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

Abstract title (Use sentence case)	Visual Fractions – new approach to tangible mathematics education
Type of Presentation	Paper ☐ Short Paper ☐ Panel ☐ Workshop ☒
Name, and contact details of corresponding author	Name: Ivan Kalas Email: kalas@fmph.uniba.sk Fax: +421 2 65424 826
Author(s)' name(s)	Ivan Kalas, Brigitta Rethey-Prikkel
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Keywords (please select 5 from list on website)	collaboration, learning styles, research, sites of learning , roles and relationships .
Audiovisual requirements (PCs will be the standard computer)	Computer ☐ Data projector ☒ Other ☐ Please specify:PC lab with 10 computers
What is the main message of your contribution with respect to the workshop's title?	We believe that new interfaces for learning which we are developing within the Minerva CoLabs project are good contribution to the process of "Learning for the 21st century. We are implementing rather powerful idea of presenting children with attractive and highly interactive set of objects which represent some basic mathematics concepts. Children will be able to connect them, play with them and build models for learning mathematics by discovering its concepts and relations.
Abstract (400 – 600 words)	The CoLabs project explores the power and challenge of ICT in making efficient collaborative learning possible. Our goal is to design and develop virtual laboratories for cooperation and collaborative learning – collaboratories. We want to provide groups of children – either in one classroom or far apart, even living in different language regions – with opportunities to work and learn together. We are studying different forms of collaboration and their possible contribution to the learning processes. Within the project we are designing and developing several applications (microworlds or environments) as experimental

	platforms for exploring various forms of cooperation and collaboration. One of them is Visual Fractions which is built around rather ambitious and innovative idea of presenting a group of children with a set of interactive visual blocks – for example in the screen of their interactive white board. These blocks present different representations of fractions and relations among them. The environment allows children to combine these visual tangible objects and thus model and explore concepts of fractions. Each object can play two roles – being either a kind of independent fraction (an input value) or depending on another fraction object or operation – being an alterantive representation of a fraction or being a result of an operation, a visualization of a value in the number line etc. In this workshop we want to offer a hands-on experience to the participants with our working version of the Visual Fractions environment (authoring tool). As far as all participants are obviously well experienced and independent experts in integrating software interfaces into learning processes, we plan to profit from this workshop by getting many reactions, by watching many different approaches, by testing our hypothesis that properly designed environment should inspire their users to learn by explorations, by collaboration and simply by doing. The participants will: - explore different representations (visualizations) of fractions and different ways of their interactions, will explore possible relations between such objects, possible dependencies etc., - build their own activity or activities for learning fractions, - play with some ready made scripts (that is, sequences of activities) depeloped by us. The goal of this is to see different possibilities the environment offers, - “unlock” some of the activities, explore their structure, relations between objects, constrainsts etc. and modify them, - combine their own activities into a script. We believe that the Visual Fractions environment offers new approach to modern mathematics education built on collaboration and exploration. We are looking forward to share this development with the participants, observe their reactions and evaluate our work within the CoLabs project.
Short biography of presenter (maximum 50 words).	Ivan Kalas is an associate professor at Comenius University, Bratislava. He is a member of the steering committee of the national Slovak InfoAge project, which has already integrated more than 1500 schools in Slovakia. Ivan is a head of the

	Department of Informatics Education, which is responsible for pre-service education of future teachers. He is author or co-author of several books and textbooks. Ivan represents Slovakia in IFIP TC3 Committee for education. In 2000, he worked as visiting researcher at the Institute of Education in London. He has read several invited lectures in UK, Brazil, USA, Hungary, Poland, Bulgaria, Czech Republic and Portugal. Ivan is a co-author of SuperLogo: Learning by Developing, which was published by Logotron, UK in 1998 and has been translated to two other languages. He is also a co-author of educational software environments, which are being used in more than 20 countries. These educational tools aim at developing creativity, logical and algorithmic thinking, communication and co-operation. Together with Andrej Blaho and Peter Tomcsanyi they developed SuperLogo and in 2001, together with Lubo Salanci they released Imagine, new generation of computer tool for education. Brigitta Réthey-Prikkel is a PhD Student at Eötvös Loránd University Budapest. She is a member of TeaM Lab. Her researching field covers the practical issues of software ergonomy in case of disabled users. Brigitta was working on TeaM Challenge 2002 and 2003 Internet searching games for 10-14 years old children and is now involved with the Colabs project
What are the themes, relevant to the scope of the workshop, that you think should be discussed?	developing software interfaces for learning, collaborative learning, hands-on experience with an example of such interface, supporting learning processes with proper software environments and tools, building new cultures in modern mathematics education, presenting and exploring (mathematics) concepts as interactive visual building blocks