The University of Sheffield, UK

Submitted by: David Mowbray, Department of Physics and Astronomy

> **Course:**
> Introductory Mathematics for Physicists and Astronomers
>
> **Type of data collected:**
> Anecdotal student feedback
>
> **During which period:** 2009–10

> **Textbook in use:**
> *Mathematics for Engineers*, 3rd edition, 2008, Croft and Davidson

MyMathLab course structure

Course design

The module provides two out of three of the maths content that is designed to prepare students taking degrees in Physics, Physics and Astrophysics, etc., for the remainder of their course. All students will have A-levels in Maths and Physics. The module is taken by approximately 120 students.

The module consists of 44 lectures supported by weekly, small-group tutorials (approximately seven students, plus one academic) and larger problem classes (approximately 25 students, plus one academic and one PhD student helper).

With increasing student numbers, finding sufficient academics, PhD helpers and suitable rooms for the problem classes was increasingly difficult. Students could cover very little work in the 50-minute class.

We wanted to replace the problem classes with online exercises to overcome the issues raised above. We also wanted to provide more support to the students during both the teaching period and during their exam preparation.

Assessment

Work is submitted at the tutorials, marked, and these marks contribute to the module mark. Students complete questions during the problem classes with unlimited help. Answers are submitted and marked, and again these marks contribute to the module mark.

Implementation

We replaced the problem classes with weekly exercises using *MyMathLab*. Other academics teaching the module had to be persuaded – they were not convinced that the system could adequately assess all the topics covered in the module.

Discussions with Pearson started mid-2009, with implementation for Semester 1 in autumn 2009. It was a bit rushed and exercises were often only developed just before they had to be made available to students. Things should be much less hectic in the second year of use. Note: The worry that a significant fraction of students might not buy the book does not seem to have happened.

Each week an assessed assignment is set and made available to the students. Assignments become available on Monday morning and close on Sunday evening at midnight. This period can be extended if a valid request is received from a student.

Exercises use a mix of existing questions from the bank of questions provided by the textbook and questions that we add ourselves. The ten assignments contribute 15% of the module mark. Each week either a formative (non-assessed) similar assignment is set for the students to practise before attempting the assessed assignment, or they are encouraged to attempt questions from the bank of questions. Only one attempt is allowed at the questions in the assessed assignment.

A past exam paper was added to the system and students were encouraged to try this in preparation for their exam. This proved very popular.

At the start of the module we set a diagnostic test which covers material that should have been covered at A-level. It has always been our aim to offer targeted support classes to students who have identifiable weaknesses but we have never had the staff resource for this. We aim to establish a number of online exercises that we can suggest students complete to help with weaknesses identified by the diagnostic test.

MyMathLab course results

Anecdotal evidence

We held a focus group with students. Generally they were happy with the system although some said they would have preferred the direct support of a problem class. They commented that the system was all about assessment and not learning. We will address this next year by placing more emphasis on formative assessment.

Statistical evidence

The completion rate of exercises is higher than in the previous system. We have only run the new system for one year so cannot yet comment if it has improved overall student performance.

Conclusions

In some tests, where the answers were mainly formulae (e.g. integration), there were issues where students entered the correct answer but not in a format we had set the system to accept. If they had completed the formative exercises first these problems would have been minimised. Next year we need to give the students more

instruction in entering answers. It is possible to set up multiple possible answers but difficult to pre-empt all possible student answers. We encouraged students to contact staff if they felt they had entered a valid answer but in a format that wasn't accepted. It is easy for staff to enter the system and revise marks if necessary but this is rather time consuming.

In brief

- **Marking by the system is quite crude – it's either all or nothing. It is possible to split questions into a series of steps, with marks awarded for each step, but there are still occasions where it would be good to give half marks for a partially correct answer.**

- **Very few students completed the formative exercises (yet complained in feedback that MathXL was all about assessment and not learning).**

- **The system is relatively easy for both staff and students to use and adequately covers all our year one maths.**

- **The ability to use random parameters in a question is very useful. For example, you can ask students to calculate $z1 * z2$ where $z1 = a + ib$ and $z2 = c + id$, and the parameters a, b, c and d are chosen at random from a specified range of integers. This prevents students colluding.**

- **It is relatively easy to enter your own questions. Though the method for entering algebraic expressions is rather cumbersome, it is easily learnt.**

- **It allows additional support for student learning (e.g. provision of past exam paper).**