National HE STEM Programme

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USING DATA

An evidence-based approach to improving transition, induction and retention.

Liz Thomas and Robert Jones

Contents

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Foreword

I am delighted to introduce to you this suite of transition and retention guides which have been produced under the National HE STEM Programme.

While increasing the supply of students to STEM Higher Education is important, ensuring that they experience a smooth transition to university and that as many as possible complete their studies successfully is of equal importance. There is a wealth of initiatives in this area that have reported on effective practice to help achieve this. The purpose of the guides is to collect and present effective practice models specifically from STEM departments. An important feature of this suite is the student perspective, which the authors have emphasised.

The issues related to induction, transition and retention are multi-faceted and therefore may have been addressed in slightly different ways in the different guides to take account of the specific context.

The suite consists of eight guides:

- Using data: an evidence-based approach to improving transition, induction and retention
- Happy landings – an introductory guide for students considering studying a STEM subject in Higher education
- STEMming the doubts – enhanced transition and induction to HE programmes
- Critical moments in the first year at university – towards a framework for effective transition
- Promoting social engagement: Improving STEM student transition, retention and success in higher education
- Improving retention: the curriculum development perspective
- Setting up a Maths Support Centre
- Optimising the part-time experience

My thanks go to the authors of the guides for distilling their knowledge and expertise and to the Steering Group for their valuable guidance. The group consisted of Professor Liz Thomas, Director for Widening Participation Research Centre (Edge Hill University), Hal Igarashi, Project Director Employer Engagement (Royal Academy of Engineering), Henriette Harnisch, Director of Academies and Trusts (University of Wolverhampton), Fiona Lamb, Associate Director (Engineering Education Centre), Ed Stevens, Regional Officer for Widening Participation and Outreach (South West) and Sadaf Alvi, Regional Officer for Higher Level Skills (Midlands and East HE STEM Anglia regional spoke).

Our collective hope is that the wealth of case studies and the student perspective presented will stimulate colleagues to consider improvements to the transition processes where they find it appropriate for their institution.

Professor Kamel Hawwash
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(Midlands and East Anglia)

Introduction

This guide is designed to help STEM faculties, schools, departments, programmes and modules to use data and evaluation to inform and implement an effective strategic approach and associated interventions to improve student transition, induction and retention into higher education.

The report of the National Audit Office (NAO) on Student Retention (2007). shows that students undertaking computer science, engineering and maths programmes are more likely than those in other disciplines to withdraw during their first year of higher education. The NAO found across the disciplines that the average continuation rate from stage 1 to stage 2 is about 91%. The continuation rate for students studying maths, computer science and engineering is about 88%; other STEM subjects, such as physical sciences have higher rates around 93%.

In order to combat the retention shortfall and promote student success, we need to have the clearest possible picture of what is going on: what factors are influencing student behaviour; what detailed evidence can we draw on both to understand and intervene? In examining these questions, this guide is informed by these key principles:

- Institutions should interrogate institutional data to identify modules, programmes and departments with lower rates of retention, progression and completion.
- Institutions should formally and informally monitor the participation and performance of students to identify those at risk of leaving early.
- Managers, staff and students must work together to take action and implement change to improve the outcomes for students, modules, programmes, departments and the institution as a whole.
- New interventions and approaches should be evaluated to improve implementation, maximise impact, and learn from innovation and change.

At the practical level, we also offer three case studies from the STEM disciplines that illustrate different ways in which data and evaluation can be used to improve student retention and success.

Importance of data and evaluation

Both the National Audit Office (NAO) report (2007) and Quality Assurance Agency (QAA) report (2008) recognise the importance of HE institutions using data and evaluation to improve student transition, retention and success.

This means collecting reliable data that all stakeholders have confidence in, putting in place routine mechanisms for proactively reviewing and, crucially, acting on it. The timescales for review and action may vary, to daily or weekly, with regard to individual students, and annually or longer for programmes that are performing poorly.

The QAA recognises that institutions do not always make best use of data. They identify the following typical stages:

- **Stage 1** little or no central provision of data; local sources using different definitions of concepts such as 'progression'; consequently little use is made of data beyond descriptive presentation in annual and periodic review reports.
- **Stage 2** central systems exist for handling data and producing reports, but staff may not yet be fully confident in engaging with the data, or completely convinced of the reliability of centrally produced data; analysis consequently still fairly limited, and some local data sources may still be in use.
- **Stage 3** tools and systems in existence so that staff can obtain the necessary data, and have the appropriate skills to analyse it in an informative manner; however, this facility not fully exploited, generally because of lack of central strategic oversight.
- **Stage 4** fully integrated management information systems producing data fit for purpose, the analysis of which informs institutional thinking and strategic decision-making at all levels.

In order to improve the collection and effective use of data, the QAA recommends:

- a single central source of data in which all staff have confidence
- appropriate tools to enable data to be interrogated in a manner

One: To identify programmes and modules with above-average rates of non-progression and non-completion.

Two: Monitoring student behaviour and performance

Three: Working partnership of staff and students to implement change

Four: Carrying out research and evaluation to learn from, and improve, approaches to improving transition, induction and retention

Identifying programmes and modules with above-average rates of non-progression and non-completion.

Some institutions that were identified as having a severe retention problem, and whose viability was under threat, have made impressive use of data to turn around the situation. One such example is the University of Pretoria in South Africa, another is Glyndŵr University in north east Wales.

The University of Pretoria took a two pronged approach: it monitored the retention, progression and completion performance of modules, programmes and departments, and specific student groups to inform their retention strategy and interventions. Identifying modules, programmes and departments with lower rates of retention, progression and completion needs to be supported by action to improve the situation. The Pretoria approach allowed the institution to concentrate limited resources to key areas to maximise the impact of their interventions.

Glyndŵr University took a more holistic approach, working with all course teams to examine their data, and take action to improve rates of retention, progression and completion. It is important to note however that data can only be used to identify trends, this needs to be supported by further investigation and research. In the STEM disciplines at Glyndŵr the retention was considered to be poor. The first action was to improve the quality of the data, partly to ensure that all staff had confidence in the data, but of equal importance was the need to have a more accurate understanding of when students were leaving. At Glyndŵr this revealed that many STEM students were not withdrawing during Stage 1, but rather was not returning to Stage 2 after the long summer vacation. This was particularly true of students who had failed assessments at the end of the year, and would be required to undertake re-sits at the start of the new academic year. At another English university Duty (2012) took a similar approach in business studies. He discovered that students were leaving earlier in the year than had previously been reported. In the past staff only registered students as withdrawn at the exam board; a more proactive approach including following up individual students, found that many were leaving significantly earlier than this.

Glyndŵr University not only examined its data to identify trends, but this is complemented by further exploration of the issues with staff and students through research and consultation. This has helped the institution and the staff involved to understand the issues better and to implement effective strategies for change.

Monitoring student behaviour and performance

Tharp (1998) argues for the use of retention data to identify early students having problems so that interventions may be put in place. There are examples of universities and colleges that have introduced a comprehensive monitoring system, and consequently made a significant impact on student engagement, retention and success. Paul Smith's College in the US is a small liberal arts college that has introduced an electronic warning flag system that identifies students at risk, or rather in need of support or intervention, and provides a proactive approach to intervention. The scheme involves three levels of flags: information, action or urgent. These are sent to the student and relevant academic and support staff. The system also integrates information from across the

institution, such as assessment grades. Evaluation of the new approach to improving student success has demonstrated significant benefits to staff and students, and a return on investment of $750,000 in two years.

Loughborough University has developed and implemented across the university 'Co-Tutor'. This is a comprehensive, technological approach to monitoring student attendance and performance, and identifying students at risk (see case study 2).

The What works? programme identified a number of activities that can be easily and usefully be monitored. These include:

i. Monitoring and reviewing institutional and programme level data as part of annual quality assurance processes to identify at risk students and plan strategies for improving retention.
ii. Monitoring student attendance in formal sessions.
iii. Monitor engagement in other activities, such as library usage, personal tutoring or co-curricular activities.
iv. Monitoring submission of course work.
v. Student performance, especially in early assessments.
vi. Monitoring students during 'at risk' times, particularly immediately before and after Christmas in the first year.
vii. Using informal contacts between staff and students to identify at risk students.

Irrespective of which student behaviours and performances are monitored, this is only an effective strategy to improve student retention and success if monitoring is supported by robust action when concerns arise. Analysis of the institutional Widening Participation Strategic Assessments (Thomas et al 2010) found that personal tutors appear to be a common way for institutions to respond to students who are identified to be at risk. For example:

'Each student is assigned a personal tutor who is available to discuss both academic and non-academic issues with their tutees. A decision tree has been developed to identify students, at the earliest possible opportunity, who may be in need of additional support. This risk management based approach may be triggered by events such as poor attendance at College lectures or clinical placements, or poor grades. The personal tutor is the focal point of risk management activities for the student. Activities are aimed at assisting students in continuing their programme of study and at resolving the root cause of problems, such as family crises, financial problems, difficulty in completing academic work or clinical placement issues'.

Working in partnership with staff and students to implement change

Staff are key to enabling students to participate and feel like they belong in higher education. Indeed in the Glyndŵr case study it is argued that responsibility for responding to data about poor retention, progression and completion needs to be devolved to staff throughout the institutions. Glyndŵr University found that it was important for staff to accept the data as accurate, then to ensure that staff teams at module level were held accountable for their data, and actively engaged with it. Working together, using data and qualitative feedback, and input from staff and students, they can work to an effective solution that is widely owned and supported. The Loughborough case study also demonstrates the importance of staff engagement in the process of change. Paul Smith College in the US found that greater staff engagement was achieved in part by focusing on student success, rather than on retention. Staff felt the former was part of their academic responsibility, but the latter may be perceived as helping unsuitable students to remain in the system, and thus as ethically or educationally inappropriate.

Thus, we suggest that data is used to identify a potential issue, which is then explored further through research with staff and students. A collaborative approach to problem solving and implementing change is likely to result in the most effective change. When collaboration is not possible from the outset data and evaluation evidence can be useful in the process of winning round the hearts and minds of other staff and managers who may have been sceptical about the value of change.

Carrying out research and evaluation to learn from, and improve, approaches to improving transition, induction and retention

When new approaches or interventions are introduced to improve student transition, induction and retention it is important to evaluate their effectiveness to:

i. Improve implementation
ii. Measure impact
iii. Identify unintended (positive and negative) consequences
iv. Assess value for money

Learning from research and evaluation should be disseminated across departments, schools, institutions, and ideally beyond.

Newcastle University implemented an induction team-building activity and group learning in the first semester to two of its engineering programmes. These were both evaluated as part of the What works? Student retention and success programme. The case study demonstrates how student surveys and focus groups were undertaken, and this was supplemented by an analysis of institutional data.

Paul Smith College in the US was able to demonstrate a $750,000 return on an initial investment of $100,000 to improve student retention and success, and this is powerful when they are approaching their board for further financial support.

3. Examples of using data and evaluation to improve student transition, induction and retention in the STEM disciplines

The following case studies have been selected from the STEM disciplines to provide real-world examples of effective approaches to using data and evaluation to improve student transition, retention and success.

a. Taking a data informed approach to improving student retention and progression: Implications for Engineering, Glyndŵr University. This university has used data to identify programmes and student groups with low rates of continuation and completion. This has been supplemented by research with staff and students. Responsibility is devolved to staff to implement solutions to improve transition, induction, retention and progression in particular. This approach is reinforced by annual commissioning, which means that programmes with high rates of withdrawal risk not being able to operate in future years.

b. Co-Tutor: Monitoring student attendance and performance, and identifying students at risk to improve student retention and achievement. Centre for Engineering and Design Education, Loughborough University. The Centre for Engineering and Design Education has developed a relationship management system called Co-Tutor, which is used across the university to track student engagement in learning, identifying at risk students and helping in the management of staff/student interactions. It plays a major role in monitoring and recording student engagement and flagging up students for whom additional intervention is required.

c. Using data and evaluation in two engineering schools to enhance induction and progression, Newcastle University. Two of the five engineering schools at Newcastle University participated in the nationally funded 'What works? Student retention and success programme'. Each participating School implemented and evaluated an intervention designed to improve student transition, induction, retention and success. The case study presents the methods used and demonstrates the key findings that could then be used to build the case for sustaining and extending the changes.

Case study

Taking a data informed approach to improving student retention and progression: implications for engineering

School of Aeronautical and Mechanical Engineering, Glyndŵr University

Description

Institutional context

In 2001 retention became a strategic priority for Glyndŵr University with the emphasis on reducing the number of students leaving the institution. Student retention remains a strategic priority and is one of the institution's key performance indicators, but the emphasis is has evolved to encompass improving understanding of retention issues, and utilising a performance management and annual commissioning approach. The institution has used data to identify problem areas, but that this has been supported by a wider consideration of issues from the perspective of staff and students, and the implementation of evaluated pilot schemes to improve student retention.

Glyndŵr University has constructed a basket of institutional indicators, which are informed by a range of institutional data sources, to identify the departments, programmes and student groups with poor levels of retention, progression and completion. The key performance indicators (KPIs) that Glyndŵr uses include:

- Progression from level 4 to 5
- Student satisfaction
- Non-continuation rates (including both withdrawals and failures)
- Widening access indicators

HESA data provides institutional level data, but it was important to develop indicators and data that could be used to identify programmes and modules which required interventions and changes to support improved retention and progression.

The retention-based KPIs, together with data about recruitment and student feedback is used to inform annual commissioning decisions about each programme. This annual commissioning model contributes to devolving responsibility for improving recruitment, retention, progression, satisfaction, completion and attainment to schools, departments and programme leaders. Brigades of staff are engaged in analysing programme and module level data and discussing the implications. The institution keeps staff up to date with the performance of their modules and programmes via a dedicated website: programme leaders can see how their area is performing in relation to key performance indicators, and they are rated as Green (indicating strongest performance), Amber and Red.

This case study examines the impact of an evidence-informed approach to improving student retention and progression in the School of Aeronautical and Mechanical Engineering.

Use of Data

Aeronautical and Mechanical Engineering has a diverse student body, including local, European and international students, and it has a board portfolio, offering Foundation Degrees and degree programmes in range of subjects. An initial review of the institutional data identified poor retention rates in the School as a whole, and in particular programmes and modules. A closer examination of the data identified poor progression between levels 4 and 5 as the major problem. In particular students who had failed an assessment disengaged over the summer period and did not return for re-sits in September and so did not resume the course. A second area of concern in the subject area was the performance of full-time Foundation Degree programmes. These were found to have low recruitment and high attrition rates, particularly as a result of non-progression from level 4 to 5. This had a further implication for the School, as the Foundation Degree is significant feeder for the BEng course for local students with low entry qualifications.

The identification of these two problems resulted in a range of interventions, including curriculum review and a re-focused programme, an intensive induction, additional attention to the entry level and development of mathematical skills and the Summer Support pilot project for students with referrals and re-sits.

In addition to regularly reviewing retention KPIs and other data, Glyndŵr University has developed a student feedback system overseen by the Associate Director for Student Experience, to actively seek feedback from students during their courses. Information is collected in a range of ways, including via module feedback, through course representatives feeding into the newly formed Student Representative Council (a Student Council Rep for Engineering was appointed in October 2011), Staff Student Consultative Committees and informally from staff. Engineering for example, has an open door policy to encourage students to give feedback/address student concerns. When students withdraw from the university they must complete a pro-forma and provide a reason why they are leaving, which provides some further insight into student experiences.

Withdrawal is followed up informally by student services, who log the reasons why students withdraw and other feedback that students provide. In addition, the University has undertaken some telephone follow-up to gain a fuller understanding of the student perspective.

The aim of listening to the student voice is to become aware of and respond to student problems and concerns before they have an impact on student retention. For example, Engineering and Creative Industries received some negative feedback from students, so the Associate Director for Student Experience is working closely with staff and students to develop a fuller understanding of the students' concerns.

The Head of the Centre for Learning, Teaching and Assessment is working directly with staff to identify the issues from their perspectives and look for effective solutions. This is complemented by a programme of workshops that are aimed at enhancing teaching practice, covering a range of issues from how best to use feedback to enhance the student experience, to Internationalisation of the Curriculum. As part of the annual monitoring and review process each programme team must triangulate its KPIs, retention data and student feedback, and demonstrate how they have responded to the issues to improve student retention and progression.

Impact on student retention and progression

As a result of this evidence-informed approach the university has seen an improvement in its retention and completion rates, and other related indicators.

- Monitoring demonstrates that there have been 10-15% point improvements in non-completion. (BEng Aeronautical and Mechanical Engineering has seen an improvement of 11.1% in non continuation rates.)
- National Student Survey performance – overall there has been a 5% point increase between last year and this year, (Engineering has seen increases of up to 9%.)
- The evaluation of the Summer Project shows a positive impact on continuation between level 4 and 5. (BEng Aeronautical and Mechanical Manufacturing has seen an increase of 5.7% in this KPI.)
- The improvement in retention is a result the cumulative effect of a raft of interventions, but central to this is being informed by data about specific programmes and student groups were further research and action is required.

Strategic fit

Improving student retention, progression and completion is a key priority within the University's Strategic Plan, and is reviewed by Governors, Senate and the Executive Group on a regular basis. Staff across the University are also actively engaged in reviewing data and implementing change, and this is reinforced by the annual commissioning model of modules and programmes. It is recognised however that reviewing data is insufficient, and monitoring has to be accompanied by an understanding of students, and dialogue with staff to implement effective solutions.

Reflection and challenges

The success of Glyndŵr University can be attributed to robust engagement with the data, listening to student voices and developing a fuller understanding of leaving early, and ensuring all staff take responsibility for improving retention, progression and completion through a number of processes and procedures:

- Developing staff professionalism through development, reward and recognition
- Annual monitoring of staff performance
- The commissioning model
- Triangulating data gathered in the National Student Survey with other key data sets related to retention and progression
- Departmental review and quality assurance processes
- Staff development opportunities including international exchange
- Commitment and leadership from the Vice-Chancellor to a culture of success for all students

It is recognised that all staff need an awareness of learning and teaching and to develop their professionalism as academic teachers (in addition to being researchers or professionals in their discipline areas). They therefore encourage staff to undertake pedagogical research.

Tips for others

- Retention needs to be a strategic priority for the institution; it must be the concern of the board, senate and the executive team. This must be led by senior colleagues in the university.
- Seek to develop a culture that expects success from staff and students. For example,at Glyndŵr University the Vice-Chancellor's briefings always refer to the institutional mission to widen access and maximise student retention and success.
- Engage with the raw data with an open mind, and learn from it and act. There is a temptation to argue with the data, but it is better to view the data as indicating a broad trend, and then look behind the data and unpick it.
- Select your own KPIs and create robust data sources to inform this. Use data to indicate a trend, rather than diagnose a problem.
- Trends are important rather than individual student experiences, and thus things that they institution can control.
- Follow up areas of concern by listening to the student voice, using formal and informal mechanisms.
- The data needs to be viewed dispassionately, rather than getting into a blame game. Cherish student feedback, but don't blame tutors, as this will not result in change and improves in the student experience.
- Promote staff responsibility for improving student retention, progression and completion, and involve them in developing and implementing solutions.
- Use data to identify problematic areas, and then use consultation with students and staff and pilot interventions to find ways of addressing the issues.
- Work across the institution to bring about change, and therefore develop teams of people to address challenges, rather than placing the responsibility on a single person, such as a 'retention manager'.

Case study

Co-Tutor: Monitoring student attendance and performance, and identifying students at risk to improve student retention and achievement

Centre for Engineering and Design Education, Loughborough University

Description

Institutional context

Loughborough University has high rates of student satisfaction, which is reflected in high rates of student retention and success. This success can be attributed at least in part to the relationships students establish with tutors, supervisors and professional services staff. Pastoral care, effective attendance monitoring and timely advice and guidance from academic and support professionals play a vital role in helping to build and support these relationships. The effective management of these processes across the institution is critical in delivering a consistently high quality experience for all students.

Co-Tutor

Over the past twelve years, the Centre for Engineering and Design Education (formerly the Engineering Centre for Excellence in Teaching and Learning – engCETL) – has developed a relationship management system called Co-Tutor. Co-Tutor tracks student engagement in learning, identifying at risk students and helping in the management of staff/student interactions. It also plays a major role in monitoring and recording student engagement and flagging up students for whom additional intervention is required, which contributes to retention and success.

Co-Tutor is used by academic staff and administrators to communicate with students (including personal tutees, project students and postgraduate research students). It can also be used to communicate with whole course cohorts, and to manage other activities such as industrial placements. Student information from various systems is made available to relevant members of university staff (according to their role) through Co-Tutor's inbuilt notification system. This automatically gives the relevant members of staff permission to access student-data. Staff can thus view a wide range of data to monitor students' attendance and progress, and to inform decision-making when planning interventions to improve retention and progression for those deemed at risk. For example, students with less than 50% attendance are automatically flagged, allowing tutors to access other relevant information.

The system is easy to use, and staff require no training to use it. Indeed, over 1000 staff (both academics and administrators) have used Co-Tutor in some capacity since the beginning of the last academic year (2009–10), and it contains details of academic and pastoral records of all registered students (currently over 19,000 students). As can be seen in Figure 1, each member of staff has a tutor home page, allowing him or her to view all their students, and perform individual or group actions. It provides context-sensitive links to professional services in the institution, such as the finance office, disability services, etc.

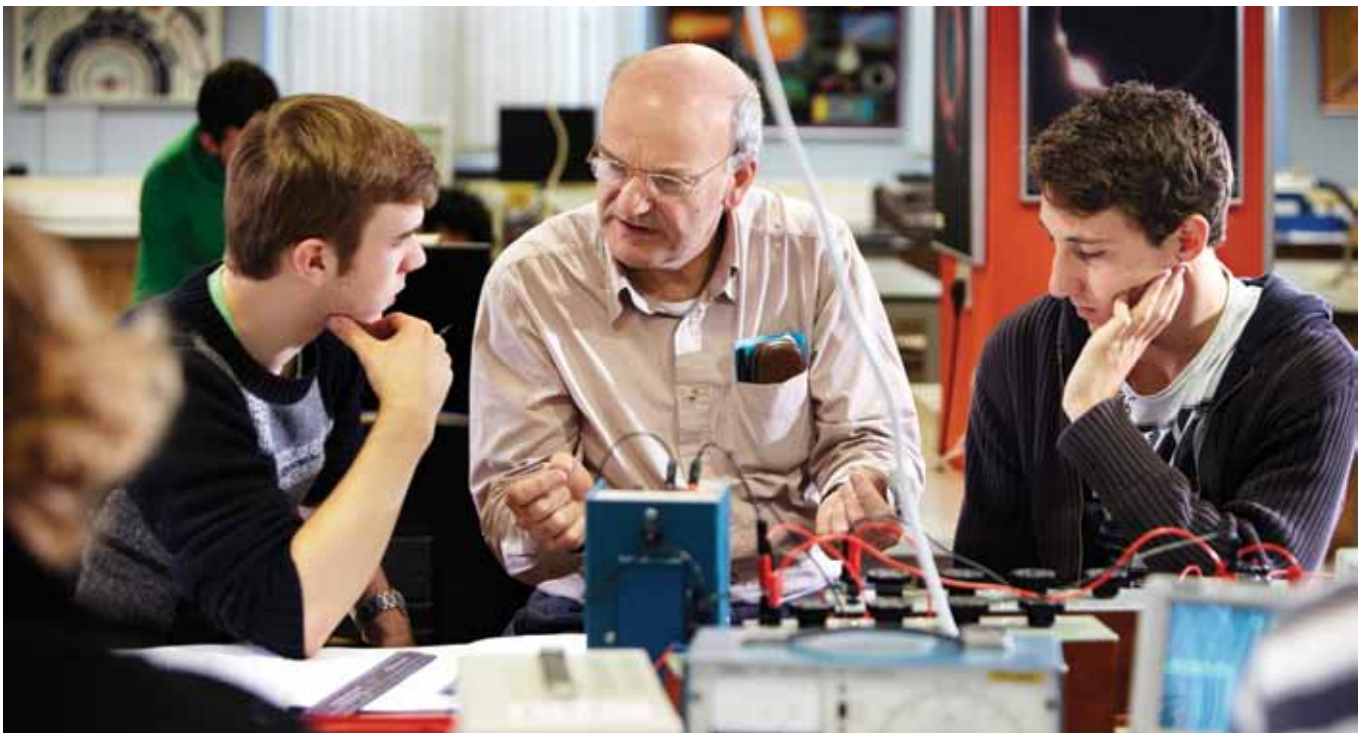
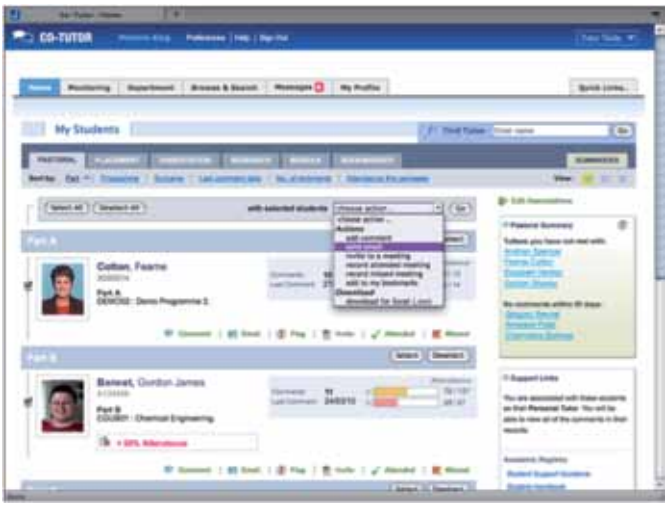


Figure 1: Sample/dummy Tutor page



Individual student records (Figure 2) provide a full picture of his or her history, engagement and achievement.

Fig 2. Sample/dummy Student record

Impact on student transition, retention and achievement

Co-Tutor has been used to improve student engagement, retention and success. In essence Co-Tutor helps staff to manage their relationships with students, and provides them with information and reminders to enhance this process. This is supplemented by metrics on student welfare, progression and attendance. The logging of information also allows managers to be sure that all students are receiving suitable levels of pastoral care and academic support. This reinforces the personal responsibility members of staff have for supporting and guiding their students, and providing high quality information and advice. Monitoring reports make the frequency and quality of support provided by staff to students completely transparent. Reports include:

- Staff online activity
- Total number of comments per student
- Total number of student/staff meetings both missed and attended
- Distribution of alert flags
- Frequency of comments, meetings and emails
- Percentage of attendance across programme or module, year group or level of study
- Reports specific to tutoring type.

The impact of Co-Tutor is demonstrated by the changes in students' behaviour in terms of attendance, as a result of staff use of information and follow up action, and impact on degree classification.

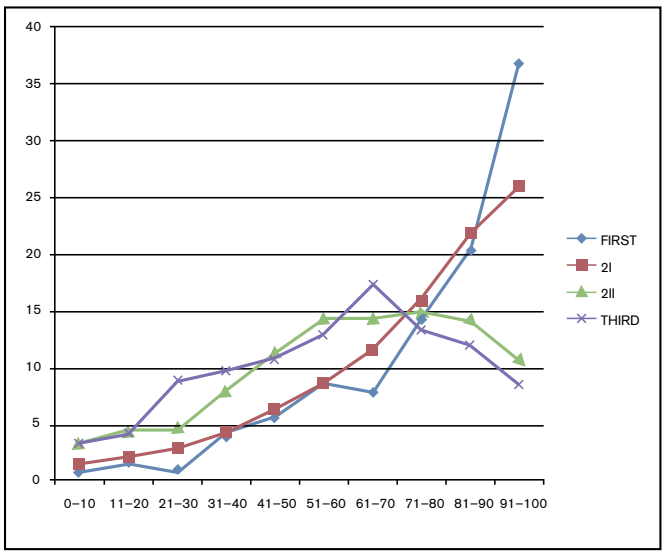
Data from the past 5 years attendance records suggests that the act of taking registers increases attendance rates, as shown in Table 1 below. The number of modules monitoring attendance has increased from 62 to 260, and the average attendance rate has increased to 70%.

Table 1: Attendance and attendance monitoring

2004/5	2004/5	2005/6	2006/7	2007/8	2008/9
Total number of students marked present	25372	37899	62017	79428	116335
Total number of student records	38715	56395	89930	117062	166027
Average attendance (%)	65.54	67.20	68.96	67.85	70.07
Difference in percentage points		+1.66	+1.76	-1.11	+2.22
Number of modules	62	121	214	229	260

The data also shows a correlation between attendance averages and final degree classifications. Table 2 below includes data for 4221 students graduating since 2004. This table shows that 37% of people with a first class degree attended teaching sessions more than 91% of the time, compared to 26% of people with a 2i, 11% of people with a 2ii and only 8% of people with a third. People graduating with a first and a 2i are most likely to attend more than 91% of the time, people with a 2ii tend to attend between 71 and 80% of the time, and people with a third are most likely to attend between 61 and 70% of the time. This is shown visually in Figure 1 below.

Attendance averages of people with particular degree classification				
Avg (%) Attendance	FIRST	2I	2II	THIRD
0–10	1 %	1 %	3 %	3 %
11–20	2 %	2 %	4 %	4 %
21–30	1 %	3 %	5 %	9 %
31–40	4 %	4 %	8 %	10 %
41–50	5 %	6 %	11 %	11 %
51–60	9 %	9 %	14 %	13 %
61–70	8 %	11 %	14 %	17 %
71–80	14 %	16 %	15 %	13 %
81–90	20 %	22 %	14 %	12 %
91–100	37 %	26 %	11 %	8 %



Additional data demonstrates that students achieving a first class degree have consistently attended at a higher rate than other students. It also suggests that interventions by staff to increase attendance might improve degree outcomes for students.

In 2009 engCETL surveyed all Co-Tutor staff users and received 110 respondents (approximately an 18% response rate). Evidence from these responses suggests five key reasons why Co-Tutor impacts on engagement, retention and achievement. (The percentages indicate the proportion of respondents who expressed a preference).

1. Provides flexibility and continuity to support a student's learning journey. 86% (55/64) reported a positive effect on the continuity of care from a student's previous tutors. 6% (4/64) reported a dramatic improvement.

2. Helps the identification and monitoring of struggling students to aid retention and improve performance. 89% (55/62) reported a positive effect early recognition of struggling students and intervention. 13% (8/62) reported a dramatic improvement.

3. Assists staff in their responsibilities and improves communication. 85% (51/60) reported a positive effect on communication between various tutors and administrators. 10% (6/60) reported a dramatic improvement. 84% (47/56) agreed or strongly agreed it helps new members of staff in their tutoring roles.

4. Provides important metrics to help enhance the student experience. 77% (41/53) either agreed or strongly agreed that it helped to provide consistent pastoral care and industrial supervision across the department.

5. Supportive and inclusive development process based on departmental and academic need. 77% (20/26) agreed that the method of developers working closely with staff created a useful, flexible and innovative system.

Strategic fit

The University has a strategic commitment to provide a first class student experience. Co-Tutor develops staff responsibility for individual students and groups, provides them with the data to inform their decision making, facilitates their communication with students and supports them to take action with respect to students deemed to be at risk. This process is reinforced by annual reports produced by each Department to monitor their tutors' use of Co-Tutor and student attendance. This information is used within the Annual and Periodic Programme Reviews as part of the quality assurance procedures.

Reflection and challenges

Co-Tutor has developed iteratively and collaboratively; the team have responded positively to feedback, and actively piloted earlier versions. This has made it responsive to the needs of different users and staff groups across the institution, and has promoted staff ownership and use.

An interesting outcome of the recent survey showed that there is increased pressure on academics to record and administer the contact they have with students and monitor attendance and intervene where necessary. Respondents report an increased feeling of frustration at this, which can manifest itself in frustration with using the system.

A few respondents worried that using a computer to record and manage the day-to-day contact with their increasing number of tutees was to the detriment of the one-to-one relationships. One respondent remarked, 'I now feel that I have to meet in my office rather than a café or neutral space'.

Tips for others

These tips are focused on maximising staff engagement across the institution, as this is necessary for a system such as Co-Tutor to have an impact on student retention and success.

- Focus on improvements to the learner experience. Combining data on student characteristics, behaviour and performance can be used to support students on course, and beyond. This should be the motivation for introducing a system such as Co-Tutor.
- Be solution-focused. Technology can be used to assist people to do tasks that they are required to do (such as monitor student attendance, identify students at risk of failing and arranging meetings with students). Automate as much as possible, such as providing notifications by email of comments added or drops in attendance, however, always have a manual override for automated emails, as it is important to consider the balance between automation and human intervention. Never sacrifice quality in contact between staff and students; for example, use automated monitoring to check whether tutors are recording face-to-face meetings with tutees. People are much more willing to engage if the technology or other change is perceived as beneficial.
- Use a collaborative-approach. Involving others in the developmental and implement process is essential to increase engagement and adoption. Co-Tutor has been widely adopted across the university because staff can see the value of it, and have evangelised to others. Collaboration can involve:

a. Talking to as many people as possible and involving staff from across the institution in developing and owning the system.
b. Undertaking early prototyping and piloting with key groups of users.
c. Seeking out and respond positively to feedback, but be careful about raising expectations that you cannot fulfil.

- Tailor provision to meet local need and promote use. Tailor the provision as much as possible to individual / department need. For example, have a user's preference section where each person or department can personalise the system. Devolve administration and first line of enquiries to a nominated department 'super-user' if possible. Encourage departments to support their own users and operate autonomously. Once the approach is tailored, encourage departments to adopt and promote the system, and promote the benefits of it. The top 3 reasons why people were motivated to use Co-Tutor are:

a. Obliged to use it by my department (67/110, 61% users)
b. I thought it would save me time (38/110, 35%)
c. It was recommended by a colleague (35/110, 32%)

Further information and resources
Web: **http://co-tutor.lboro.ac.uk/about.php**
Email: m.r.n.king@lboro.ac.uk

Case study

Using data and evaluation in two engineering schools to enhance induction and progression

Schools of Chemical Engineering & Advanced Materials (CEAM) and Mechanical & Systems Engineering (MSE), Newcastle University

Description

Newcastle University is a pre-1992 university with a strong research focus, and has five schools of engineering. The University was a member of a project team[1] participating in the What works? Student retention and success programme. The Newcastle team focused on improving the retention of engineering undergraduates through curriculum-based strategies that enhanced students' academic and social engagement with peers through Engineering Teams which were introduced in two schools: the School of Mechanical & Systems Engineering (MSE) and the School of Chemical Engineering & Advanced Materials (CEAM).This case study focuses on how these interventions were evaluated using institutional data and qualitative feedback from students to explore the impact of academic and social integration on improving student retention and success.

Evaluating impact

As part of the What works? programme two specific practices were evaluated:

- The 'T-shirt' induction activity in the School of Chemical Engineering and Advanced Materials (CEAM); and
- Group learning in the School of Mechanical & Systems Engineering (MSE).

The T-shirt activity is a facilitated way of getting students to meet and talk to other students to form groups. These groups then form the basis of friendship and study groups. Group learning involves dividing students into groups of five on the first day of the first semester for collaborative study and assessed work during the first semester, and further group working in semester two. Fuller descriptions of these interventions are provided in our guide 'Social engagement to improve student transition, retention and success in higher education' (Jones and Thomas 2012 forthcoming).

Evaluation strategy and research methods

The aim of the evaluations was to explore the impact of these interventions on student retention in higher education. The research team used mixed methods combining qualitative research with students, with survey responses and analysing institutional retention data at school level. The team was keen to draw on the student voice to gain understanding from the students about the early group formation and collaborative learning; they therefore made use of focus groups and interviews with students and student surveys. The What works? programme was particularly keen to measure impact on retention, and thus qualitative evidence was supplemented by an analysis of institutional data about first year retention, making comparisons with previous years before the interventions were introduced, and comparing retention rates with the other engineering schools that did not introduce interventions aimed at promoting early academic and social engagement.

Ethical considerations

The research team began by getting ethical approval for their study. Their approach was informed by some key principles:

i. Right not to participate or to withdraw from the research. Students could choose not to participate, or to withdraw from the research at any time.

ii. Confidentiality and anonymity: All students involved in this research were assured that their comments would be treated in confidence and any quotations used would be anonymised. The researcher employed specifically to undertake the evaluation was based outside of the participating schools. The data collected was not shared directly with the school, but rather a report of the key issues was prepared which excluded student information.

iii. Professional protocol. The researchers were guided by professional research protocol, and in particular abided by the British Educational Research Association's (BERA) ethical guidelines for educational research.

Focus groups and interviews with students

The aim was to collect as much student voice as possible about the student experience. Eleven focus groups were undertaken over a two year period. Students were recruited in two ways: voluntarily and through timetabled sessions; irrespective of how they were selected they were given £5 for attending. The focus groups that ran in seminar time were well attended as it did not involve students having to come to campus specially or stay on campus for additional time (it was not compulsory however for students to participate in focus groups that were held during seminar time). The smaller groups of about four students generated particularly rich data. In addition five in-depth face-to-face interviews were conducted, and five interviews with students who withdrew (three by telephone and two face to face).

A semi-structured interview schedule was prepared to explore students experiences of the interventions being evaluated, and their impact on the student experience and their sense of belonging in HE. The second year focus groups were informed by first year findings. In particular they wanted to explore the extent to which different student groups had distinct voices, so they created focus group for mature students, women, students from the local area and independent schools.

[1] Good practice in student retention: an examination of the effects of student integration on non-completion, led by University of Sunderland, together with Newcastle University and University of Hull.

Student questionnaires

Student feedback was also collected through student questionnaires. In total four questionnaires were conducted with students, two from each school. The surveys were administered in different ways. Some were sent to students through their student email accounts, while others were administered in class. Much higher response rates were achieved by giving students time to complete the surveys during class, although this is dependent on whether it is a session that is usually well attended or not. One survey was administered in class and made use of TurningPoint, which allows students to respond to questions using a handset. This provided relatively simplistic feedback, was a useful way of gauging students feelings about key issues.

Institutional data

Institutional data was used to examine progression from stage 1 to stage 2, and to assess whether the interventions appeared to have contributed to improved retention. The research team were very aware that changes in the data could not be directly attributed to the two interventions under investigation, as student diversity and other changes may also account for any identified changes. Therefore it is not possible to prove cause and effect, but trend data could be identified.

Institutional data was used in two ways. First, year on year changes were considered; in other words did the rates of progression from stage 1 to stage 2 change from before and after the interventions were implemented? (Tables 1 and 2). Second, the progression rates in the two participating schools were compared with the three engineering schools that had not implemented changes (table 3). Both of these approaches provided useful comparative data, which is presented here for information.

Table 1: Progression data for CEAM students (2005–06 to 2009–10)

Academic Year	Number of students registered	Percentage of students remaining on the same Programme next year	Number of students remaining on the same Programme next year
2005–06	46	89%	41
2006–07	41	85%	35
2007–08	48	75%	36
2008–09 (intervention year)	52	94%	49
2009–10 (intervention year)	74	93%	69

Table 2: Progression data for MSE students (2005–06 to 2009–10)

Academic Year	Number of students registered	Percentage of students remaining on the same Programme next year	Number of students remaining on the same Programme next year
2005–06	93	85%	79
2006–07	75	84%	63
2007–08	91	89%	81
2008–09 (intervention year)	114	84%	96
2009–10 (intervention year)	107	94%	100

Table 3: Progression rates across the five Schools of Engineering (2009/10)

School	Number of students registered	Percentage of students remaining on the same Programme next year	Number of students remaining on the same Programme next year
M&SE	107	94%	100
CEAM	74	93%	69
School A	89	89%	79
School B	101	86%	87
School C	54	72%	39

Reflections

- One of the strengths of the project is its focus on obtaining feedback from the students who took part in the interventions so that their voices are heard.
- Another strength is that the evaluation took place in parallel with the interventions which meant that changes could be made in response to student feedback.
- The methodology for the evaluation was flexible and at times opportunistic which increased the range and forms of feedback obtained.
- The research focused on the student experience, rather than more explicitly on student retention, progression and success.
- It is not possible to introduce changes under experimental conditions. Thus student cohort differences year on year and between schools, and other changes (such as teaching staff, organisation of the timetable, and other interventions) may also impact on the student experience. It is not possible therefore to prove the link between changing academic and social engagement through team working and higher rates of retention and progression, but the data can be used to make a case for the former positively influencing the latter.

Tips

- Use the student voice to explore student perceptions and experiences.
- Integrate evaluation and research into the process of change, as this allows you to learn from the student feedback, and improve the interventions as necessary.
- Use a range of methods to collect data, and be opportunistic and pragmatic.
- Build data collection into class time, so invite students to complete surveys or participate in focus groups during class time to get high response rates from across the cohort, including those who might not usually participate or respond.
- Use a researcher who is not part of the core academic team to encourage students to be open and honest about their experience.
- Use evidence that is available, such as institutional data, module feedback from students, other survey data.
- Ensure the research is ethical and conforms to professional protocol.

Further information and resources
Web: **http://co-tutor.lboro.ac.uk/about.php**
Email: m.r.n.king@lboro.ac.uk

Key messages and principles for using data and evaluation

i. Institutional data needs to be accepted, interrogated and acted upon to improve student retention and success.
ii. Responsibility for reviewing data and implementing change needs to be effectively devolved to staff teams.
iii. Institutional data should be extended and supplemented through formal research and informal dialogue with staff and students.
iv. Student behaviour and performance (rather than entry characteristics being used to label students 'at risk') should be monitored across a range of indicators.
v. An effective institutional (or local) system needs to be in place to take action when students' behaviour and/or performance indicates that they may be at risk of withdrawing and need additional support.
vi. New interventions or approaches to improve student transition, induction and retention should be evaluated using both qualitative and survey methods with students, and by examining institutional data. Value for money calculations can be powerful in persuading further investment and wider adoption.
vii. Effective approaches to improving student transition, induction and retention should be shared with colleagues across the institution, and especially in cognate disciplines.

Reflective questions

The following reflective questions are intended to assist STEM departments to critically review their approach to using data and evaluation to improve student transition, induction, retention and progression.

i. In what ways is institutional data about non-continuation and non-completion used in your school or department to identify programmes and modules with low rates of success?
ii. How do you ensure that staff teams take responsibility for regularly reviewing their data and taking action to address poor levels of retention?
iii. Do you have mechanisms and a culture that encourages further exploration of poor performance through informal discussion and further research with staff and students?
iv. What, if any, student behaviours and performances are measured? How comprehensively is this information collected, and what incentives or sanctions could be applied to improve reporting?
v. If a student has low levels of engagement and/or achievement what action is taken by the school or department? To what extent are certain that the response will be consistent for all students?
vi. Do you make use of formative and summative evaluation to assess new interventions or approaches to improving student transition, induction and retention? If this data is collected, how is it used to make the case for maintaining and embedding this new approach?
vii. What arrangements do you have in place to share effective practice between colleagues in your school or department, with the institution more generally, and the HE system? Do you provide active encouragement for staff to participate in such opportunities?

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Titles in this series

- *Happy landings: a transition advice guide for students*
- *Critical moments in the first year*
- *Setting up a Maths Support Centre*
- *Improving retention: the curriculum development perspective*
- *STEMming the flow: a toolkit for improving transition*
- *Optimising the part-time experience*
- *Social engagement to promote success in retention*
- *Building on data: an evidence-based approach to improving transition, induction and retention*

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