

sketchometry - Dynamic Mathematics on Mobile Devices

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Short (and mostly wrong) history of DGS usage in schools

- ▶ 1980/1990s: Students create constructions from the ground up
 - ▶ Standalone programs, Java applets
 - ▶ Where: computer lab, desktop computers
 - ▶ The whole lesson is devoted to DGS usage
- ▶ 2000s: Students study worksheets
 - ▶ Teacher prepares electronic and paper worksheets (HTML)
 - ▶ Worksheets contain (sometimes) sophisticated constructions done by the teacher with DGS
 - ▶ Where: computer lab, at home, desktop computers
 - ▶ Students study these worksheets and explore constructions
 - ▶ The whole lesson is devoted to DGS usage
- ▶ 2010s: Students create constructions from the ground up
 - ▶ Apps, Web apps
 - ▶ Where: classroom, tablets, smartphones
 - ▶ Students experiment with DGS (or with constructions)
 - ▶ Only parts of the lesson are devoted to DGS

Our consequence:

- ▶ Simple tools are needed for classroom

Our solution: <http://sketchometry.org>



sketchometry v1.1.2

- ▶ First presented at CADGME'10
- ▶ Free to use
- ▶ Euclidean geometry
- ▶ Calculus
- ▶ HTML5
- ▶ Based on our open source projects
 - ▶ JSXGraph
 - ▶ JessieCode
- ▶ Adapted to run on smartphones, tablets, desktop pcs, and interactive whiteboards

Languages

- ▶ Chinese
- ▶ English
- ▶ French
- ▶ German
- ▶ Italian
- ▶ Polish
- ▶ Portugese
- ▶ Slovenian
- ▶ Spanish

Platforms

- ▶ Desktop PCs, tablets with web browser
 - ▶ Chrome
 - ▶ Firefox
 - ▶ Internet Explorer > 9
 - ▶ Safari
- ▶ Apps
 - ▶ iOS
 - ▶ Android
 - ▶ Chrome
 - ▶ firefoxOS
 - ▶ Windows (via Firefox Marketplace, Windows 8 Store App coming soon)

New Features since CADGME'10

- ▶ New design
- ▶ Measurements
- ▶ Change dependencies of points
- ▶ Melt points
- ▶ Easy integration of sliders
- ▶ Tangents
- ▶ Slope triangle

Using sketchometry in Mathematics Education

First results of a *pilot project*

Situation

- ▶ 2 years with 13 years old students (3 classes)
- ▶ students equipped with iPads
- ▶ screen mirroring with AppleTV
- ▶ digital whiteboard

sketchometry is used

- ▶ by teachers and students in the classroom
- ▶ anytime, when it is necessary

Using sketchometry in Mathematics Education

First results of a *pilot project*

sketchometry

- ▶ becomes a tool like compass and ruler or pocket calculator
- ▶ is easy to use after a short introduction
- ▶ supports individual geometric modelling
- ▶ enables student centered teaching and learning

Example usage in classroom

Problem: *The Indian and the River*



- ▶ An indian is at point I
- ▶ His tent Z is on the other side of a linear river b
- ▶ Search for the shortest connection from I to Z , but pay attention:

The indian has to walk a given length s in the river in order to hide his traces.

The Indian and the River II

sketchometry

- ▶ Draw the points and the river
- ▶ The indian may reach b at point F
- ▶ Draw s (s is a fixed line segment)
- ▶ Copy s
- ▶ ...
- ▶ ...

The Indian and the River III

Explorations

- ▶ ...
- ▶ Measure the length of the segments
- ▶ ...
- ▶ Support: ...
- ▶ Mathematical argumentation: ...
- ▶ Give a description of the construction (using only compass and ruler)

Tomorrow 3pm: *sketchometry workshop*



Thank you very much!

<http://sketchometry.org>