

Title: Didactics of Physics: Modern Physics in the Classroom

Abstract

In this educational session we will explore some of the ways modern physics is introduced in the classroom of the 21st century.

The chairman of the Institute of Physics will be giving an overview of the physics education field in the UK and we will have contributions from the Freudenthal Institute (UU) about teaching special relativity and from the Fontys Hogeschool about the use of 3D printing in the classroom.

Conveners: Ralph Meulenbroeks and Wouter van Joolingen

Speakers (in order of appearance)

Sonja Voorn (Fontys)

Title: 3D printing: a useful tool for Engineering Physics students

Abstract: Engineering Physics students at Fontys University spend at least 38% percent of their four-year program on Project-Based Learning. During the first year the students will perform fixed projects so that basic knowledge and skills are acquired. Starting at the beginning of the second year the students will work on real-life projects, quite a challenge for the students and the project tutors!

The aim of this lecture is to show some interesting projects bachelor engineering physics students have done. A number of interdisciplinary projects in the medical field will be presented, during these projects 3D printing proved to be a very useful tool.

Floor Kamphorst (UU)

Title: Constant speed of light – what does it mean for secondary education students?

Abstract: As part of the 2014 physics curriculum revision, Special Relativity Theory (SRT) has been introduced in the pre-university level secondary education in the Netherlands. Internationally, the interest for teaching SRT in the secondary curriculum has been growing as well. However, secondary students, just like university students, struggle to understand the abstract and counterintuitive concepts of SRT, and research on how to teach this topic is scarce, especially in the domain of secondary education. The struggle with relativistic concepts might be rooted in problems understanding the two postulates that underlie all of relativistic reasoning. There has been some research to suggest that students misinterpret the relativity principle, but we expected that secondary students will also struggle with their initial understanding of the light postulate, and that this may yield further understanding of SRT problematic. We therefore studied secondary education students pre-instructional reasoning with light propagation. In this talk we will address how these students interpreted and misinterpreted the constancy of light speed, how this affects their reasoning about light propagation, and what lessons we learned for teaching the light postulate.

Laudatio NNV hbo Jong Talent Prijs

Fontys Hogeschool, Haagse Hogeschool & Saxion Hogeschool celebrate their best students.

Charles Tracy (Institute of Physics, UK)

N.B. 45-minute long presentation, including introduction by Ralph Meulenbroeks

Title: A curriculum based on big ideas

Abstract: In 2013, the Institute of Physics established a curriculum committee to develop its position on the school physics curriculum. The committee has worked on developing guidance for a curriculum framework based on big ideas. In this talk, I will outline the results of the committee's work today including what constitutes a big idea, what a set of big ideas might include and how to organise a curriculum framework around those big ideas. One aspect of our work has been an attempt to make explicit the practices of physics and some of the ways of thinking like a physicist. I will also discuss the challenges that we faced (and continue to face) in trying to consider the curriculum in this way.