Modelling in Cross-Disciplinary Authentic Student Research Projects

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In the Dutch secondary education system students are obliged to carry out at the end of their school career their own research project of approximately 80 hours. They are stimulated to choose the topic themselves (preferably with relations to two subjects, like mathematics and physics, or mathematics and biology) and have a lot of freedom in the design of the research. Ideally students experience the stimulating aspects of doing research, and this is especially the case when the project is advanced and authentic, and even comparable with actual research done by real researchers. With the help of ICT (for data acquisition, video-analysis, modelling, data-analysis) the level and methods of the work of the students becomes quite close to the type of work of researchers in the field.

Since five years, mathematics and science freshmen at the University of Amsterdam do a small mathematical project in Calculus 1 using *Mathematica*. Once more a strong motive is to let students experience at an early stage of their university career that a rather basic knowledge of mathematics and science in combination with the use of sophisticated tools already allows them to do independent problem-solving and to successfully carry out a mathematical investigation.

In this talk, examples of students' work about human gait, intake and clearance of alcohol in the human body, bungee jumping, and chaotic motion will be presented and the role of technology in mathematical modelling will be discussed.