II Interdisciplinary Scientific Conference „Mathematical Transgressions”
March 15 – 19, 2015

Plenary lectures

	Keynote Speaker	Title of the lecture & Description
1	**Joseph Krajcik** Michigan State University, USA 	Will be given later.
2	**Kobus Maree** University of Pretoria, South Africa 	**Career Construction in the mathematics classroom: Using an integrated, qualitative+quantitative approach to enhance learners' sense of self** Career Construction Counselling and Self-Construction Counselling aim to help learners script their career-life stories. This approach is suitable for exploring personal meanings and for helping learners deal with the many problems involving meaning. The aim of the paper is to demonstrate the implementation of an integrated, qualitative+quantitative approach in career counselling in combination with a parallel approach in mathematics to elicit and harness learners' reflexivity, enhance their sense of self and, ultimately, enable them to participate more actively in career and self-construction and in the writing of their emerging career-life stories. A brief case study will be discussed to demonstrate the approach. The results cannot be generalized but it seems that drawing on an integrated, qualitative+quantitative approach in mathematics classrooms holds much potential to enable learners in a variety of contexts to improve their mathematical performance and, more importantly, help them to make and execute informed decisions about their career-life journeys.

3	**Sylvia Rimm** director of Family Achievement Clinic in Cleveland, USA 	**How Educators Can Prevent and Reverse Underachievement in Mathematics** Dr. Rimm's well-known book, *Why Bright Kids Get Poor Grades and What You Can Do About It*, explains how underachievement has become an international educational epidemic. Many gifted children who sit in our classrooms don't work up to their ability. Patterns that cause underachievement take place at home and in the classroom. Parents and teachers may overlook or misinterpret the symptoms and may be manipulated by children in ways that accidentally maintain the problem. Mathematics is sometimes the first area where gifted children avoid achievement. In primary grades gifted children often complain of boredom related to the repetition and writing of math facts. In middle grades, children who earlier found math too easy may feel threatened by its difficulty. They believe they're not "smart" in math or that math isn't social enough. There are also gender issues related to math fears. Dr. Rimm will give practical strategies for developing students' achievement, love of challenge, perseverance, and their ability to balance academics and social life. Differentiating curriculum is crucial in allowing gifted children to develop self-efficacy or the relationship between efforts and outcomes in relation to math. Dr. Rimm's Trifocal Model provides guidelines for accelerating learning, changing expectations, finding math role models and developing an intrinsic interest in math. Dr. Rimm will focus on how teachers can identify the patterns of underachievement related to math and guide these students in the prevention and reversal of underachievement.
4	**Bernard Sarrazy** Université de Bordeaux, France 	**Contract, transgressions and creation** **An attempt to clarify the paradoxes of the didactical relationship in mathematics education from a didactical and anthropological approach** During the first part of the lecture, we will study, from a theoretical point of view, the issue of transgression as an expected response given by the pupil but unrequired by the teacher. This phenomenon is the paradoxical result of the contract which forms during any didactical relationship : "this is what you have to know, and from now on, think for yourself to show that you are able to *create* new uses of what you have been taught ; in other words, act in accordance with what I have taught you but don't obey me!". So, transgression will be considered as a necessary condition for learning mathematics (different from the use of techniques, algorithm, and rules)

		whose conditions of existence stand at the crossroads of determinations which are both *didactical* (with reference to "the paradox of devolution" as defined by Guy Brousseau in the theory of didactical situations) and *anthropological* (with reference to the concept of "use" in Wittgenstein's anthropology and to his famous rule-following paradox). During the second part, we will base our argument on different research in order to underline : a) the relevance and the interest of this theoretical approach in order to gain a better understanding of the reasons for pupils' and teachers' recurrent difficulties (for example, "you know your lesson, the teacher says, but you didn't understand it."), and the reasons why some means intended to regulate these difficulties fail and b) the role of "backgrounds" (in the Searlian meaning of the word), like familial educational practices and the didactical and pedagogical cultures of school environments (which are linked to values, beliefs, epistemological and pedagogical conceptions of the teachers) in order to account for the appearance of interindividual differences concerning the relations with transgression, and so clarify the ways we can go beyond the initial paradox. In conclusion, we will promote the idea of a "normative transgression" to describe this phenomenon of sudden appearance of new creations ("transgressive" dimension) which are expected by the teacher and lived by the pupil as a measured disobedience, for it is basically in accordance with the "account books" of mathematicians (normative dimension). This is probably where the fascinating and singular essence of mathematical activity stands, between logical constraints and boundless openness of creative possibilities.
5	**Alan Schoenfeld** University of California, USA 	**What makes for powerful classrooms, and how can we support teachers in creating them?** Most of us think we know what "good teaching" is. The problem is that we don't – opinions about "good instruction" differ, although research clearly says certain things are important. My research-and-development goal has been to do some ground clearing: to lay out a straightforward way of characterizing classrooms that produce students who are powerful thinkers, to test that characterization empirically, and then to fashion forms of professional development that supports teachers' growth in the things that count. I'll discuss progress along those lines. The talk will include a discussion of the "Teaching for Robust Understanding of Mathematics" (TRUmath) framework, a

		description of how it can be used for research on teaching, and then the characterization of some tools to support effective teaching and can be used to build robust professional development.
6	**Erich Ch. Wittmann** Technical University of Dortmund, Project Mathe 2000+ , Germany 	**Structure-Genetic Didactical Analyses – empirical research of the first kind** In mathematics education of today theories of teaching and learning that are based on disciplines different from mathematics („imported“ theories) are widely dominating the field. This imbalance greatly reduces the impact of mathematics education both on teacher education and on the teaching practice. In order to return to a balanced situation it is necessary to pay more attention to theories which are based on mathematics. As an example of such a „homegrown“ theory the talk will present the structure-genetic didactical analysis, *the* research method of mathematics education conceived of as a „design science“.