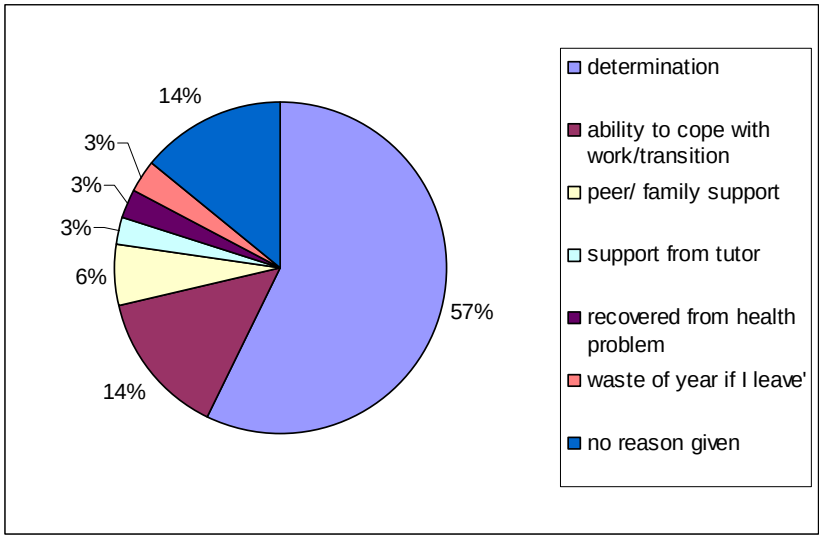

Figure 10 Reasons for staying given by the students who had thought of leaving

The key characteristic of students who think of leaving but persist appears to be their determination. They have more inaccurate expectations of how the course will be when they arrive, they want more contact with staff including for feedback and are less confident in approaching staff independently. They are less socially integrated in the University.

Roberts et al (2003) found that persistence in their students who had thought of leaving (doubters) appeared to be facilitated by determination or 'within-the-individual factors'. They found no association between thinking of leaving and 'at risk' factors for withdrawal but noted differences in attitudinal responses where doubters were more likely to give negative responses in their perceptions of a range of aspects of University. They conjecture that doubters may be less satisfied with the student experience due to higher expectations and taking longer to adapt to their new environment. The results reported here would seem to fit with this model.

Problem areas and support

There was little consistency in identifying problem areas by asking students. When asked about the most demanding aspects of the course individual students' answers varied. There was some concurrence in the wish for more feedback on assessments and coursework, as identified in the National Student Survey (NSS, 2006). The limitations in academic (and peer) contact due to large class sizes were noted.

From their comments, students generally feel well-supported, think staff in their Department are approachable and know where they need to go to get help if they need it. There was an element of self-selection noticeable in the type of student who volunteered to join the focus groups so these answers are probably not surprising. They correlate with the general opinion of the course coordinators who believe that although there are support systems in place both within Departments and in central University services the students who are most in need of help are not the ones who seek it out and take advantage of what is available.

Staff expressed frustration over those students who 'just disappear' or 'slip away' despite their efforts to contact the students giving them concern. This may indicate that although it is undertaken by individuals in Departments a standardized, more pro-active procedure by the University may be required to support failing students. Including increased pastoral care, more academic feedback and embedding study skills in the curriculum, as happens in some but not every case.

Discussion

Widening participation students are likely to be the students who live off campus with a long commute to the University. They may find it harder to integrate both with the Institution and socially. They will also be more likely to need to work longer part time hours to support themselves through their studies. They may not have had the opportunity to study to an advanced level at school or may be more mature having entered the University with non-standard qualifications – all these being factors shown to increase the likelihood of non-progression. They may also be first in their family to participate in higher education and may have less self-confidence, lower aspirations and less accurate expectations with respect to University study (Walker, 1999). However, we have shown that widening participation students can and do succeed although they were seen to be consistently slightly under-performing in achievement of the higher grades.

The highest achieving students can be characterized by: -

- Motivation – having a clear idea of their degree course or career and mention determination to succeed;
- Commitment – spending on average 10 hours or more a week studying outside of timetabled classes, know the importance of good attendance and time management, socialize with their course-mates and feel part of the University;
- Accurate expectations – particularly of subject content and workload, attended Open Days or used material from the Department for their pre-entry information;

- Preparation before they arrive – having learned effective study skills before arriving at University.

The challenges faced by underrepresented groups of students in Higher Education are often the same problems encountered by the increasingly diverse student population as a whole. In particular, many findings point to the need for adequate preparation before arrival – ensuring accurate expectations, skills to cope with the academic and social transition and initial commitment and motivation. As such we would recommend that strategies which may be designed to aid a particular group of students in transition into HE and may be targeted to support them but not to the exclusion of other at risk groups. Certainly this research has shown that the retention issues in the Faculties of Sciences and Engineering are not predominately linked to the Widening Participation agenda. Students who may be predicted to fail have a 50 – 75% chance of success, which is comparable to the success rate of the population as a whole. It seems that personal characteristics of the individual such as determination, commitment and motivation are more important for success than any background predictor. Therefore, support strategies should be looked upon as examples of good practice as retention strategies and should be used to enhance these positive traits in all first year students to allow all students the best possible chance of success. Motivated students are likely to find their own ways to overcome barriers and succeed (Simpson, 2006).

Yorke and Longden (2007) found in the student survey for the HE Academy that around 47% of the negative aspects of the first year experience were factors under control of the institution. Improved retention will benefit individual students, first year teaching staff, the institution in terms of meeting it's targets, it's reputation and monetary gain (Simpson, 2003) and ultimately society as a whole as we train the future professional Engineers, Scientists and graduates of all disciplines.

Recommendations for retention strategies based on our findings are shown in Table 4.

FINDINGS	RECOMMENDATIONS FOR RETENTION
Previous Maths lacking for courses in Engineering and Sciences	Pre-entry preparation programs; Maths support throughout the first year curriculum.
Benefit of Advanced Highers or A-levels in relevant subjects	Pupils should be advised of the benefit of extended study as preparation even if it is not an entry requirement.
Social opportunities on courses are few, partly due to large class sizes, which may particularly affect commuting students	Social events at Induction and beyond run by Department or course; Increase small group work: teambuilding/ learning communities; Buddy schemes/ mentoring; PAL.
Less contact time with staff than expected	Personal tutor schemes; Small group work with academics; Staff attend Departmental socials; Visible student support services.
Inaccurate expectations	Pre-entry taster packs; Pre-entry contact with an e-mentor; Pre-entry preparation programs; University Open or Applicant Visit Days; Extend Induction period to ease transition.
Determination, motivation and commitment are key to success	Pre-entry strategies to address inaccurate expectations as above and Positive Psychology pre-entry telephone call (Simpson, 2006); Engage academically by learning and teaching strategies appropriate for diverse modern students; Engage further by extra-curricular activities, including those linked back to coursework;

	Engage socially as point 3 above.
Older students and those with non-standard entry routes are 'at risk'	Target support specifically to these groups, including tailored social opportunities; Flexibility to allow preferred learning strategies.
Lack of confidence, particularly in widening participation students	Formative assessment; Improve feedback on assessment and work; Pre-entry strategies as previously mentioned; Staff development on the experiences of widening participation students and retention issues.
40 minutes or more commute to University impacts negatively on studies	Target social opportunities and support to students living off campus who may be less engaged generally. Encourage Accommodation Service to place high risk entrants in University Accommodation.
Part time work commitments of 8 hours or more impact negatively on studies	Advise students to avoid if possible; Time-management skills as above; Build flexibility into the curriculum, including use of VLE's.
Attendance	Monitor and supportively contact students as soon as possible after missed classes.
Time-management	Highlight importance from the beginning; Study skills classes embedded in curriculum.
Withdrawing students often just 'slip away'	Early identification of students having problems by attendance monitoring and/or regular meetings with tutor; Exit interviews and 'reclamation' contact.

Table 4 Recommendations based on key findings.

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