

Making and using video introductions for physics lab experiments

Alexander Struck, Georg Bastian

Daria Dvorzhitskaia, Lina Kyvoruchkov, Lea Wemmers, Antonia Geck

2015-08-18

Our situation



HSRW: International University of Applied Sciences

- Students from many countries with different school education
 - Faculty of Technology & Bionics: engineering, materials science, science communication
 - Physics is minor subject for all BSc. programs
 - Wide range of motivation amongst students

Big obstacle for many students: Physics labs!

What can go wrong ?

Don't like the topic

Don't have enough time

Dropped physics early in school

Scared of math

Not used to scientific thinking



A typical physics lab experiment at HSRW

Download instruction manual (2-4 pages), prepare theory and understand experimental setup

Write a small test before the actual experiment

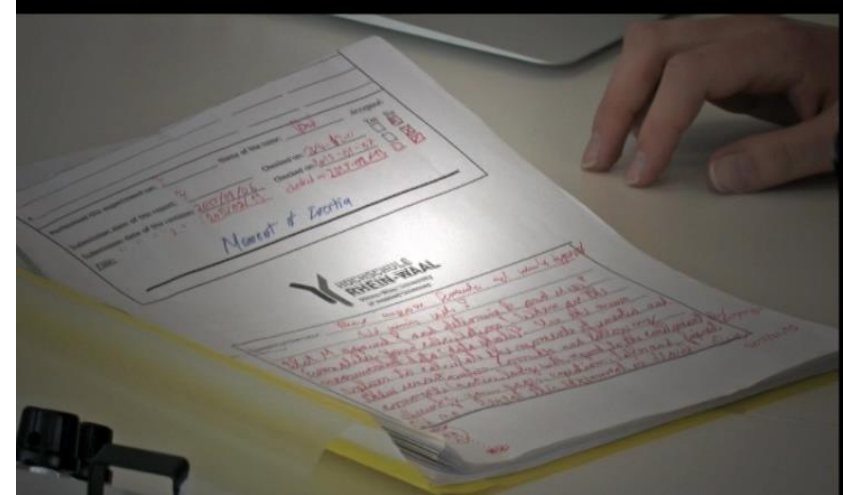
Perform experiment (in groups of 2-3 students), take data

Analyze data, write a lab report according to distributed template

2 weeks time



Time consumption



- Mainly by writing lab reports
- Difficulties often arise through lack of preparation
- Workpile grows larger over the course of the semester and hampers preparation for the next experiment

Naive solution attempt: „multimedia instructions“, videos, smart phones, templates

Advantages of DIY video instructions: Didactical

- Greater motivation to play, experiment, especially if the result is not immediately shown
- Reduced fear of the apparatus
- Eagerness to perform an experiment rather independent of its role in the learning process
- Enhanced fun factor, flow experience
- Applied project for Science Communication students

Advantages of DIY video instructions: Practical

- Saving teaching time especially in large groups
- Small features of the experiments can be enhanced by zooming
- Explanations on the real object, not on a drawing
- First experience of how the experiment should look like
- Time for editing the videos is shared between many, time effort of the instructors is reduced

Some previous attempts



- Using video tapes for teaching physics (1974):
<http://searchworks.stanford.edu/view/873958>
- Clicker-War / Audience-Response-System– feedback from students during lectures using an app:
<http://mytu.tu-freiberg.de/>
- Cell phone use by students:
<http://www.unicum.de/studienzeit/rund-ums-studium/allgemein/smartphones-an-der-uni-staendige-begleiter/seite/1/>
- PhyDid 1/11 (2012), „Influence of Video instructions on motivation of pupils“
<http://phydid.physik.fu-berlin.de/index.php/phydid/article/view/310>

Why physics labs at all?

- Basic science for engineering and natural sciences
- Hands-on access to physical laws
- Team work
- First direct and intensive interaction between professors and students, mutual feedback
- Introduction to scientific methods and measurements
- Introduction to technical documentation and scientific word processing