

Take the laboratory into the classroom

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ABSTRACT

Hands-on, Miniature systems teaching, Large classes

Please indicate clearly the type of contribution you are submitting: hands-on, explore, poster.

It is a wonderful thing when students forget about time when trying to get a setup to work. Working towards such a concrete goal they will get immediate feedback from the system itself, by whether it is working as intended or not and they need to analyse and understand the setup to solve open issues which engages the students (raft.net, 2013).

The number of students for engineering education is increasing in Denmark (ufm.dk, 2015), and often laboratory space cannot keep up. Considering adult leaning processes (Kolb, 1984) and the preferred learning style for each learning stage (Honey and Mumford, 1982) the active experimentation forming the concrete experience are part of the learning process best learned when trying things out to see if they work. So sacrificing experimentation due to an increasing amount of students is inefficient without reducing the expected learning outcome. In this work a different solution is sought.

One way of solving the issue could be to split the big classes into small teams and then each team gets a certain amount of lab time together with the educator. However this is very time intensive and teaching is at the risk of becoming an uninspiring record player, playing the same song over and over again. So if the students can't come to the laboratory equipment, we might try to bring the laboratory equipment to the student. However in many cases, the equipment is too large and heavy and there is only a limited amount of equipment. So I propose to consider shrinking the equipment to a miniature size, sacrificing some of the functionality, but saving the active learning environment in big classes.

In this hands-on session you will be presented with a number of examples of large laboratory equipment, shrunken to something that students can handle in the class room like (Frenzel, 2012). You will then in the hands-on section present your relevant equipment in groups and be challenged to consider your own courses and laboratories for miniaturization. The outcome of the session should be new and fresh ideas to improve the hands-on part in your courses.

This will need to be followed by a discussion of the problem of the teacher-to-student ratio, which is particularly critical working with hands-on exercises and how to address this. Finally I propose to discuss and evaluate how this affects our teaching style, learning goals and learning outcome.

REFERENCES

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