

Using an MLE to challenge students' learning, encourage interaction with lecture materials, and to assess their knowledge

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Subject Area: Fluid and Thermodynamics Module

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This case study has been developed from data gathered through a demonstration of the teaching and learning materials available, interviews with the tutor and a student focus group.

Background

'Fluid Mechanics and Thermodynamics' is a compulsory first year module, with approximately 150 students following the course, which comprises of weekly lectures and tutorials and two lab sessions. Support materials for the module are provided through the University of Hertfordshire's Managed Learning Environment - StudyNet - which actively seeks to integrate teaching materials, notes and module news, as well as on-line class discussions to enhance opportunities for personalised and collaborative learning. For this particular module materials a range of automated facilities have been developed, in addition to lecture notes, to support the teaching, learning and assessment processes.

During the first lecture the students are given a session to explain how the processes within the module will work and to watch a demonstration of the facilities available through StudyNet. This helps to develop confidence in the system and also highlights the correlation in previous years between students engagement with StudyNet and module grades. Students are sent an email at the beginning of the module containing their passwords and details of how to access the StudyNet materials.

The module is assessed through a final examination and coursework, comprising two lab reports and weekly assessed tutorial sheets (WATS). The tutor developed a set of 'student unique' tutorial sheets to actively encourage and improve student engagement throughout the duration of the module, writing a computer programme to automate the associated processes of setting, delivering, collecting, assessing, providing feedback and tracking student participation and success. Students access tutorial questions generated from unique datasets, on a weekly basis through StudyNet, and after completing the work, submit answers to a bespoke computer program. Following the deadline an email with marks and feedback is sent to each student and worked examples are posted on StudyNet. The marks for each week are analysed by the tutor and additional support materials provided where necessary. The tutor also seeds and monitors the discussion board and addresses issues concerned with the current weekly task before the submission deadline and materials covered in the lecture.

Reasons for introducing this teaching method

In previous years failure rates for this core engineering subject had been as high as 50%. An in-phase class test had typically been conducted in Week 7, with marks and feedback being returned only weeks before the end of module exam. This left limited opportunities to "*diagnose learning or for students to use anything from the feedback*". The materials available through StudyNet aim to "*support and challenge*" students on "*a weekly and even daily basis*". WATS, which has replaced the in-phase class test, forces students to complete studies on a regular basis and on-line discussion boards encourage students to raise issues and provides an opportunity for the tutor to be "*dynamic*" in their support provision through responses to questions posted.

Students' perspective

Students used the facilities available through StudyNet because "*it covers everything*". Students found it a "*really handy place to get notes etc*" and helpful for a variety of things including understanding lecture

materials, revision, accessing support for tutorial questions, timetables and room changes. StudyNet was seen to provide support *“when you’re working, or it fits in with your schedule”*.

Overall the students found that the use of WATS was an *“excellent”* approach. Students felt more prepared for the exam because of the phrasing and structure of the questions being similar to the exam. The weekly feedback provided *“more confidence”* and *“highlighted weaknesses”*. *“If you complete the WATS for the lectures being taught you can be sure that you know the material.”* Students appreciated the speed at which feedback and results were delivered *“always within a week”* and that they were not left *“waiting months”* before *“you’ve got an idea of how you are doing”*.

Issues

StudyNet allows most file types (including all Microsoft Office files) to be uploaded but can not currently handle executable files. The computer program responsible for collecting the students weekly submissions is uploaded to a server which the students can only access from Learning Resource Centres on campus. They can not, therefore, submit their answers from an alternative location. However this approach does not *“tie the students to a computer”*, allowing students to work in a setting and, within the weekly deadline, at a time that best suits them. The exercises can be completed on paper and only the numerical solution is submitted. All other features of StudyNet can be accessed from any location over the internet.

The tutor spent a lot of time setting up and writing the questions to avoid *“inappropriate questions”* being asked. *“I think there is a need to think differently, if the computer is doing all of the marking, taking you out of that marking loop then ... clearly you need questions which can discriminate from a good student and a bad student.”* The type of feedback offered to each student also needs to be considered. Currently the feedback given to students reflects their overall score for the particular tutorial sheet. Planned developments include programming the computer to detect common errors (for example, use of an incorrect multiplying factor) and offering feedback based on errors made in the submission.

Benefits

As well as improving students engagement with the materials and tutorial activities, completing the WATS *“encourages people to talk to each other”*. Groups of students often worked through problems together but this was not seen as an issue because *“you can’t copy... because each solution is different”*. Some students had also found this activity so useful that they got together in groups to solve problems with other module tasks.

Students could appreciate the benefits of being more organised and commented that *“WATS was a great help for structuring you to work through the semester and taking you through the materials.”*

After the first year’s introduction of the additional support materials and the weekly assessed tutorial sheets the failure rate for this Fluid Mechanics and Thermodynamics module has been reduced from 50% to 23%

Reflections

This type of activity can help to reinforce to students that studying regularly is useful. Whilst it may only tackle lower levels of learning skills (which may be more appropriate at first year level) the tutor hopes this will develop students’ confidence and understanding of problem solving.

Overall students were very positive about their experiences of using StudyNet and WATS to support their learning in this module. They appreciated the honest opinion of the tutor who *“doesn’t see failure as the student’s failure, but the fault of him as a lecturer for not getting it across to them”* and who *“just wants people to do well and improve their own learning”*.