MasteringPhysics

Aalto University, Finland

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LEARNING OUTCOME

Students at Aalto University who choose to use MasteringPhsyics **get an average of 15% higher mark on the exam**. The lecturer requires his students to do Skill Builder or Self-Tutoring Problems, with their built in support tools, before attempting an End-of-Chapter question, which **helps ensure effective learning**.

Course
Physics I and II

Textbook in use
Essential University Physics, 1st edition, 2007
Wolfson

Type of data collected
Weekly exercises, final exam, student feedback

Data collection period
2009–10

Course design

This one-year course is divided into four parts: IA, IB, IIA and IIB. Each part lasts for six weeks, and at the end there is an exam. I give four 45-minute lectures every week. I select 12–18 problems from MasteringPhysics every week for the students to solve. In order to learn how to solve problems using pen and paper, we offer exercise sessions supervised by the teaching assistants. Each student can attend one 90-minute session per week.

With web-based material I can give the students more problems to solve and thus improve their problem-solving skills. Also, one quarter of my students have not studied the required physics courses in high school. The Self-Tutoring Problems (STP) and Skill Builders (SB) problems are especially helpful for them.

Assessment

All assessment is summative. In the exam there are five questions, each worth six points. So, the maximum mark is 30 points. The MasteringPhysics credit is converted to exam points, with the maximum credit providing six additional points for the exam.

Implementation

The MasteringPhysics assignments are optional, but are strongly recommended. The department purchased access codes for the students this year. The recommendation is also enhanced by providing credit based on the MasteringPhysics assignments. In the exam, the credit corresponds to one (out of five) exam questions.

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The problems set in my MasteringPhysics assignments contain Skill Builders (SB), Self-Tutoring Problems (STP) and End-Of-Chapter problems (EOC). The EOCs are always placed after an SB or STP problem that explains the physics, and the option ‘require previous’ is systematically used. Most of the problems provide credit, but some are for practice (these are not very popular among the students).

The settings I use are:

- show correct answers
- number of answers limited to six
- no time limit
- not allowed to print
- gain 2% credit for not opening a hint

- opening a hint does not cost anything (it seems that students are reluctant to open the hints in order to maximise their credit)
- loose 5% for incorrect answers
- loose 5% per each day late

Course results and conclusions

- I always check the MasteringPhysics records for students that get high points in MasteringPhysics and low points in the exam as this can be a sign of cheating.
- This year the average total of the exam points was 15% higher for students who used MasteringPhysics when compared with those who didn't. Whether this is due to MasteringPhysics or other factors is left open. The same picture has been repeated with four 250-student exams.
- Student feedback shows that students like the ability to complete assignments online. This has been mentioned several times in feedback questionnaires.
- Would I recommend this technology to a fellow lecturer who was planning to teach this course? More yes than no. The use of MasteringPhysics is more time consuming than I imagined it would be. However, it seems to improve the skills of the students.

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