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Benefits and Challenges of Technology in Teaching Physics

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How to make Physics Education more challenging, relevant and attractive for our high school students? How to stimulate the development of creative thinking, problem solving, and other higher cognitive skills?

In many countries governments like to stimulate science and technology in schools, but in this direction. STEM (or STEAM), IBSE, MINT (Germany) are the more recent Alphabet Soup acronyms.

Can technology applied in physics education bring us closer to the desired goals? Clearly it has been demonstrated technology can help to make physics education more relevant, more linked to real life and more authentic. And can increase the opportunities for own investigations by the students. So really has an added-value, and not just provides another way of teaching the same. This is known for decades but still applied at a relatively small scale. I will give several examples of the use of measurements with sensors, video measurements and modelling demonstrating these benefits. See also:

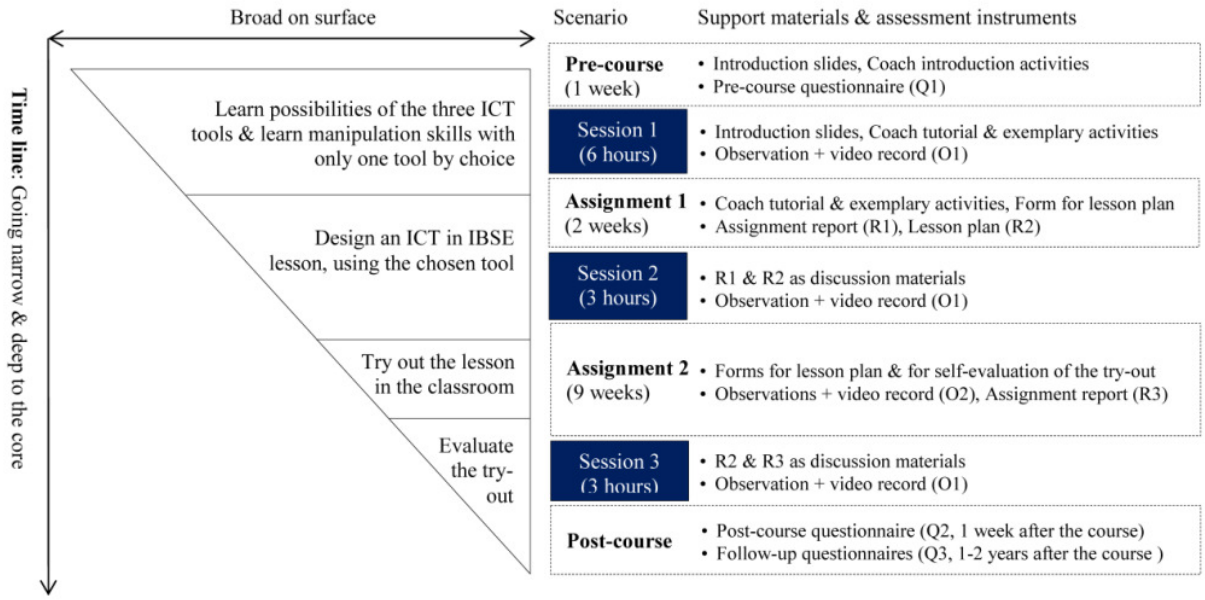
Heck, A., & Ellermeijer, A. L. (2009). Giving students the run of sprinting models. American Journal of Physics, 77(11), 1028-1038.

A major challenge is the preparation of teachers for using technology in this direction. In a PhD research study Trinh Tran (Hanoi) recently investigated the

development of an effective and relatively short course for teachers to prepare them for the use of ICT/Technology in IBSE lessons.

We applied several pedagogical principles, like the depth-first and one theory-practice cycle. We focused not only on learning ICT skills, but also on awareness of benefits and motivation. The final course set-up is based on several rounds of try-outs and improvements, and has been applied in the Netherlands, Slovak Republic and Vietnam. The course will be presented, some attention will be given to the differences in application in different settings (pre-service and in-service, different cultures) and also the learning effects on the participants. Interesting and important conclusion is a.o. that such a high quality course design can be applied broadly.

The scenario for the course in the Dutch context is given in the below picture:



Prof Ton Ellermeijer, is Director of CMA, Amsterdam, The Netherlands. He supervises PhD students at Free University of Amsterdam (VU) and University of Amsterdam (UvA). Ton Ellermeijer is an experienced researcher in science education, curriculum developer and teacher trainer. He is specialized in the application of ICT in Science Education. He has been Director of the AMSTEL Institute of the University of Amsterdam from 1997 up to 2010. From 2006 – 2012 he has been President of GIREP (the International Group of Physics Education Researchers, Teacher Trainers and Teachers).At present he serves as a Board member of MPTL. Ton Ellermeijer received the Minnaert Prize for his contributions to Dutch Physics Education (1999) and the ICPE Medal (International Commission of Physics Education of the IUPAP, 2009) for his contribution to Physics Education worldwide.

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