

Online-based surveys in the Lectures on Mechanics II

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Lectures on Mechanics 2 is a fundamental course for all technical related studies for bachelors at Hamburg University of Technology (tuhh). The content of the lecture is a comprehensive introduction in elastostatics. To this fact and presenting in front of 891 students (subscribed students for the summer term 2019) there exists nearly no time to include or respond to students questions. Moreover, the students do not dare to ask questions during the lecture because they think that they expose themselves to their fellow students. Still these answers to those questions would improve the general understanding of fundamental concepts of the theory and would be of great interest for the remaining students.

To improve the interaction between the lecturer and the students and simultaneously increase the learning rate in understanding fundamental concepts of the theory during the lecture we introduced ConcepTests as a didactic concept. In detail, we generate a pool of (in sum 66) multiple-choice questions in elastostatics, for every lecture unit. We presented these polls with an open access, browser based software called PINGO. In order to participate in the surveys, an internet-enabled device is required, e.g. mobile phone, tablet etc.

Up to stage of planning the lecture, there existed no benchmark concerning a stress test with internet-based polling systems at the tuhh. Therefore, we asked the Rechenzentrum to log the network traffic at the access points at the Audimax lecture hall during the first lecture. In the end, no limitation concerning the IT infrastructure was observed during the course of the lectures. Moreover, the lectures were more relaxed and were not so overdriven by theory and the students had a lively subject-related discourse with each other while they memorized and repeated the theory.

In summary, it is an appropriate indicator for the lecturer and for the students how well the theory was understood and presented. For an objective evaluation of the impact of ConcepTests, we did two questionnaires with the same questions during the lecture at the beginning and around midterm. This questionnaire is based on the Colorado Learning Attitudes about Science Survey (CLASS), which quantifies the students attitude in learning physics. We used a modified, extended version for MINT students, created by the group of Christian Kautz at the tuhh. By conducting the same survey twice, it is possible to analyse relative changes concerning CLASS metrics and to quantify the impact of ConcepTests. In summary, no significant improvement in optimal learning attitude was observed.

We observed and quantified an increased acceptance in the introduced method of ConcepTests by evaluating the CLASS and we would like to continue these online-based surveys. Nevertheless, we have to redesign multiple-choice questions, especially those chapters where a significant drop in correct answers are observed.