

ICT and virtual environment for mathematics education

Reporter: Evgenia Sendova, Bulgarian Academy of sciences

The participants in the workshop were greeted by **Professor Baptist** who then introduced the first speaker – **Volker Ulm, University of Augsburg**.

Dr. Ulm spoke on the *Dynamic Worksheets as a Catalyst for innovations in Mathematics Education*.

After elaborating on the notions “dynamic worksheets” and “dynamic mathematics”, the lecturer gave some examples of using dynamic worksheets:

- Exploring the effect of changing the parameters in the sine function
- Exploring and discovering the relationship between the circumference of a circle and its diameter

Then the concept of *Learning environments* was presented as a flow diagram

Dr. Ulm emphasized on the importance of the methodical concept dealing with:

- individual working
- cooperation with partners
- presentation of ideas
- summary of results

He concluded his talk with expressing his hopes that ICT might improve the mathematics education at different levels – if the teachers and students become used to seeing mathematics as a place for making exploration, the ICT could be the natural tool!

The next speaker was **Dr. Paul Drijvers, Freudenthal Institute, Utrecht University** who presented his views on *Tools & Teachers*. He reminded the audience that the technological tools may support or enhance the mathematics education, but there were a lot of examples of “old pedagogy with new media”. The speaker then demonstrated very convincing examples of exploratory environments in harmony with the inquiry-based learning. *No matter how good the tools we are using are, he emphasised, a nice tool does not mean a good education! Teachers are crucial!* then Dr. Paul Drijvers introduced the audience with a framework for carrying out research on the following questions:

- Which *types of instrumental orchestration* emerge in technology-rich classroom teaching?
- To what extent are teachers’ repertoires of orchestrations related to their *views on mathematics education* and the role of technology therein?
- What does the model of instrumental orchestration offer?

In the follow- up discussion the most essential problems were related to:

- the type of technological and virtual environments most appropriate to be used in math education
- the role of the teachers in these environments
- the possible implication for the professional development of the teachers in mathematics.

The participants referred to an analysis of the current state showing that the very active teachers using media and participating even as teacher educators are only a minority, the majority use ICT for learning rarely, or ever. The reason pointed out was not the lack of software, or lack of didactic ideas – the problem seemed to be that working in computer labs requires teachers' abilities and attitude to work in the IBL style, and the students to be able. Further on the participants shared their hopes that ICT could be a catalyst but at the same time they expressed their doubts that its potential is sufficient to change the education system as a whole. Still the prevailing opinion was that Fibonacci is the answer!

PS. Below an article jointly written by E. Sendova and T. Chehlarova on the Conference entitled Breathing life back into inquiry-based learning of mathematics (the Fibonacci project in action), published in the *Mathematics and Informatics journal* for teachers in Bulgaria. Part of it describes the workshop under consideration as shown below.

<http://www.grpi.iit.bas.bg/>

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 **Inno MathEd**
Innovations in
Mathematics Education
on European Level

 **The Fibonacci Project**
DISSEMINATING INQUIRY-BASED SCIENCE
AND MATHEMATICS EDUCATION IN EUROPE

**ДА СЪЖИВИМ ИЗСЛЕДОВАТЕЛСКИЯ ПОДХОД
В МАТЕМАТИЧЕСКОТО ОБРАЗОВАНИЕ
(ПРОЕКТЪТ ФИБОНАЧИ В ДЕЙСТВИЕ)**

ЕВГЕНИЯ СЕНДОВА, ТОНИ ЧЕХЛАРОВА, София

Най-добрият начин да учиш е да действаш – да питаш и след това да действаш. Най-добрият начин да преподаваш е да показваш примери за мислен и след това – да действаш.



Moments from the discussion of the workshop
ICT and virtual environment for mathematics education