

## DG 1: Issues, movements, and processes in mathematics education reform

Team Chair: *Zalman Usiskin*, University of Chicago, USA  
Team Member: *Bengt Johansson*, University of Gothenburg, Sweden



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# DG

Discussion  
Group 1

### Aims and focus

Mathematics education can be studied through a variety of lenses. These lenses range from those that zoom in to allow us to see the veins of petals and leaves of individual lessons, students, and mathematical concepts to those that zoom out to allow us to examine the climatic phenomena influencing a country's mathematics education as a whole. The focuses of DG 1 required lenses that zoom out to discuss the issues, movements, and processes in mathematics education reform. With the help of the overall ICME organizers, the DG 1 organizers framed a set of questions to guide the thinking of those who might be interested in contributing to or attending this group. The first purpose of these questions, summarized below in this brief report, was to encourage papers dealing with the processes by which mathematics curricula are formulated and goals of mathematics are determined and announced, and the issues, forces, and interest groups that affect these developments. The second purpose of these questions was to serve as an organizing tool for cross-country discussion and comparison.

### Organization

This discussion group had two organizers (from China and the USA) and three associate organizers (from Chile, Japan, and Sweden). Of these five, only Zalman Usiskin (USA) and Bengt Johansson (Sweden) were at the congress. Huang Xiang (China) was ill and the associate organizers Fidel Oteiza (Chile) and Eizo Nagasaki (Japan) both had to remain home because they were leading figures in mathematics reforms that needed attention in their countries even as the congress was going on. Bengt also was in the position of having to do work at home during the congress, but being from Gothenburg he was able to go back home and return during the congress. Thus one could argue that, for the most part, the unfortunate absence of these people was an outgrowth of the high positions they held, exactly the positions that made them appropriate to be organizers.

This expertise of the other organizers was matched by the expertise of many of the people who attended one of the three meetings of DG 1. A number of attendees at DG 1 were in charge of testing programs, curriculum frameworks, or development projects in their countries.

No formal presentations were allowed in the DGs. And although the organizers asked for papers to be sent to us before the conference, only one paper written for the conference from Margaret Kidd of the United States was received. Another person sent two papers written some time before the conference. The absence of papers on the web may have been a boon for DG 1, because unlike the TSGs and posters, everyone could participate without preparation.

Around 50 people attended one or more of the sessions; 45 at the first; and about 28 at the second and third. The discussions involved participants from 20 countries and all but a few of those in attendance. The organizers heard later that the leading ministry person in one Asian country attended the group but did not contribute to the discussion.



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## First session

At the first session, the following questions were raised before the whole group.

1. Who is mostly responsible for mathematics curriculum reform?
2. How do these individuals get together?

By “reform” the discussion centered around “re-formulating the mathematics curriculum”, not necessarily tied to a particular kind of reform movement within mathematics education. Thus the discussion centered more on process than on the substance of the reforms (which operationally were defined as major changes). Most of the contributions were informational in direct response to the questions.

In most of the countries represented at DG 1, nation or state-wide ministerial committees are formed to lead the reform. Sometimes commercial publishers are involved, either because they write directly to the reforms or because they help stimulate some reforms. Rarely are professional organizations involved. An exception in this regard has been the involvement of the National Council of Teachers of Mathematics in the United States in encouraging reform initiatives and in steering the direction of reform. It was noted that the size of this organization (about 100,000 members) automatically gives its work a presence in that country.

The individuals responsible for working out the details of the implementation of the reform are usually mathematics educators, mathematicians, and mathematics teachers. Rarely are parents, students, users of mathematics, or the interested public involved. At times, people working anonymously behind the scenes become involved in the reform. A disturbing commonality appeared in the discussion: In a number of countries, consensus-building that has been carefully reached over an extended period of time (often a number of years), in committees whose members have been carefully selected to represent different viewpoints, is sabotaged by last-minute changes by people whose competence is questionable and whose identity may not even be known. The phenomenon seems to occur most often when there is a change at the a high governmental level and the new leaders in education want to place their own stamp on the reforms, or when the education leaders disagree with the consensuses that have been reached, or sometimes (it seems) when the leaders (old or new) are or wish to remain ignorant about what is done somewhere else than under their watch.

The phenomenon of the unknown reformer is not universal. In areas where education is separated from politics and where well-established procedures are in place for decision-making (e.g., Japan, where reform in the system follows a schedule planned years in advance), reform proceeds in a more orderly way.

## Second session

In the second session, the large group was split into small groups of 6-16 to discuss the following questions:

3. What are the goals of mathematics education reform?
4. What developments in mathematics curriculum reform are currently being undertaken?
5. What forces inside the mathematics community have had significant effects on curriculum reform?

6. What forces outside of mathematics have had significant effects on curriculum reform?
7. What is the role of various kinds of documents in instituting reform?

Several participants noted that the opportunity to be in a small group was something that they had not experienced at previous ICME congresses, and they were quite happy to be able to sit with a few people they did not know before and discuss issues of common concern. Summaries of the discussions were presented to the whole group by representatives of the small groups and centered more around Questions 5 and 6 above than any others. Six forces inside and outside the mathematics education community were identified: professional groups of mathematics educators and/or mathematicians; politicians, often those dissatisfied with how schools are doing; new technologies, which influence both the content and approach; commercial interests, including publishing companies and electronic sources; business leaders, who desire an educated workforce; and teachers of mathematics, who can work both for and against change.

### Third session

In the third session, the group met again as one body. Attendees were asked to identify reforms that they felt were working in their countries. A number of examples were offered, allowing the DG to end on a positive note. Among the mentioned reforms was the National Numeracy Project in England, a project whose main goal to get children in grades K-5 to think about mathematics (rather than to view mathematics as all memorization and rote) by working with their teachers. This project has been adapted in Australia under the banner "Count Me In, Too", and New Zealand. A reform in Singapore has been to raise awareness of social issues and society in mathematics classrooms. Again the mechanism for reform is to transmit ideas to teachers through workshops. In Sweden, the movement has been towards systemic reform, namely to consider the following aspects of mathematics education simultaneously: the public sector, the teacher's professional identity, the commitment of all participants in the process, institutional issues, time resources, curriculum content, and assessment. The group was also informed about the latest reforms in Spain and Japan.

This report has been written by Zalman Usiskin.



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