

CASE STUDY

Employing Student Ambassadors to Enhance Mathematics Support Provision

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Abstract

The Mathematics Resources Centre (MASH) at the University of Bath received funding from the Thriplow Charitable Trust to provide employment opportunities to vocational entry students. We have used this funding to enhance the support provision for students who have difficulties with the mathematical content of their course. Ideas were given to the students as to what support provision enhancement may look like, but ultimately it was left up to them to determine the most appropriate focus of any additional support. In this article, the approaches taken, the changes made and the results achieved to date are presented.

Keywords: Student employment, mathematics support, vocational entry.

1. Background

Since 2011, the University of Bath has provided support for vocational entry students entering Higher Education (HE) who have difficulties with the mathematical content of their course. This has included: provision of pre-sessional material, additional small group support and alternative teaching arrangements. Development of this support has been informed by current students entering through the BTEC route in three subject areas: Sports and Exercise Science (SES), Electronic and Electrical Engineering and Computer Science.

Activities have been developed recently to also include support for local Further Education (FE) students via the '*On Track to Uni*' initiative. This is a year-long programme designed to encourage students from widening participation backgrounds to apply for selective universities. It includes preparatory mathematics tutorials held locally in FE colleges and a residential summer school held on campus at the University of Bath.

Staff from the Mathematics Resources Centre (MASH: Mathematics and Statistics Help) at the university lead and deliver these activities, supported by colleagues from the Widening Participation Office, Admissions, and Student Experience Officers. The Centre received funding from the Thriplow Charitable Trust (Charity Number 1025531), which provides grants to support the furtherance of HE and research in institutions, to provide employment opportunities to vocational entry students.

All SES students without A-Level Mathematics (or equivalent) are required to take a credit-bearing mathematics module in first semester of Year 1, Foundation Mathematics 1. The content comprises of both refresher (GCSE standard) and new (AS-Level standard) material. Due to the high numbers of SES students with a vocational qualification (usually BTEC), teaching is split between A-Level and vocational entry students. Assessment and content is identical; the split simply allows BTEC entrants to receive more dedicated support.

All students at the university can also access support with mathematics and statistics via daily MASH drop-in sessions and one-to-one appointments for more complex statistical queries.

This article focuses on the recent developments made in enhancing support provision for SES students. I am the MASH Coordinator at the University of Bath, and also the lecturer for the BTEC cohort of Foundation Mathematics 1. In 2014/15, 102 students were enrolled on the module, of which 47 came via a vocational entry route. Respective figures for 2015/16 are 85 and 40. For ease of discussion the 2014/15 intake is henceforth referred to as Cohort A, with the current Year 1 intake (2015/16) as Cohort B. Despite these activities being undertaken by and for SES students, many of the learnings can be applied to any degree discipline.

2. Project Overview

During the spring of 2015, we employed three Cohort A SES students to work alongside us on this project. They were all from a vocational background (BTEC or Access to HE) and at the time were in Year 1, having recently completed the mathematics module. Ideas were given to the students as to what support provision enhancement may look like, with the following four ideas put forward for projects:

- Creating a survival guide for freshers’;
- Creating an alternative prospectus for recruitment;
- Discipline-based mathematics resources; and/or
- Peer support.

However, ultimately it was left up to them to determine the most appropriate focus of any additional support and the direction of the project. They were given the job title of BTEC/Access Mathematics Ambassador, and as such are referred to as Ambassadors in this article.

3. Methods

The Ambassadors felt that the realisation of the importance of mathematics in their degree only really came after the completion of the module. They decided that the main aim of their work was therefore to address this issue; increase engagement with current resources and content delivery, not the development of new resources. There were two strands to their overall objective; embark upon new initiatives to enhance engagement with the current set-up, and to make improvements to the current set-up. It was made clear that large changes to the module could not be achieved in a timely manner and that the content itself was not really an area for prospective change.

Student input was key. The three employed students all had similar experiences in Year 1. They each engaged well with the mathematics module, put in a good amount of effort and achieved good grades. However, they crucially realised that they were the exception, not the norm, and wished to explore the experiences of other students in their class. Aside from informal word of mouth and anecdotal evidence, it was difficult to determine precisely how to better support students with the unit.

Two formal activities were undertaken to ascertain student opinion and feedback, a survey and a focus group. The survey was conducted via the free surveying website, SurveyMonkey (SurveyMonkey, 2016). The link to the survey was sent to all SES students and 20 responses were received. The focus group lasted approximately one hour and ten students attended. The feedback received via these avenues, alongside personal reflection from the Ambassadors, informed the activities consequently undertaken and recommendations made.

4. Actions

An overview of feedback received is given below, alongside changes made for 2015/16. Suggestions relate to how the current mathematics module and other support provision could be

amended. Many of these changes required minimal effort but often have resulted in a big impact. There have to date also been two main *new* initiatives; a freshers' survival guide and a video (more about this later).

4.1. *Better and more-timely information*

Students reported that the revelation of having to take a mathematics module was very off-putting, so much so that university choice was an extremely close call. More needed to be done to better inform prospective students about the support available, as well as educating them as to the purpose of the inclusion of mathematics for their degree programme. Most students were also surprised to find that there were other vocational-entry students on their degree programme, something which they would have liked to have known about sooner.

What we did: The Ambassadors attended the departmental open day that is typically popular with BTEC students. This is the time when current students reported first hearing about the mathematics module and immediately becoming panicked. As part of the information session, they spoke about the module and support offered by MASH, and were also available after the session to answer queries. The high numbers of BTEC entry students admitted to the course was also highlighted by the Admissions Tutor.

4.2 *Greater encouragement for BTEC students*

Entering HE from a non-traditional background can be daunting and students reported feeling less smart than their A-Level counterparts. The alternative teaching arrangements for BTEC SES students, despite being established to help them and despite assessment being identical for all students irrespective of background, felt for some like they had been put in a remedial class. They perceived that staff had lower expectations, which in turn led to reduced motivation. Students therefore need additional encouragement and need reminding that once entry to university has been achieved, all students are assessed equally. Indeed, it is worth reminding vocational-entry students that many of them thrive at university, and that their entry route can have a positive effect.

What we did: The survival guide includes clear information to address this issue. The reasoning behind the alternative teaching was explained, and also reiterated during the first week of classes. The advantages of coming via a vocational-entry background were also discussed. At open day, the Admissions Tutor also spoke about the excellent grades that can be achieved by BTEC students, highlighting that they would not keep accepting them onto the course if they were not good enough.

4.3. *Shock tactics.*

The mathematics module begins with a gentle introduction of rudimentary topics taught at GCSE, including BODMAS, fractions and solving simple algebraic equations. Some students were led into a false sense of security at this point and attendance soon dropped. It was suggested to include some form of assessment earlier in the semester to address this over-confidence.

What we did: The first Foundation Mathematics 1 class for Cohort B included a diagnostic exercise for all students. It lasted 20 minutes and was sat under examination conditions, with no calculators permitted. A range of topics, all to be covered in the following semester but also at GCSE level, was included. Students commented that this helped them realise how much they had forgotten.

4.4. *Weekly online quizzes*

In their other modules, students are used to completing weekly online quizzes that contribute a small percentage to their final grade. Given that this practice is well-established, it was recommended to introduce this in their mathematics module.

What we did: Such changes, particularly to summative assessment, cannot easily be achieved, but online resources were uploaded to allow students to self-assess progress. The majority of uploaded resources are notes, exercises and quizzes from **mathcentre** (2010). Weekly formative quizzes were included in class under the guise of 'Mental Maths' (no calculators allowed). An auto-transitioning slideshow, containing 10-20 questions, was used and students would attempt the questions alone. No marks were collected but it allowed students to discover which topics they might need to put more effort into; all questions were based on topics covered in the previous one or two weeks. Additionally it was highlighted which topics would feature in the coming weeks.

4.5. Dedicated drop-in support

Students reported finding general MASH drop-ins to sometimes be intimidating, due to having 'simple' questions in an environment often dominated by students studying more complex topics. Many SES students require more assistance than a typical visitor to a drop-in, so during busy sessions they reported really struggling to get appropriate help and consequently were less motivated to attend in future.

What we did: One drop-in session per week was arranged specifically for support with Foundation Mathematics 1. Attendance has been relatively good, and the session is complemented by the presence of a recent SES graduate who can help put the mathematics into context. She is volunteering in these sessions as work experience before applying for a place on a Mathematics Postgraduate Certificate in Education (PGCE) course and is a valuable asset to the sessions.

An anonymous online forum was also introduced, where students can post questions to be answered by peers or by staff. This is via Lino (Lino, 2016), a website which allows users to create a virtual noticeboard. Posts are made via a "sticky", a virtual post-it note, which can include images. This has proven to be a useful functionality in mathematics where taking a photograph of an equation is typically a simpler option than writing an equation where mathematical typesetting is unavailable.

4.6. Post-module advice

Despite efforts to tailor the module to SES topics, some students failed to fully understand that topics covered would appear later their degree. Instead the module was considered a standalone. Notes were not necessarily kept and many students aimed simply to pass the module, and not to do well in it. Better information was required as to how and why each topic was taught, where it would feature later in their degree, and the importance of not simply aiming for a pass.

What we did: Increased focus on explaining the purpose of the module has been employed at every opportunity. This includes the open day, the survival guide and in class. Most crucially, the Ambassadors, now in Year 2, attended class in the first week of the semester to speak about the module to Cohort B students. The change in attitude, when been spoken to by a peer and not staff, was palpable. The Ambassadors spoke about how many topics came up later in Year 1 as well as Year 2, and about the importance of a good set of grades if applying for placement (a popular option for SES students). The importance of attending lectures, asking for help early and attending extra support classes was highlighted.

The freshers' survival guide (Figure 1; available upon request) was created using Microsoft Publisher and is a booklet of length 12 pages, size A5. It includes information about the module, information about MASH, student quotes, an A to Z of how to survive Year 1, a list of do's and don'ts, and contact information. The overall theme of the guide is the mathematics module and support available for it, but other more general advice is included also. A copy was handed out in the first mathematics class for Cohort B and was very well-received.



Figure 1: Freshers' survival guide (front cover)

Four Cohort A students feature in the video (Figure 2), the three SES Ambassadors plus one other student who was part of the A-Level stream. Discussion topics were guided by asking questions off camera. The style is intended to be an informal chat between friends; discussing everything from their pre-conceived ideas of the module through to where the topics appear later in their degree. Once complete (it is currently in post-production), the video will be shared online and played at future open days.



Figure 2: Filming the video

5. Preliminary Results and Next Steps

The activities undertaken were student-designed and discipline-specific. By handing ownership of the project over to the students, and deliberately not being prescriptive about the required outcomes

or deliverables, support was highly targeted. I believe that any changes to teaching activities or support provision should always be informed by students. Many of the minor amendments made have required very little effort on my part, but are things that would never have been contemplated without student input. It was made very clear to the Ambassadors that I wanted to make adjustments in order to improve the module and support provision, so that they should not feel any apprehension in suggesting changes.

One of the most noticeable impacts was having Year 2 students speak to Year 1 students at the start of the semester. Effort put in to assessment was typically low for Cohort A, with many students being very open that they simply aimed to pass the module. The attitude has, to date, been completely different from Cohort B, with students much more motivated to achieve a high grade and to understand as much of the material as possible. I believe that the potential between the groups is similar, it is simply a shift in attitude, which I also believe is largely attributable to having their peers speak to them about the module. Assessment includes a midterm test which contributes 20% of the overall module mark. Results for the midterm and overall module grade are shown in Table 1.

Table 1: Assessment results for both cohorts

Cohort	Midterm (/40)		Overall unit mark (%)	
	Mean	S.D.	Mean	S.D.
A (2014-15)	18.2	9.6	50.3	18.8
B (2015-16)	33.9	5.6	71.8	12.7

S.D. = standard deviation

Differences between the cohorts are statistically significant, $p < 0.0005$ in both cases (Mann-Whitney U test).

Now that the Ambassadors are in Year 2, they are in an even better position to understand how mathematics is used throughout their degree. We are now looking at what other enhancements can be made. They are all keen to still be involved in this work and we will also employ one Cohort B student to work alongside them.

6. Acknowledgments

The author wishes to thank the Thriplow Charitable Trust for providing funding for this project. Thanks also to all students involved in this work and particularly the Ambassadors for their hard work and enthusiasm.

7. References

Lino, 2016. *Lino sticky and photo sharing for you*. [online] Available at: <http://en.linoit.com/> [Accessed 24 March 2016].

Mathcentre, 2010. *Mathematics resources*. [online] Available at: <http://www.mathcentre.ac.uk/> [Accessed 24 March 2016]

SurveyMonkey, 2016. Survey Platform. [online] Available at: <https://www.surveymonkey.com> [Accessed 24 March 2016]