

INTRODUCTION

FROM A STUDY OF TEACHING PRACTICES TO ISSUES IN TEACHER EDUCATION

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Group 10 is particularly interested in theoretical, methodological, empirical or developmental papers on issues concerning teachers' practices, professional knowledge and teacher education. Several themes are possible to be discussed, such as teachers' beliefs, teachers' activity, the role of the teacher in the classroom, professional knowledge, professional development, strategies for teacher education, and links between theory and practice, research and teaching, and teacher education and collaborative research.

This group received 57 proposals (48 for papers and 7 for posters). Each proposal was reviewed by the leader of the group and two authors, in general including one of the others co-leaders. Some proposals were immediately accepted (8 papers, 3 posters), others were asked some revisions (31 papers, 4 posters) and 9 proposals for papers were recommended to be transformed into posters. Fifty five authors from 19 nationalities participated in the sessions of the working group during the conference, through the presentation of 35 papers and 5 posters, all of them accepted to be included in the proceedings.

All the papers and posters have been grouped in different topics that constituted five panels. Each panel began with short presentations (5 minutes each), where the authors presented their paper contributions to the topic and posed three questions (maximum) to be dealt with in the working groups and the further discussion. This first part ended with a comment related with all the presentations (10 minutes), made by a previous invited participant of the working group. Afterwards, a discussion part took place. In general, this discussion had a first moment in small groups and a second one with the whole group.

The organisation of the sessions was highly valued by the participants, as well as the atmosphere. Nevertheless, due to the high number of presentations, the time for discussion was sometimes less than desirable. The group leader presented a different way to organize the working group for the future (some panels may occur in parallel), if the participation maintains so high, informing in advance the distribution of the papers in the different panels. One participant suggested that each author would be in a different small group permitting that the work in that group focuses on that author's

paper. It has been also proposed a possible change in respect of presentations: the participants would present other participant's paper. We didn't get to any final agreement on this last proposition.

Panels

We present the emerging issues and ideas that rose during the different panels.

Panel I: Mathematical curriculum and practice

- Is it possible a renewal of the curriculum, which implies changes in the teacher's style of work into the class, without any external stimulus (working at school in group, consulting only textbooks, even with the help of some experienced teachers)? If yes, what conditions are necessary at schools, and more widely in the social context?
- How can one develop a new curriculum in a mode that integrates top-down and bottom-up approaches?
- There is a specific role for mathematics educator, but which one and when? And for research?
- How does curriculum management influence students' learning of mathematics?
- Is the study of teachers' efficacy meaningful without taking into account the teachers' views about mathematics?
- What is the incidence and availability of such research, at international level? Can we think about common research on any topic in Europe without taking into account cultural and social differences among the countries?

Panel II: Professional knowledge

There are uses of similar, but different terms, within the notion of professional knowledge: knowledge base for teaching; pedagogical content knowledge; competence: disciplinary, didactic, and relational; subject didactical competence; practical knowledge (beliefs and knowledge)

- How can one present mathematics for the teachers to contribute to the development of their pedagogical content knowledge?
- What tasks can we use to diagnose the (students) teachers' subject matter knowledge (its possible weakness)?
- How can one change teachers' conceptions on mathematical communication (as information transmission) through a collaborative work (eg. centered on teachers' reflection on their own practice)?
- How can one promote lasting classroom culture among teachers, one of its focus being the discussion of students' (right or wrong) strategies?

Panel III: Professional development

As for primary teachers, also for secondary teachers, mathematical content knowledge and pedagogical content knowledge must be interrelated in teacher education (having a mathematics degree isn't enough to understand the mathematics to teach).

- Professional development is about becoming autonomous and critical at designing and conducting classroom teaching. How do teachers develop professionally? In particular, what is the role of:
 - theory (listening to lectures, reading papers, discussing issues, ...)?
 - practice (appropriating ideas from the practice of others, transforming ideas from his/her own practice)?
 - reflection (reflecting on what? how? with what purpose?...)?
- How is it possible that groups of teachers develop towards a real learning (inquiry) community? What kind of impulses do they need?
- Which role could/should researchers/teachers' educators play in such professional development (taking account of their experience in international projects, in research studies, in the use of supporting tools of analysis...)
- How is it possible to promote real changes in the beliefs and the teaching practices of in-service teachers?
 - How can we measure the sustainability of this professional development?
 - What is the impact (if any) of the changes on the mathematical experience and learning of pupils?
- Co-learning is a means to promote professional development. But how to combine the expertise of teachers and that of mathematics educators/researchers in a way that can be useful to the two partners?

Panel IV: Approaching reflection and collaboration in mathematics teachers' professional development

Collaborating is not just sitting or working together and reflecting is not just thinking about or thinking aloud. Content and depth of reflection are determinant. Reflection is a privileged way for professional enhancement. Collaboration is a mean for professional development and for research strategy.

- What strategies, settings and content can we design to promote reflection and collaboration amongst teachers and between teachers and researchers in order to achieve a real professional development?
- How can we categorise data, statements, and phenomena? And why?

- What data should be analysed to measure the improvement of teaching via (joint) reflection?

Panel V: **Models to analyse the practice**

The practice of teachers includes classroom teaching, as well as training and other professional development contexts, ... There are different examples of models to analyse the practice, such as: focusing on teachers' cognitions; focusing on interactions in a collaborative environment (bottom-up); and focusing on teachers' use of curriculum materials, textbook in particular.

- Enquiring into teachers' beliefs about teaching and learning mathematics through *focus* groups:
 - What other uses might the focus group interview have in teacher education/teaching development?
 - What are the special techniques for managing a focus group interview?
- How can we manage to make research results and instruments useful for teachers as means in their professional development, and for educators in training contexts?

PAPERS

Panel I: **Mathematical curriculum and practice**

Hellmig, L. *Effective blended professional development for teacher of mathematics: Design and evaluation of the “UPOLA” Program.*

Isler, I. & Cakiroglu, E. *Teachers’ efficacy beliefs and perceptions regarding the implementation of new primary mathematics curriculum.*

Nunes, C. & Ponte, J. *Curriculum management in the context of a mathematics subject group.*

Panel II: **Professional knowledge**

Andrá, C. *Gestures and styles of communication: are they intertwined?*

Doritou, M. & Gray, E. *Teachers’ subject knowledge: the number line representation.*

Guerreiro, A. & Serrazina, L. *Communication as social interaction. Primary School Teacher Practices.*

Hosson, C.; Vandebrouck, F. & Robert, A. *Experimental devices in mathematics and physics standards in lower and upper secondary school, and their consequences in teacher’s practices.*

Joubert, M. *et al.* *Professional development for teachers of mathematics: opportunities and change.*

Kattou, M. *et al.* *Teachers’ perception about infinity: a process or an object.*

Kontoyianni, K. *et al.* *Perceptions on teaching the mathematically gifted.*

Larguier, M. & Bronner, A. *Nature on the numbers in second: A professional problem.*

Malara, N. & Tortora, R. *A European project for professional development of teachers through a research based methodology: The questions arisen at the international level, the Italian contribution, the knot of the teacher-researcher identity.*

Moscucci, M. *Why is there not enough fuss about effects and meta-effects among mathematics teachers?*

Murphy, C. *The role of subject knowledge in Primary Student teachers’ approaches to teaching the topic of area.*

Reinup, R. *Developing of mathematics teachers’ community: five groups, five different conceptions*

Rowland, T. *Foundation knowledge for teaching: contrasting elementary and secondary mathematics.*

Schwarz, B. & Kaiser, G. *Results of comparative study of future teachers from Australia, Germany and Hong Kong with regard to competences in argumentation and proof.*

Turner, F. *Kate’s conceptions of mathematics teaching: Influences in the first three years.*

Ubuz, B. *et al.* *Pre-service teacher-generated analogies for function concepts.*

Panel III: Professional development

Abboud-Blanchard, M. *Technology and mathematics teaching practices.*

Alatorre, S. & Saíz, M. *Teachers and triangle.*

Mgombelo, J. & Buteau, C. *Mathematics teacher education research and practice: researching inside the MICA program.*

Soto-Andrade, J. *Cognitive transformation in professional development: some case studies.*

Stehlíková, S. *What do student teachers attend to?*

Stylianides, G. & Stylianides, A. *The mathematical preparation of teachers: A focus on tasks.*

Tichá, M & Hospesová, A. *Problem posing and development of pedagogical content knowledge in pre-service teacher training.*

Zehetmeier, S. *Sustainability of professional development.*

Panel IV: Approaching reflection and collaboration in mathematics teachers' professional development

Martinho, M. H. & Ponte, J. *A collaborative project as a learning opportunity for teachers.*

Matins, C. & Santos, L. *Reflection on Practice: content and depth.*

Pesci, A. *Developing mathematics teachers' education through personal reflection and collaborative inquiry: which kinds of tasks?*

Witterholt, M. & Goedhart, M. *The learning of mathematics teachers working in peer group.*

Panel V: Models to analyse the practice

Kleve, B. *Use of focus groups interviews in mathematics educational research.*

Muñoz-Catalán, M. C.; Carrillo, J. & Climent, N. *Analyses of interaction in a collaborative context of professional development.*

Petrou, M. *Adapting the knowledge quarter in the Cypriot mathematics classroom.*

Ribeiro, C., Monteiro, R. & Carrillo, J. *Professional knowledge in an improvisation episode: the importance of a cognitive model.*