Mapping University Mathematics Assessment Practices

Edited by

Paola Iannone
University of East Anglia

Adrian Simpson
Durham University

Chapter 11
Portfolios using Maple

Abstract This case study presents the assessment strategy for a year 1 computational mathematics module. Assessment consists of a portfolio of questions and a mathematical modeling project developed using the mathematical software package Maple.

11.1 Background and rationale

Changes in the assessment structure for this module were introduced following the university's drive to improve students' employability skills. The approach to assessment used in this module came from the lecturer's desire to improve students' programming skills, to draw together concepts from across the curriculum, to develop students mathematical modelling abilities and to help them use their mathematical knowledge across different subjects.

11.2 Implementation

This is a year-long module divided in two parts: computational mathematics and mathematical modelling. The first part is assessed by a portfolio of weekly questions students are assigned from a set list, linked to the mathematical topic taught in that week. An example of the question in the portfolio is:

Maple Tutorial Sheet 7
Use the `dsolve` command to solve the differential equation

$$\frac{1}{x}\frac{dy}{dx} - \frac{2y}{x^2} = x\cos x.$$

Plot the solution with constant of integration equal to -1, -0.5, 0, 0.5, 1 on the same graph.

The emphases of the questions are on understanding mathematics, but also on learning the use of Maple.

The second part is assessed by a group project and presentation in mathematical modelling. This is done as a group, with the grade given for a mixture of assessment tasks including presentations and report writing, and the module contains teaching focused specifically on developing these skills.

Students are required to use Maple for both assessments and they are taught how to programme in Maple in the first part of the course. Developing computer programming skills and developing effective contribution to group work are among the set learning outcomes of this module.

Key advantages of this assessment schedule are the focus on employability skills including programming and computer literacy, communication and writing. It is also seen to have benefits in developing many of the skills needed for the more substantial final year project. As with any form of assessment, one concern is that there are a small number of students who do not engage or put in sufficient effort.

11.3 Assessment

Stage	No. of students	Assessment pattern
Year 1	78	60% mathematical modelling group project and presentation 40% portfolio of questions

11.4 Discussion, learning and impact

The lecturer coordinating this module describes how the university drive to include employability skills in the teaching of mathematics has partly motivated their choice of assessment. Being able to programme and being computer literate are skills that any employer will value and that students do not have at the start of their degree. Marks so far for this module are high, near 60-70%, showing that most students put in the time and effort required. The lecturer also appreciates seeing students grow in confidence using the software as the year progresses. The drawback of this assessment schedule is the heavy marking workload, especially in view of the growing number of students joining mathematics degrees.

Mapping University Mathematics Assessment Practices
Published 2012.
University of East Anglia
ISBN 978-1-870284-01-1