

Submission of Abstract: Please use NORMAL style for all text in the Abstract Template

Abstract title (Use sentence case)	Let Children Play to Develop Mathematical Ideas – Imagine Microworlds Examples
Type of Presentation	Paper <input type="checkbox"/> Short Paper <input checked="" type="checkbox"/> Panel <input type="checkbox"/> Workshop <input type="checkbox"/>
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Keywords (please select 5 from list on website)	development, curriculum, evaluation, collaboration, change.
Audiovisual requirements (PCs will be the standard computer)	Computer <input type="checkbox"/> Data projector <input checked="" type="checkbox"/> Other <input type="checkbox"/> Please specify:
What is the main message of your contribution with respect to the workshop's title?	What really matters is children's activity allowing to develop new skills and ideas.
Abstract (400 – 600 words)	<p>There is a pressure in primary schools in Poland to use computers across curriculum. The process starts at a level of elementary education, where the pupils are mainly drawing and playing. One of the subjects in primary school with teachers interested in using ICT is mathematics. My colleagues were involved in international project MatComp – Applications of Information and Communication Technology in Learning and Teaching Mathematics, aiming to help teachers of mathematics in Poland and across Europe to become confident and competent users of ICT in everyday professional practice. The key element of the activities was the modeling of mathematical systems in the form of open and accessible computer programs.</p> <p>Now we are taking part in international project CoLabs proposed by Márta Turcsányi-Szabó. Major challenge of CoLabs is to find ways to support children in building and testing models collaboratively across European cultures and beyond. Polish part of the project is to define and develop collaborative microworlds for mathematical and scientific modeling for secondary school children aged 12-18. Presented</p>

	<p>microworlds are either product of Polish team working on CoLabs project or side product concerned with this work. Two of this microworlds are included in primary school informatics course. All microworlds are prepared in Logomocja – Polish version of Imagine. Imagine Logo is a strong authoring tool for development of sophisticated microworlds.</p> <p>In my presentation I'll show 4 microworlds: one second grade example, one fourth grade example and two sixth grade examples. Microworlds are “open”. They are defined on the base of constructivist approach. There are possibilities of different kinds of pupils activity, gathering the experience, answering questions: what will happen when we change...?</p> <p>Second grade example (8 years old pupils): counting and rests (remainder). There are 2 parts of microworld: counting money – what will be the change, and counting time in hours and minutes (on a clock). The first part is based on Imagine authors project (A. Blaho, I. Kalas, P. Tomcsanyi and L. Salanci) presented on Imagine workshop in Warsaw.</p> <p>Forth grade example (10 years old pupils): factorization. Building rectangles out of bricks pupils can exercise factorization of numbers. It may also help in understanding concept of prime numbers.</p> <p>Sixth grade example 1 (12 years old pupils): stripe code. The code is simplified to white and black stripes replacing 0 and 1. Counting the value of the stripes is changing from binary to decimal representation, while building the stripe code is changing in reverse direction.</p> <p>Sixth grade example 2: vectors and coordinates system. The aim of this microworld is to introduce different ways of presenting vectors: graphic representation, analytic representation in Cartesian coordinates system, analytic by length and direction (circular coordinates system) and by means of colors (model of space of colors). The exercises show the connections between different vector representations and help to understand what is vector and how it can be represented.</p>
<p>Short biography of presenter (maximum 50 words).</p>	<p>Teacher trainer in the centre for in-service teachers training in ICT. Co-author of schoolbook “Lessons with computer” for lower secondary school students, now preparing schoolbook on ICT for primary school (to be published in 2004). Involved in popularization of LOGO language in Polish schools.</p>
<p>What are the themes, relevant to the scope of the workshop, that you think should be discussed?</p>	<p>Learning by doing, ways of evaluation, impact of using ICT on learning results.</p>

