BACK

LEARNING MATHEMATICS WITH AN AUSTRIAN CD ROM "MATHE TUTOR OBERSTUFE 2.0"

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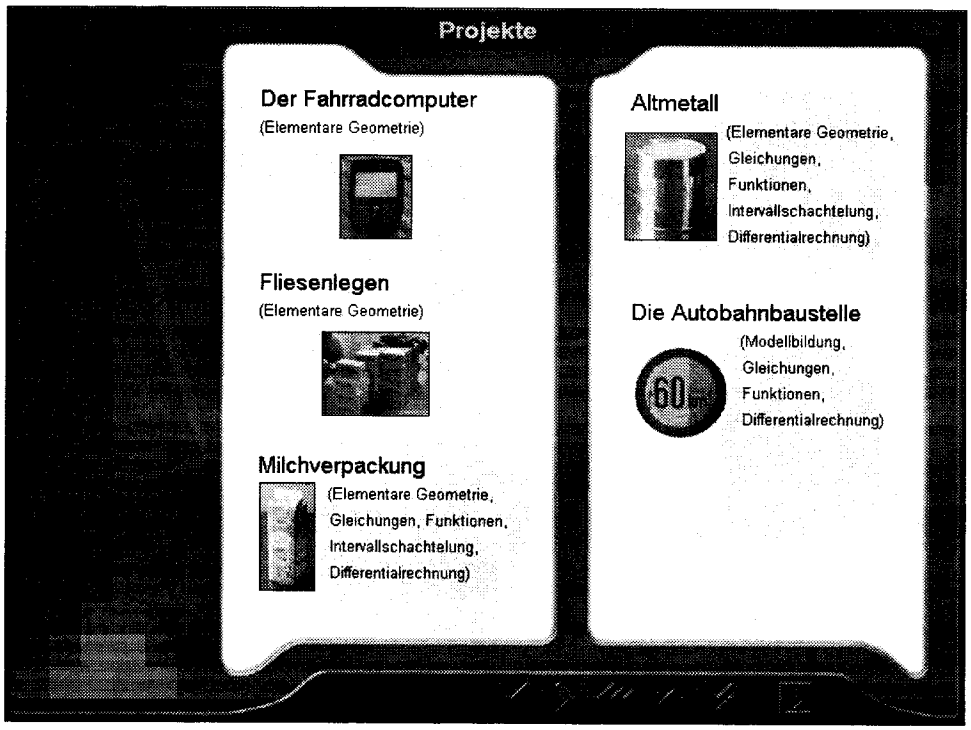
Abstract
Many adults remember their mathematics lessons at school as a bad time in their life. "Why should I learn this?" is a question frequently posed. Students now can get an answer on a CD ROM made by Andreas Stoeckl and me. We applied multimedia technics to show how and where mathematics is used to understand and to solve real world problems. This is one way to answer the question.

One of the basic aims of the work of mathematics educators is the intrinsic motivation of the learners. Students should know that learning mathematics is important for them not only because they have to pass some examines. Mathematics is beautyful and useful. Learning mathematics opens the door to understand our technological world better. Most of the technologies are mathematical technologies. A lot of rules for our society and economy are based on mathematics.

Sentences like these are often teached but not all students believe them. How we can convince the students? They must see it with their own eyes. This is one of the basic ideas of the CD ROM "Mathe Tutor Oberstufe 2.0". Five examples are presented with video, computer animations, text, formulas, grafics and interactive parts.



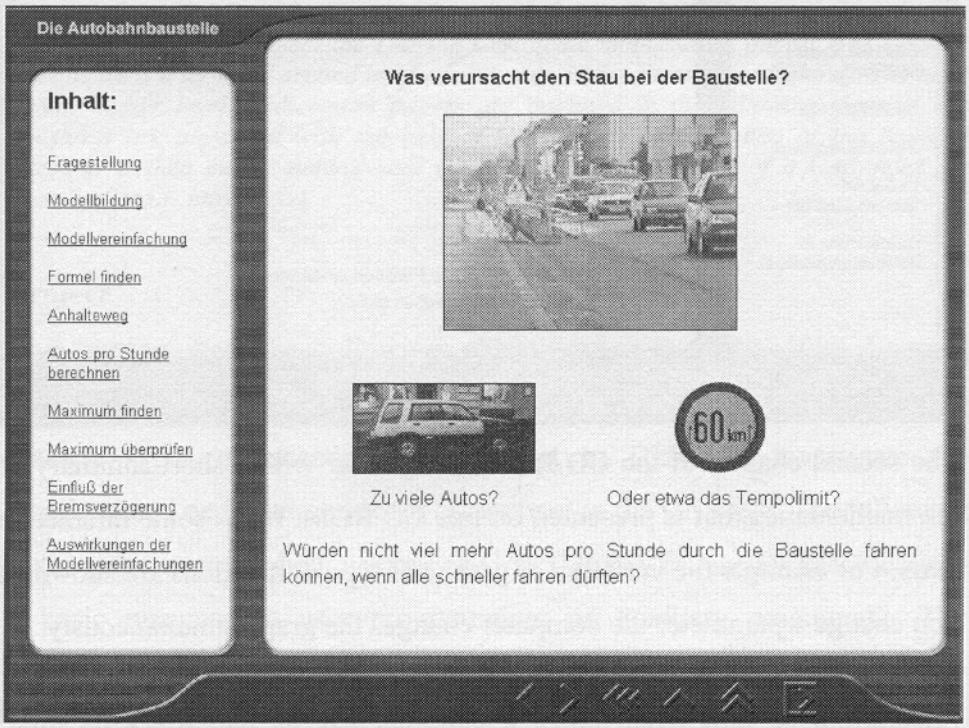
"Der Fahrradcomputer / The bicycle computer" asks for help to adjust an instrument that shows the speed of a bicycle. Geometry of cirles is useful here.

"Fliesenlegen / Tiling" is one of a lot of similar problems for handworking to improve the quality of living rooms. Calculating how many tiles are needed leads to some typical questions of real world modelling. Again elementary Geometry is useful.

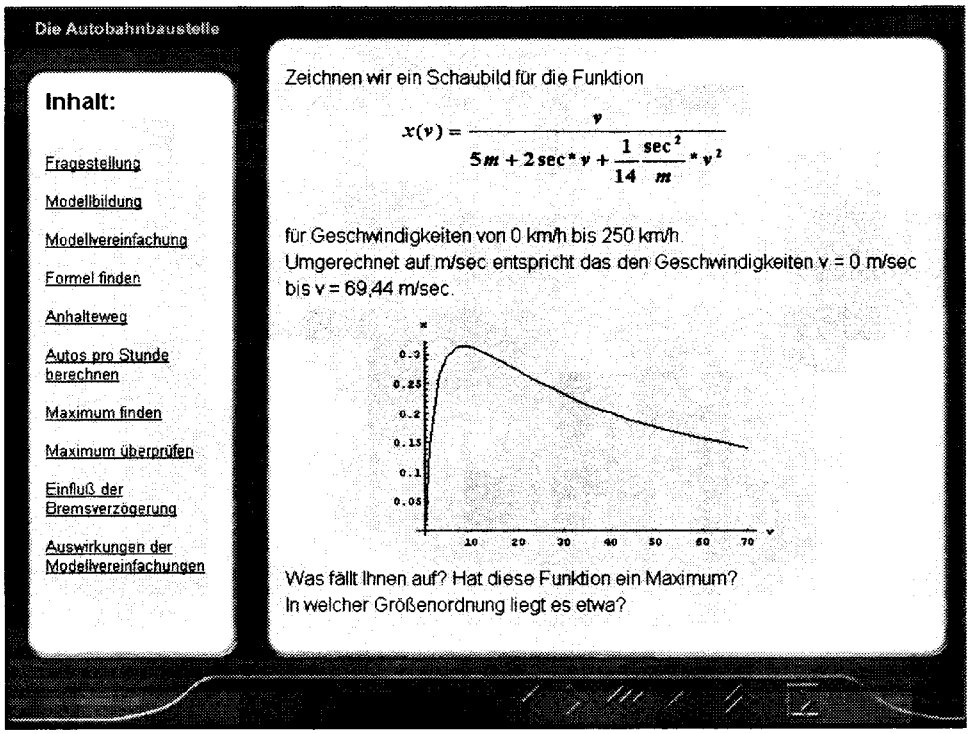
"Milchverpackung / Packing of Milk" is a typical problem of industrial production. We need some steps of modelling and calculating and improving the model to reach the aim. We proof: A cube is not the optimal way to store one liter milk in industry.

"Altmetall / Metal salvage" is a similar problem with tins. Again we find the solution used in industry by looking closely at the real tin and our model of tins.

"Die Autobahnbaustelle / Motorway Roadworks" is the third example for an optimization. The following screenshot shows the structure.



The main steps are listed as hyperlinks on the left side: Question, modelling, simplifying the model, find a formula, include physics (how does a car stop?), calculate the model, find a maximum, think about the maximum, what is the influence of the physical parameters? What are the consequences of the simplifying steps? Most people believe that a maximum of cars can pass a road if they all drive as fast as possible. This is wrong because the distance of the cars has to increase as a quadric function of the speed.



The second chapter of the CD ROM is a glossar with a short summary of the mathematics that is presented on this CD ROM. It has some interactive parts. For example the variation of graphs of typical functions are shown. If you change a parameter the computer changes the graph simultaneously.

The third chapter contains a lot of training tasks about functions, linear and quadratic equations, elementary and analytical geometry, calculus and linear optimization. The feedback for each task is not only "right" or "wrong" but a solution and sometimes a hint what else should be learned.