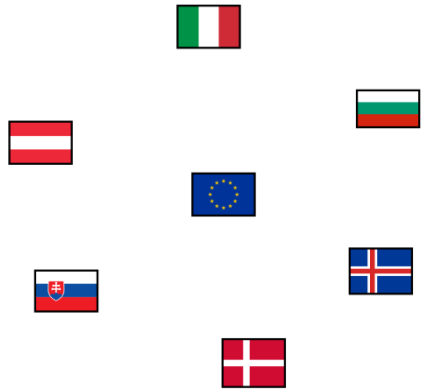
Dynamical and Creative Mathematics using ICT

Andreas Ulovec

University of Vienna, Austria

[1] This project is supported by the European Community in the framework of its Lifelong Learning Programme under project number 510028-LLP-1-2010-1-IT-COMENIUS-CMP. This publication reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Who is working on this?



http://www.dynamathmat.eu

- Dipartimento di Matematica "L.Tonelli" Pisa - Italy
- Universität Wien - Austria
- VIA University College – Læreruddanne Aarhus - Denmark
- Институт по математика и информат Sofia - Bulgaria
- Univerzita Konštantína Filozofa v Nitre Nitra - Slovakia
- University of Iceland – School of Educa Reykjavik - Iceland

What do we do?

- Use new technologies (ICT, GPS, digital video) in teaching
- Create tasks and teaching materials
- Support creativity and dynamical thinking
- Develop and provide e-learning courses
- Offer courses to teachers and students

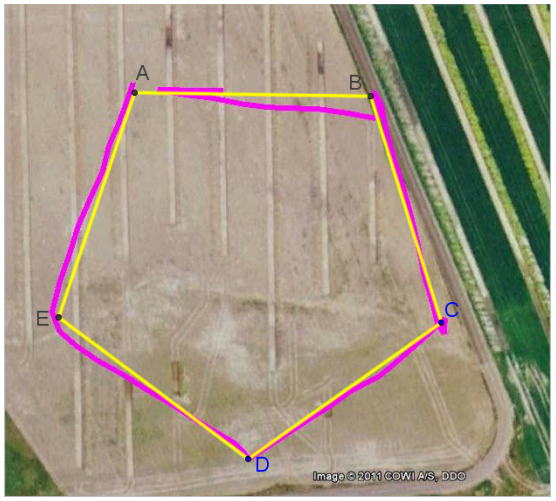
Example 1

Dynamic geometry constructions as composition tools in art/photography

- **Analyzing geometric figures used in composing art and photos**
- **Use of Dynamic Geometry Software to support the analysis**
- **Students can use this for exploring various objects and figures**

Example 2

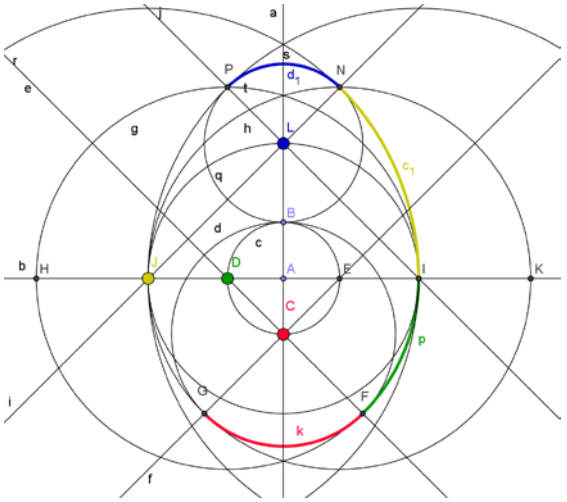
GPS – geometry in the landscape



- **Use of GPS technology to track and analyze real-life movement**
- **Vice versa: Construct a geometric figure with DGS, then try to reproduce it large-scale in nature, video efforts**
- **Students can discuss about scaling, vectors, angles etc.**

Example 3

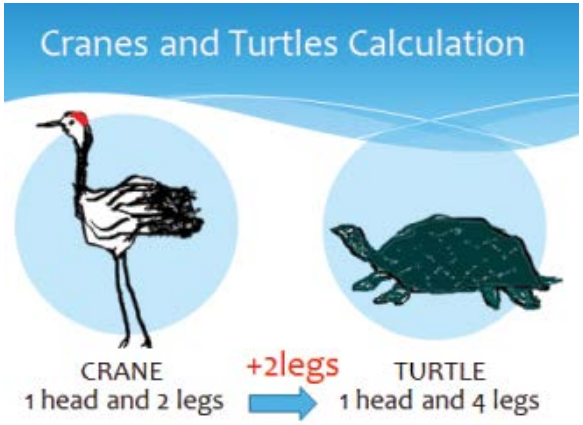
Euclidian Eggs

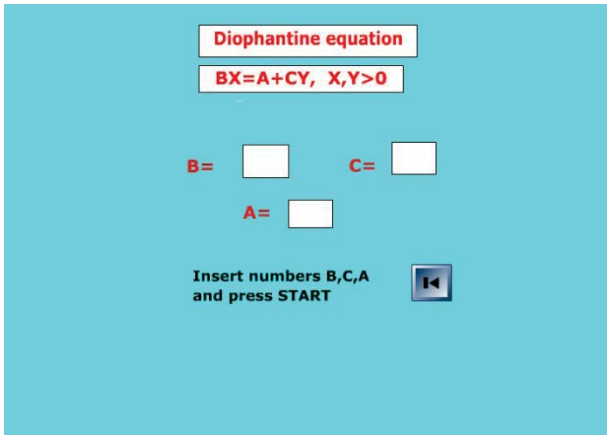


- **Start with constructing simple arcs in DGS**
- **Discover how to make these arcs meet in a smooth way**
- **Take real-life eggs, photograph them, and try to recreate their form using different models (Moss, four-point, five-point)**
- **Students can compare models for real-life situations**

Example 4

From static to dynamic problem posing

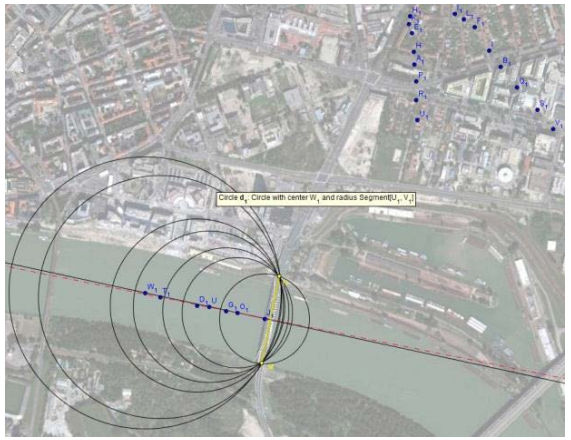




- **Start with solving typical problems**
- **Use ICT to support solution and model similar situations**
- **Explore situations and create own tasks**
- **Students can not only solve tasks (as usual), but create tasks with ICT support, and discuss about tasks from other students**

Example 5

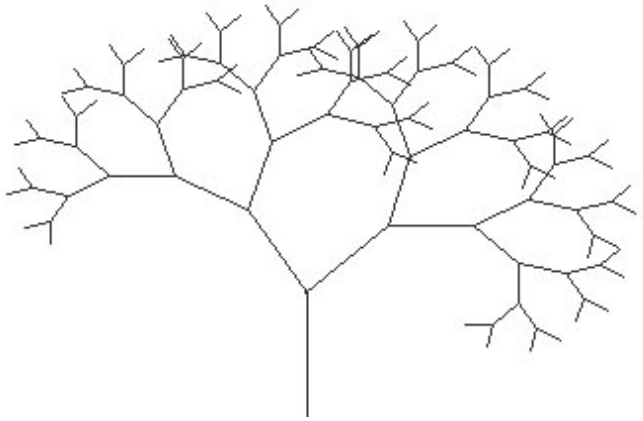
Best spot – investigation with circles

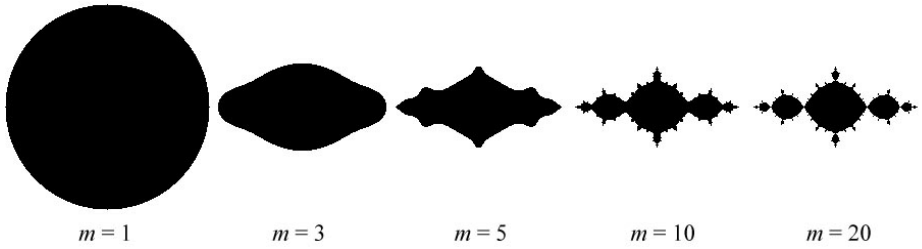


- **Real-life problem: Best view of this bridge?**
- **Start with discussion: What can “best view” mean?**
- **Try out several viewpoints with DGS**
- **Make geometric analysis of the situation**
- **Students can use DGS to analyze real-life situation, and discuss about data vs. subjective impression**

Example 6

Fractals – broken with no need for repairs





- **Use of Java and Logo to implement fractal algorithms**
- **Discussion about self-similarity, “broken” dimensions etc.**
- **Approximation of fractal figures**
- **Working with complex numbers and the Gaussian plane**
- **Students can use software to discover influence of parameters on final form, and discuss about approximation processes**