BRIDGES FOR THE MIND 2014 INQUIRY, TECHNOLOGY AND ARTS IN MATHEMATICS EDUCATION

November 3, 2014 @ University of Jyväskylä, Finland International Open Seminar by the Department of Art and Culture Studies (TAIKU)

9.00-12.00 AM, Venue: SemD119

9.00-9.05 Welcoming Remarks

9.05-9.40 Allan Tarp (MATHeCADEMY.net, Denmark): Nordic PISA Meltdown - or ManyOlogy from the MATHeCADEMY.net

9.40-10.00 Cao Yiming (Beijing Normal University, School of Mathematical Sciences - Chair of Chinese Association of Mathematics Education): Mathematics Education in China 10.00-10.20 Zsolt Lavicza (University of Cambridge, Faculty of Education): Integrating Technology into K12 School Teaching to Enhance STEM Education in Hungary 10.20-10.30 BREAK

10.30-10.50 Markus Hähkiöniemi (University of Jyväskylä, Dept. of Teacher Education): Teacher questioning in inquiry-based mathematics teaching

10.50-11.10 Kristóf Fenyvesi – Raine Koskimaa (University of Jyväskylä, Dept. of Art and Culture Studies): Visuality & Mathematics. Summary of a Tempus Project (2012-2014) 11.10-12.00 DISCUSSION

3.00-4.30 PM, Venue: SemD119

Roundtable: GROUNDING CONFLICTING THEORIES. An invitation to a dialogue to solve the Nordic Math MeltDown Paradox

Chair: Allan Tarp (MATHeCADEMY.net, Denmark)

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Guest Lecturer's Abstracts

- Allan Tarp (curriculum architect at the MATHeCADEMY.net): Nordic PISA Meltdown - or ManyOlogy from the MATHeCADEMY.net. The meltdown in Nordic PISA results occurs simultaneously with an increased funding of mathematical education research. The author predicted this paradox in his 2004 paper 'Mathematism and the Irrelevance of the Research Industry.' Instead of teaching mathematics, Nordic schools teach 'meta-matism', a mixture of 'metamatics', defining concepts from above as examples of abstractions instead of from below as abstractions from examples, and 'mathematism', true in a library claiming that 2+3 is 5 by nature, but not in a laboratory containing countless counter-examples as e.g. 2 weeks + 3 days = 17 days. As to research, discourse protection accepting only research within the ruling discourse prevents the Nordic universities from dealing with conflicting theories. As an alternative, the MATHeCADEMY.net is created to teach teachers to teach mathematics as Manyology, the natural science about Many, needing only two basic competences, to COUNT and to ADD in time and space. Many-ology is about to revolutionize early childhood mathematics where icon-counting and next-to addition will allow children to learn proportionality and integration in preschool before these golden learning opportunities vanish in ordinary school, insisting that only the number ten can be used when counting and adding.

- Cao Yiming (Professor of mathematics education at Beijing Normal University / Vice Director of Chinese Committee on Mathematics Education / Chairman of Chinese Association of Mathematics Education / Specializing in international comparison of mathematics curriculum, and studies in classroom practice and students' achievement): Mathematics Education in China. This talk introduces education system in China, and basic and higher (in particular the pre-service teacher) mathematics education. Education in China is a state-run system of public education run by the Ministry of Education. The education is divided into three categories: basic education (K-12), higher education, and adult education. All citizens in China must attend school for at least nine years, includes primary education (G1-6) and junior secondary education (G7-9). Senior secondary education in China comprises three years of schooling (G10-12). After National College Entrance Exam, or gaokao, about 75% student can get access to higher education. Mathematics education has long been highly valued in China. Chinese schools view mathematics education as a key component of basic education.

- **Solt Lavicza (Faculty of Education, University of Cambridge): Integrating Technology into K12 School Teaching to Enhance STEM Education in Hungary.** Technology is increasingly becoming an important part of STEM teaching and learning in the 21st Century. There have been numerous attempts to integrate technology into education systems, but without serious development and research the success of these attempts have been limited. Recently, together with my colleagues in Hungary, we started a project called Geomatech (http://geomatech.hu) to develop high-quality teaching and learning materials for all grades in primary and secondary schools in Hungary. These materials (1200+ Mathematics, 600+ Science) will be embedded into an on-line communication and collaboration environment that can be used as an electronic textbook, a homework system, and a virtual classroom environment. In addition to material development, we will offer 60-hour professional development courses for more than 2500 teachers in 800 schools in Hungary. Furthermore, we will organize a wide-range of teacher and student activities including competitions, maths and science fairs, and develop a network of schools for the long-term sustainability of the Geomatech project. The technology background of the project is offered by GeoGebra (http://geogebra.org). All activities of the Geomatech project will be assisted and evaluated by a strong research team offering support for pedagogical resources involving teaching methods based on highly-respected Hungarian Teaching Traditions by Pólya, Lakatos, Varga and Dienes as well as successful technology integration programmes from other countries. The research team will also carry out a pilot programme with approximately 3,000 students and prepare instruments for evaluating the impact of Geomatech on teachers' and students' learning and understanding of mathematics and science. In addition, in our project we aim to involve and collaborate with as many experts and researchers as possible from around the world. We

More Info: kristof.k.fenyvesi@jyu.fi/+358 40 805 3324