

## **WG: International Perspective on Proof and Proving– PME 43**

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The aim of the group was to foster research on proof and proving from an international perspective, by organising networks of researchers interested in collaborating on comparative research focussed on proof and proving.

Among the participants in the PME WG there was interest in continuing to work on several sub-topics:

- Pre-Primary and Primary Argumentation and Proof
- Secondary Level Argumentation and Proof
- University Level Proof Teaching and Learning
- Proof in the Primary & Secondary School Curriculum
- How are Argumentation and Proof conceptualised internationally?
- Interrelationships between Visualisation and Proving

The short term plan is for interested researchers to conduct research projects on each of these topics in the next year, and to report back (either in person, or in writing) to the PME WG at PME 44. The long term plan is to present the outcomes of these projects in a research forum at PME 45 and/or in an edited book. Readers of the Newsletter are welcome (encouraged) to join in the research projects. All levels of participation are needed, from being fully involved in planning and conducting the research, to providing information about your country. If you are interested in participating, please contact the coordinators listed below.

### **Details of research topics**

#### **Pre-Primary and Primary Argumentation and Proof**

Possible research questions:

- At what age do children first engage in ‘academic’ discussion/argumentation in different international contexts?
- What kinds of proof/argumentation related activities take place in Pre-Primary and Primary schools in different international contexts?
- What do the terms ‘proof’ and ‘argumentation’ mean in practice in Pre-Primary and Primary schools in different international contexts?

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## Secondary Level Argumentation and Proof

Possible research questions:

- What teaching resources /constraints influence teaching proof at the secondary school level in different international contexts? (e.g., are textbooks, exams, or curriculum the major influence on teaching?)
- How do teaching resources /constraints for teaching proof at the secondary school level differ in different international contexts? (e.g., How is proof presented in textbooks?)
- What framework for describing proofs is best suited to analysing textbooks, exams and curriculum documents?

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## University Level Proof Teaching and Learning

Goals:

Descriptive overview about differences in the conception, implementation and use of argumentation/proof between

- different countries
- types of universities
- service, (different kinds of) teacher and mathematics degree programs

In particular the use/implementation of different proof related activities such as proof construction/comprehension/validation. The (long term) aim there would be to evaluate the effectiveness of according activities.

Method:

- Online survey
  - First for lecturers
  - Maybe later for students
- Prior research may serve as basis for the survey's questions

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## Proof in the Primary & Secondary School Curriculum

Possible research questions:

- To what extent, and to which students, is proof taught in different countries? (e.g., what does the curriculum say?)
- When does the curriculum / teaching practice introduce proof/theorems/theory/etc.?

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## How are Argumentation and Proof conceptualised internationally?

Possible research questions:

- How is truth established at different school levels in different international contexts?
- What is the relationship seen between proof and argumentation in different contexts?
- What goals for teaching proof apply in different countries/cultural contexts?

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## Interrelationships between Visualisation and Proving

Research interests: The relationship between visualisation and reasoning, students' reading of Proofs Without Words, etc.

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