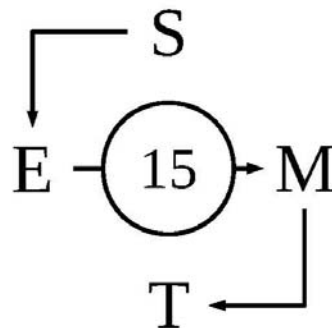


International Symposium Elementary Maths Teaching



Developing mathematical language and reasoning

Charles University
Faculty of Education
Prague, the Czech Republic
August 16 – 21, 2015

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Edited by Jarmila Novotná and Hana Moraová

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associated with doing mathematics), and creativity related to mathematics education. Groups of participants will work together on activities related to each of the above aspects of creativity. Together we will evaluate the products of those activities in terms of theories related to creativity. Participants will be asked to consider the relationships between the processes involved in mathematical creativity and the products of those processes.

The third session will revolve around implementing tasks and how different contexts, situations, and ways of implementing a task may enhance or detract from the potential of a task to occasion mathematical creativity in the classroom. We will also examine the affordances and constraints (in terms of the creative potential) of implementing tasks on an individual basis versus in a group situation. Teachers' views of different ways of implementing tasks will be presented and analysed, including how their beliefs and emotions may influence the promotion of creativity in their classroom.

References

- Liljedahl, P., & Sriraman, B. (2006). Musings on mathematical creativity. *For the Learning of Mathematics*, 26(1), 17-19.
- Pepin, B. (2009). 'Negativity' and learner identity: Classroom tasks, the 'minus sign' and classroom environments in English, French and German classrooms. In: J. Maass, W. Schloeglmann (Eds.), *Beliefs and attitudes in mathematics education – new research results* (pp. 179–196). Rotterdam: Sense Publishers.
- Silver, E. (1997). Fostering creativity through instruction rich in mathematical problem solving and problem posing. *ZDM Mathematics Education*, 3, 75-80.
- Stylianides, A., Stylianides, G. (2008). Studying the classroom implementation of tasks: High-level mathematical tasks embedded in 'real-life' contexts. *Teaching and Teacher Education*, 24(4), 859-875.

INCLUDING MULTICULTURAL ELEMENTS IN TEACHING AND LEARNING MATHEMATICS AT ELEMENTARY LEVEL



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Abstract

Heterogeneity of classrooms is one of the most significant changes in many school systems. Differences in cultures and languages make the maths teaching-learning process harder than it is. That is why attention should be paid to the specifics of teaching mathematics in these circumstances.

A questionnaire study reported in clearly shows that teachers across Europe

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would appreciate if tools and materials for work in a culturally heterogeneous classroom of mathematics were available. They are well aware of the difficulties a pupil trying to master the language and mathematical content at the same time, as well as the new culture and working procedures faces. Obviously, what is needed is careful wording of assignments, explanations and instructions, multimodality of representations. The questionnaires also show that some teachers are aware of the fact that not just pupils from different cultural backgrounds will benefit from these approaches. They should promote better understanding of mathematics to everybody.

The workshop will begin with a session focusing on specifics of culturally heterogeneous classrooms (verbal and non-verbal communication, dimension of cultures). In the other two sessions, samples of teaching units and environments supporting the multicultural approach in teaching elementary mathematics will be introduced and worked with. The participants will see samples from lessons based on these units, will discuss the potential and develop their own teaching materials and units set in the same environments.

Session 1 – Intercultural psychology, dimensions of cultures

This session will not focus directly on teaching mathematics but on the specifics of teaching in a culturally heterogeneous classroom. The participants will look at how the same things are done in different cultures and how diametrically different values different cultures hold.

Session 2 – Ornaments, magic squares, finger and line multiplication

The aim of this session is to show that it is not difficult to pose problems supporting cultural heterogeneity, either by drawing on methods and procedures used in different cultures, or by setting mathematical content into a culturally unusual setting. Pupils then at the same time learn mathematics and meet new cultures.

Session 3 - Vehicular language

The aim of this session is to draw attention to the difficulties that non-native speakers encounter when reading and writing in a foreign language. The activities will cover analyses of textbooks and word problems. The focus will be on mathematical language and possible conflicts arising from different meaning of words and verbs that are common to both the natural and mathematical languages.

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