USING A MODELLING PERSPECTIVE FOR LEARNING PROBABILITY

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This poster presents the background, preliminary research question, method and analytical framework for a pilot study analysing mathematical modelling in the learning of probability.
Keywords: Probability, modelling, Fermi problem

BACKGROUND AND OVERALL PURPOSE

Due to the present technological development researchers have called for moving from traditional problems solving towards modelling in order to describe, explain, construct, manipulate and predict complex systems (Sriraman & English, 2010).

The project focuses in its initial stage on the design of mathematical modelling problems for students in their normal classrooms. This poster presents the background and starting points for a study that aims to improve our understanding about using a modelling perspective for the learning of probability. It will also present a framework for analysing mathematical modelling problems.

The poster presents a preparatory study where the learning of probability is given opportunities to take place through modelling real-life problems. Recent research shows that opened-ended questions, so-called Fermi problems, might serve well as a means to introduce mathematical modelling at school (Ärlebäck, 2009).

PRELIMINARY IDEAS OF THE PILOT PROJECT

In the pilot study I will videotape and analyse pairs of students interacting with specifically design Fermi activities. One idea is to develop an activity in which students are asked to model the probability of hitting a hole-in-one. In accordance to the principles of a Fermi problem, there is not only one-way trajectory of modelling the probability of hitting a hole-in-one. Based on what properties and attributes the students are taking into consideration, the model will appear different from other students' models, taking other aspects into consideration. Such differences are considered valuable for promoting discussions and learning of probabilistic ideas.

A general preliminary research question for this experiment can be formulated as: *In what ways can learning probability be promoted by mathematical modelling problems?* A more specific research question could be: *Under what conditions has so called Fermi-problem the potential to work as a herald in the learning of probability?*

FRAMWORK

Mathematical modelling is often described as a cyclical process. It is illustrated as an iterative cycle that students go through during the solution, where the modelling process is described in terms of phases from the real world into a mathematical world. Inside and between this phases there are transitions as description, manipulation, prediction and verification (Lesh & Zawojewski, 2007). Ärlebäck's research has questioned the cycle process as highly idealised, artificial and simplified (Ärlebäck, 2009). The study suggests that the modelling process is more complex and is better described as haphazard jumps between different stages and activities.

The poster will present an analytical framework called the modelling activity diagram developed by Ärlebäck (2009). This framework is developed from Schoenfeld's graphs of problem solving (Schoenfeld, 1985). Ärlebäck has identified the following six modelling sub-activities to be used as codes for the activities the students engaged in when solving a Fermi problem: *Reading, Making model, Estimating, Calculating, Validating* and *Writing*. Using this framework as an instrument for analysis gives me an opportunity to better understand how learning of probability can be promoted by modelling activity.

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