

TSG 24: Research on classroom practice

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1. Introduction

For the first time, ICME opened a TSG on this topic. The reasonable surge of proposals (27 of which 23 were accepted) shows that this decision was appropriate. Prior to this group, literature on this topic were arranged according to the main purpose of research, which determined the kind of practices which must to be observed:, namely the one which was meaningful for this topic. As a consequence, the observation of classroom—an essential component of any experimental research on teaching—was reported hastily, never being regarded as an essential element of research.

The Organising Team interpreted the TSG as below, incorporating our hesitations between two attitudes:

- to specify the topic more fully, or
- to welcome all texts which the authors believe belong to the topic.

The Organising Team chose the more open and pragmatic approach, in order to collect a broad sample of interpretations. This led us to organise two parallel groups. The participants undertook two common actions: the publication of all accepted communications and the preparation of a special issue for a review. Following a group decision, we are glad to announce that a special issue in *Quaderni di Ricerca in Didattica Matematica* has been prepared.

From the start, the term "classroom practices" appeared vague, and it is probable that it remained as unclear after the congress, for the contributors represented diverse cultures, models and perspectives. We did not devote time to this topic, but only discussed it a little with respect to each presentation. We continue to exchange opinions. It would be desirable to open a new TSG on this topic at the next ICME.

2. Aims, Goals, Scope and Focus

2.1 Aims

This TSG intends to stimulate people's interest in research on classroom practice in mathematics, and to strengthen the use, knowledge and understanding of that practice. Studies and comparisons of classroom practice in mathematics are one of the goals that Felix Klein proposed at the foundation of ICMI. These studies deal with significant events which happen in classrooms, mainly those which depend on teacher's actions. Thus classroom observations and significant events are the key base and result of scientific studies on teaching. We want to examine in an experimental way questions about teaching mathematics resulting from observations of classroom practices. The major part of these studies should be distributed according to the various study topics of ICME. We want to improve and to discuss ways of organising observations, means of observation, ways of describing and recognising teaching-learning phenomena, means to identify what we are looking for, what we know, and why we are sure we know it.

2.2 Goals

As there are diverse theoretical frameworks and practices in different countries, one of the goals is to help the group understand various practices in different didactical systems and the theories supporting these practices. The group intends to address the following general issues.

- Classroom practices within well-defined didactical systems.

- Classroom practices promoted by research projects.
- Analytical accounts of empirical lessons based on observations of classroom practices.
- Comparison of classroom practices between different systems.
- Perspectives (theoretical, socio-cultural, political) informing different classroom practices and analysis of these.

There may also be variations in practices as a result of the mathematical topics and focus of the lessons, for example, classroom practices in algebra lessons may be very different from those in geometry, problem solving, or learning of basic skills. Therefore, we may also consider themes such as:

- Classroom practices for the teaching of specific topics;
- Classroom practices for specific mathematical processes such as problem solving, investigation, projects, basic skills.

We want to present contributions which represent current practices and perspectives and to share main tendencies in this topic, to identify needs, to discuss and suggest orientations for future research. We hope to maintain and strengthen this topic for the next ICME.

2.3 Scope

- To gather, document, bring closer and compare studies on classroom practice independently of the reasons for which they were carried out.
- To present and compare classroom practices following different conditions or mathematical topics.
- To present projects of multimedia-libraries to preserve the observations of classes (video recordings, transcriptions of lessons, collection of pupils' work, preparation of lessons), to classify them and to make analytical accounts of these available to researchers.
- To reflect on the bases and the methods which legitimate the contributions of observations of classroom practice in research on mathematics teaching.
- To reflect on the uses of these observations and of their results in education systems.

2.4 Focus

The focus of TSG 24 is a discussion of research related to mathematics classroom practice. Classroom practice includes practices located within the classroom as a system in which activities of learning and teaching processes are embedded. A consideration of the mathematics classroom as a system requires the study of the interactions between: the mathematical content to be taught and learned, the activity of the teacher, and the work of the students. In the interaction process, mathematical content is contextualised through situations and the teacher plays an important role related to his/her knowledge and his/her teaching practice. It is important to understand through research the nature and extent of the interactions in the mathematics classroom, the complexity of the didactic system, the roles of the teacher and students in the interaction processes when the mathematical content is taught and learned and the complexity of the activities in mathematics classrooms.

3. Presentations

The papers are available on <<http://tsg.icme11.org/tsg/show/25>>.

1. *Solving mathematical word problems in primary grades*. Shuhua An, Zhonghe Wu, Joyce King
2. *Organization of the study in 10th grade classes: Analysis of the didactical contracts*. Floria Arias, Andrea Araya
3. *Studying arguments in mathematics classroom: A case study*. Ma. Guadalupe Cabañas Sánchez, Ricardo Cantoral
4. *Confucian heuristics and mathematics teaching in Shanghai: Qifa Shi teaching*. Yiming Cao, Li Hua Xu & David Clarke

5. *Status and methods of observation or classroom practices: Pieces of discussion from the example of the COREM.* Marie-Pierre Chopin, Marie-Hélène Salin
6. *A theoretical characterisation of service mathematics.* Olivia Gill & John O'Donoghue
7. *The explanation of the teachers: An experience study of the notion of similarity in upper middle level.* Hermes Nolasco Hesiquio
8. *The reproducibility phenomenon in the context of teacher-student interactions.* Javier Lezama
9. *Supporting secondary novices' efforts to implement a pedagogy consonant with the NCTM Teaching Standards.* Gary Lewis
10. *Motion sensor: A learning tool for reading function graphs.* Maria Lucia Lo Cicero, Filippo Spagnolo
11. *Communication in the classroom: Practice and reflection of a mathematics teacher.* Maria Helena Martinho, João Pedro da Ponte
12. *Exploring functional relationships to foster algebraic thinking in grade 8.* Ana Matos
13. *A glimpse of a mathematical enculturator in Chinese mathematics classrooms: An example from a Shanghai Lesson.* Ida Ah Chee Mok
14. *Tensions in integrating mathematics and other school disciplines: Cases from classroom teachers in South Africa.* Willy Mwakapenda
15. *A trajectory to generalization: The teacher's support to pupils' mathematical investigations in the classroom.* Hélia Oliveira
16. *Secondary school students' understanding of the concept of function.* Manuel Joaquim Saraiva, Ana Madalena Teixeira
17. *A didactical situation in multicultural primary school.* F. Spagnolo, B. Di Paola
18. *Sharpening teaching ability in K-8 mathematics classrooms.* Zhonghe Wu, Lanying Li
19. *The understanding of the integral defined as mathematical object in the university students.* Aida María Torres Alfonso, Dámasa Martínez Martínez
20. *The impact of written reflections in a geometry course for preservice elementary teachers.* Hortensia Soto-Johnson, Ann Wheeler
21. *Notes on the observation of classroom practices.* Guy Brousseau
22. *Two Grade 5 teachers' enactment of mathematical problem solving and their classroom talk: Contrasting approaches.* Kai Fai Ho
23. *A study regarding the genesis of the primary teachers' practices who teach mathematics.* Christine Mangiante

4. Conclusion

The papers that we finally present are an inventory of the state of affairs. They represent what the participants imagine to be classroom practice. For this first appearance of this TSG we did not attempt precise definitions, a list of specific questions or the objects of study of this topic. We agreed to give priority to actual observations rather than theoretical arrangements that had not been acted on.

An observation report is incomparably bulkier than a research report, and the volume cannot be reduced without a common vocabulary, and thus without appropriate concepts. The observations the authors chose from their works were uniformly interesting, but not well related to each other. There was little time for exchanges that might reveal the participants' positions or feed their reflections on this complex subject. Therefore we put off for later the inventory of types and methods of observation, the classification of subjects to be studied, and the ethics that should guide any approach to systems of teaching.

Everyone wants to observe classes and share their observations. Everyone is curious about what others have done and seen. But among the enormous mass of lessons that can be reported on, the only reports that currently can be diffused are those that represent something unusual or some defect that is assumed to be typical. Making a collection of exceptions does not determine what is normal, and it falsifies its representation. The less knowledge and the fewer

concepts the participants have in common, the more difficult it will be for them to benefit from these exchanges.

Observation of classes, and especially of what is normal there, is the basis of research on education. The conditions of those observations are likewise essential. The modelling of the phenomena and episodes observed is the third component of what is required to guarantee the practical and scientific interest of the observations.

We hope that ICME will renew this TSG in future. Meanwhile, the texts that we present bear witness to considerable development, and they constitute a reference panorama that is indispensable for further progress.