AN EXAMPLE OF ASSESSMENT THAT INVOLVES...

- Formative assessment
- Automated feedback

AIMS

The Programming and Algorithms (4000CEM) module is taken by students with huge diversity in study skills, prior programming experience, and interests. The module is taken by hundreds of students each year, but the majority of actual contact time is delivered in groups of 40 or less, as it needs to take place in PC labs. This necessitates a large module team and thus adds the issue of consistency among the labs and teachers.

Against this backdrop, the module team aimed to vastly increase the amount of formative feedback students receive; whilst increasing its availability (as it does not have to take place in labs) and making it more consistent while still meaningful.

ACTIONS

Students were provided with licences for a cloud computing environment ("Codio"). This enables them to be presented with tasks and then to undergo a cycle of:

- (re)attempt task;
- run automated tests;
- read feedback

This is similar to the development and testing environment used in professional practice, and can be undertaken at any time or location. Although feedback from Codio is automated, it is also:

- Meaningful: it points out what has gone wrong for that student in that attempt at the task.
- Consistent: all students get the same opportunity to access feedback of the same quality.
- On-time: students can access it whenever they want.
- Extensive: there are multiple tasks every week each with feedback.
- Popular: See Impact section below.

Timetabled lab sessions were used for staff to support students who were unable to end the cycle, and discussion (e.g. what lessons should be drawn from the tasks and links to theory).

Staff were thus able to spend more time engaging in deeper learning, and less pointing out common bugs. Staff subsequently started using this feedback mechanism for (part of the) summative assessment.

IMPACT

- The module’s most recent MEQ had:
  - 93% satisfaction overall, and
  - 90% satisfaction with feedback.
- This data indicates that students do accept automated feedback; in fact, they seem more willing to accept it than human generated feedback delivered informally (talking in the lab).
- In recent years there has been a steady increase in overall satisfaction, feedback satisfaction and student performance in line with the introduction of this initiative.
- Anecdotally teaching staff have reported better attendance on this module than many others in the course.
- The module team have produced research based on this intervention (see Further Reading below).

TOP TIPS

- There is scope to use automated feedback in other modules where the right answer can be judged automatically (e.g. programming, mathematics, languages).
- Automation is not a replacement for human interaction. The module team retain the same amount of contact hours. Rather, the automation enables the human interaction to be more focused on covering deeper, more important topics.
- Automation does not save staff marking time in this module. Students still undertake group projects which are marked by group presentation and viva.
- The formative tasks and tests took considerable time to develop, but once created they can be used for several years with only minor maintenance.
- Codio was the tool used in this case, although the development of tasks and tests was undertaken by the module team. Moodle’s Coderunner feature provides similar functionality.

FURTHER READING