

The role of professional associations in mathematics education ⁽¹⁾

Corinne Hahn, Will Morony and Tomás Recio

Introduction

Associations of mathematicians, mathematics teachers and mathematics education researchers around the world share a common aim of promoting and improving research and practice in mathematics education.

How do the different groups see their roles? How do they undertake their work? What, in particular, is their role in relation to educational reform? To what extent do the different groups (mathematicians, mathematics teachers and mathematics education researchers) collaborate? Should the relations between associations be strengthened? Is there a new role for associations in the context of the current global trend for evaluation of performance through PISA, TIMSS, etc.? Would it be desirable to establish a world federation of mathematics teacher associations to help respond to this and other global trends and issues? Discussion Group 28 at ICME-11 (Monterrey, México, 2008) was asked to seek answers to these questions under the theme *The role of professional associations in mathematics education: locally, regionally, and globally*. During the Fall 2007, the team for DG 28⁽²⁾ launched a survey to collect information about mathematics associations around the world.

In the first part of this paper we will briefly describe the survey characteristics and synthesize the answers to this survey. In the second part we will present the main points that emerge from the discussions at ICME-11. We will conclude with some proposals about actions to consider.

The Survey

Characteristics

The survey was available on line on the ICME-11 website⁽³⁾ during Fall 2007 and Spring 2008. It was written in English, but there was an option to read and to answer it in Spanish. The survey's items include questions about aims, focus, main mathematical level, governance and administration, number of members, activities, policy influence, regional and international relations.

Respondents

Twenty-four Spanish speaking societies answered the survey (see list in Appendix 1), including two federations (one at the country level, for Spain; another at the Iberoamerican level). These societies come from twelve different countries with Spain represented, in the Spanish language responses, through ten different societies (marked with * in the list), each one with a specific regional area of influence, and two federations (marked with ** in the list).

Twenty-eight societies provided responses in English: three international and twenty-five national, including two other societies located in Spain. The twenty-five national societies are mostly European (seventeen), five are North-American and three from the Southern hemisphere (see list in Appendix 2). No answers were collected from Asian countries.

Survey main findings

On basic information and contact details

The responses to the survey were provided, in the great majority of cases, by the president or the secretary of the society, and includes email and phone contact data. Most of the responding societies have a web site. In fact, only nine societies have not provided a specific url.

Aims, mission, purposes

Here the responses split in two different directions. On the one hand, there are societies that aim to support mathematics (research, dissemination, education, etc.) generally. On the other hand, there are societies that regard mathematics education (in a broad sense, including a majority of teachers as members, and not only researchers in mathematics education) as their specific field of interest. In general these organizations exist in countries where there is a separate society with specific interest in mathematics research.

This is clear in the many regional societies within Spain that are clearly devoted to mathematics education — as it is assumed that the *Real Sociedad Matemática Española* takes care of mathematics research issues. This also happens, for instance, in the *Sociedad Peruana*, or in the *Comité de Educación Matemática del Paraguay*, or in the *Mexican Asociación Nacional de Profesores⁽⁴⁾ de Matemáticas*, etc., devoted to mathematics education. On the other hand, for instance, we have organizations such as the *Sociedad Cubana*, the *Asociación Matemática Venezolana* and the *Sociedad Matemática de Nicaragua* that have aims in relation to mathematics generally.

This is an important issue. In many countries there is a (not always easy) co-existence of societies of general purpose (constituted mainly by mathematicians related to research and university teaching, but which nevertheless do extend their influence to school mathematics matters) and societies of specific educational purpose (related to school mathematics and to teacher training). The survey shows that this co-existence is well spread, but does not provide means to analyze it further.

As an additional remark, we note that there are no responses in Spanish of societies that have an exclusive focus on mathematics education *research*. This contrasts with there being seven societies with this focus among the responses to the survey in English.

There are three broad categories of aims and purposes among the English language respondents. For the most part the use of the term ‘teacher’ in the name of the society points to a major focus on mathematics teachers / teaching; similarly those societies with a focus on mathematics education research typically have the term ‘research(er)’ in their name. When neither of these terms are included or implied in the name, the society tends to have its focus in the discipline of mathematics (or statistics). There are exceptions, however. The Mathematical Association (UK) and some regional groups such as the Auckland Mathematical Society (and others known of in Australia) are very clearly focused on mathematics teachers / teaching.⁽⁵⁾

These categorizations are not exclusive, of course, with many societies having interest and substantial engagement in more than one category. For example, the National Council of Teachers of Mathematics (NCTM) cites the support of teachers as its main aim. As part of achieving this, the NCTM publishes the *Journal for Research in Mathematics Education*, which is among the most respected journals in mathematics education research. The Royal Statistical Society is primarily involved with the overall field of statistics — it does, however, have a significant initiative in statistics education through its Centre for Statistical Education.

The table below shows a summary of respondents, categorized according to the language of response for each society, their membership base (i.e., the ‘description of members’ provided) and main focus (see later section for a discussion of these categories).

	International (membership and purposes across national borders)	National (mostly confined to one country)	Regional (established in a single region of a country)
Mathematics	0 Eng + 0 Sp	6 Eng + 3 Sp	0 Eng + 0 Sp
Mathematics education research	2 Eng + 0 Sp	4 Eng + 0 Sp	1 Eng + 0 Sp
Mathematics teachers/teaching	1 Eng + 1 Sp	10 Eng + 10 Sp	6 Eng + 10 Sp

Main mathematical and educational focus

The societies set their sights high. The statements of ‘Aims, mission, purposes’ typically include statements that are about ‘service’ and achieving a vision of the ‘greater good’ of mathematics, the teaching and learning of mathematics, research in mathematics education, and the community as a whole. We found three recurrent ideas in the responses.

Facilitate exchanges

Many societies mention that one of their main aims is to stimulate the interchange of ideas and experiences between members of a community, and also to build a bridge between communities (researchers of different fields; researchers and teachers; etc.).

Improve mathematics education

Of course societies claim that their work will improve mathematics education and will help to better answer to students’ needs by supporting the work of mathematics teachers. This can be achieved by spreading results from research, discussing and implementing innovative pedagogical practices among teachers, but also by supporting people who are involved in critical issues concerning mathematics education and by making researchers more aware of teachers’ needs.

Promote mathematics

Another claim by many societies is that they communicate about mathematics outside the mathematics education community. Therefore they help to foster and increase interest for mathematics and mathematics education. They “increase awareness of mathematics as a tool for renaming one’s world” and “promote greater interest in the effective study of mathematics”. They are (or at least claim to be) the “public voice of mathematics education”.

Whilst the different societies have different terminology for their aspirations and their work, it seems that their intentions commonly cluster in three groupings: they claim to support *research in mathematics education*, to support the *work of teachers*, and to help *students and the community*.

There were two societies that cited a specific aspect of mathematics as their main focus. One of these was in the area of statistics. This is arguably a domain so large that it is logical that there it does form such a focus for a society. The other was a small group that operates virtually (via Facebook) with a focus in the area of ‘critical mathematics’. The Internet may be a vehicle for the development of special interest groups such as this, as it is clear from the rest of the responses that they are not formal associations (at least from those having answered our survey) devoted to specific aspects of

mathematics (dynamic geometry software, problem solving, algebra and history of mathematics in math education, etc.). Such groups of interest are, probably, constituted either outside of the mathematical societies (*Cabri* and *GeoGebra* group users, for instance, established by the software providers), or they exist through personal networking and collaboration between members of these societies. Analyzing this situation further could be of interest, especially in the context of the opportunities for collaboration provided by the Internet.

Governance and administration, number of members, description of members

Whether they responded in English or Spanish, all the societies reported that the governance of their organization is in the hands of volunteers. There were various names for this group, including council, committee, board of directors and executive. All of the regional mathematics teacher groups indicated that they are affiliated with a national body, in much the same way as the regional teacher groups in Spain are members of the national *Federación Española de Sociedades de Profesores de Matemáticas*.

In relation to the Spanish language respondents, there is a great variation concerning the number of members. It ranks from a few tens (e.g. *Sociedad Peruana*, the *Comité de Educación Matemática de Paraguay*, and some regional societies in Spain) to the declared 27 000 members of the *Federación Iberoamericana de Sociedades de Educación Matemática* (FISEM).

Some conclusions about these membership figures are:

- the existence of great differences among countries (for instance, consider the cases of Uruguay/Paraguay or México/Brazil, pairs of countries with similar numbers of members, but with the second country in each of these couples roughly doubling the number of inhabitants of the first; or the case of Venezuela/Perú, both with a similar number of inhabitants, but very different number of members affiliated to national mathematics associations)
- the need to encourage the merging of mathematics associations in some countries (perhaps through temporal, regional federations), achieving in this way a minimum size that allows having some real impact in society.

The societies with the smallest numbers of members were those with a focus on mathematics education research. The smallest were less than 100, with the largest around 300. Next largest on average were the regional mathematics teacher groups. These ranged up to 1000 members. None of the societies in these two smallest groups reported employing paid staff.

The societies with a focus on mathematics and mathematics research that are located in relatively populous countries (Spain, UK, etc.) have memberships in the thousands. The smallest in this group was, not surprisingly from a small country (Ireland) with 300 members. Some of these societies reported employing paid staff.⁽⁶⁾

The national mathematics teacher organizations that responded in English all have memberships numbering in the thousands. Most also reported employing paid staff. The organization that stands out from all others is the NCTM, with membership well over 100 000 and a staff of 100. This makes it an order of magnitude greater than any of the other groups.

Main activities: journals, meetings, policy influence, students' activities

Communication

Obviously, in view of such large differences among the size of the societies, their level of activity is also very different. Large societies usually publish one or more journals or bulletins; some small ones did not indicate that they have any communication means. All of the respondents in English indicated that they use a newsletter (hard copy and/or electronic), and/or an email list as means of

communication. Professional journals are published by the vast majority of the societies. These range from annual to ten issues per year, with most distributed a few times per year. Some of the journals are made available electronically (via websites).

Meetings

On the other hand, almost all societies confirm that one of the most common roles is that of organizing courses and seminars, conferences and congresses of direct relevance to their members and their interests. These societies see this face-to-face provision of opportunities for professional contact as a major role. There are formal conferences and courses, but also meetings with much less formal intentions, such as “sharing” teaching strategies or findings from research. Finally, many societies reported organizing activities for students, mostly around the preparation of Mathematical Olympiads. There was no question in the survey about number of student-members.

Policy influence

Another role of mathematics associations, besides being a mechanism for sharing didactical experiences and situations and for helping develop teacher’s profession in all respects (training, updating, addressing common labor problems), is that of being an interlocutor with the relevant authorities concerning mathematics education policy. The societies have reported a wide variation in their influence on policy for mathematics in schools. Apparently this influence does not depend on the size of the association. It is often due to the particular position of some members of the association. Some societies declare having a rather small influence on the policy, while some others report to have an important one, such as the Brazilian society, that writes: “Since its beginnings SBEM has played an important role in Brazilian public educational policies related to mathematical education”.

Among those reporting the least amount of influence were the organisations involved in research in mathematics education, and the regional mathematics teachers groups. For some, influencing policy is an active priority — “we have been increasingly active in promoting mathematics education”; “NCTM has focused on advocacy as one of its five strategic initiatives” — whilst others tend to provide responses when invited. One respondent may have captured the essence of the experience of professional societies in trying to influence policy: “While I would not say we have enjoyed total resounding success, it might well be that things would be much worse were it not for our influence and lobbying.”

Many of the societies outlined the means they use to try to influence policy. Most societies declare that they have formal contacts with other societies, and some belong to federations (such as FISEM or UMALCA⁽⁷⁾), but these contacts do not seem to have any real impact in their regional or national influence.

Presentations and discussions at the Congress

Discussion Group 28 sought submissions of proposals, through the ICME-11 website, to make a short presentation at the group sessions during ICME-11. Three sessions were organized. The first one focused on associations *locally*; session two focused on associations *regionally*; and the final session focused on associations *globally*. We present here a summary of discussions about the functioning of associations involved in mathematics education, about the specific role of teachers associations, and about international collaboration between them.

The operation of associations

The problem of independence

Independence of associations from government and other official institutions is important as it enables the association to be the authentic voice of the profession.

Although they are largely based on volunteer effort, associations need money to operate, and this comes from a variety of sources in different countries. These sources include membership fees and sales; outside organisations (business and government) can support associations through sponsorship and contracting project work (to undertake, say, research and curriculum or professional development). These sources of funds can lead to potential problems by compromising the independence of the association.

National institutes that are well-funded by governments can have a negative impact on professional associations; the independence of the professional voice can be lost. There needs to be a balance between the range of stakeholders in mathematics. These national centres should support and encourage associations.

The problem of involvement

Associations need strategies for keeping people interested, involved and active ‘forever’. There are two issues. The first is ‘burn-out’, where formerly active people become less involved in the work of the association as a result of pursuing other personal or professional interests. The second is a ‘consumer orientation’ of members — they judge the association on what it provides for them and don’t ask how they can contribute to the ongoing work.

The main role of teacher associations as a link

Link between teachers

Associations are very important in overcoming the ‘isolation’ of teachers. Day-to-day work in school is focused on everyday matters, whereas associations have the capacity to address the professional isolation of teachers by providing information and helping teachers to feel and be professionally connected with others. Isolation is particularly an issue in geographically large countries like Canada and Australia, although it is not necessarily a matter of geography — being in a school without any like-minded and professionally oriented colleagues can also be extremely isolating for a teacher of mathematics.

Teacher associations need to plan a program of activities in between annual events (typically an annual conference). Teachers need continuing support (either as individuals, or in groups at the school level) to implement what they have found out about and become encouraged to try new approaches. The Internet can and should be used to provide this support. This sort of ongoing support and engagement and support of teachers by associations assists teachers to come to view themselves as inquirers into their practice who are able to work with researchers to explore and resolve questions.

Journals and websites of associations can be used to promote and inform professional conversations at the school level and beyond. Information and professional conversations can help teachers identify and articulate research questions; they are then able to work with researchers to address these questions.

Link between teachers and researchers

Associations can be the structures (formal bodies) that build bridges between different groups of people working in mathematics education. This bridging can improve the communication between ‘researchers’, ‘mathematicians’ and ‘teachers’ (responses to the survey noted that these gaps exist in

many countries and in many ways). This is an important role, and a contribution that associations can make to the health of the field of mathematics education within and between countries.⁽⁸⁾

Research funding often has a focus on ‘scientific’ work that may not serve to answer teachers’ questions and dilemmas. Hence, one role for associations of teachers of mathematics could be to articulate, and argue, and lobby for research funding programs and rules that enable good research on the questions that matter for teachers. This current bias towards the ‘scientific’ in many countries is also reflected in the practices and rules in university about the work of academics — publications of research findings are privileged over working with teachers on issues of importance to them. The latter is commonly categorized as ‘service’ and seen as of much lower status than academic research.

Mathematics teacher associations can play a role in fostering collaborative research practices and identify issues and possibilities for scaling up projects.

International collaboration between associations

It is acknowledged that there is already some international contact and sharing between mathematics teacher associations. For example, Latin American associations have a history of contact that reflects a formal regional structure of mathematics groups and a shared language. Some previous ICMEs have facilitated meetings between representatives of teacher associations, and there is *ad hoc* contact in a range of forums. There are also some examples of bilateral arrangements. There has been, however, no international promotion or coordination of collaboration between teacher associations.

Several factors suggest that a greater level of connection and collaboration between mathematics professional associations will benefit both the work of those associations and the health of mathematics education more globally.

a. The finding, from the DG28 survey and subsequent discussions, that associations in different countries share many similar challenges.

Associations in different countries have different strategies for meeting these common challenges. Sharing those strategies will provide ideas, approaches and examples that may be capable to be adopted or adapted in other countries. The survey shows that the aim of influencing public policies is not well achieved by many associations, regardless of size or economic level of their country of reference. Thinking about different methods for helping societies achieving this goal could be a subject of discussion within ICMI, and at subsequent ICMEs. Improving the impact of societies may be capable to be achieved through ICMI, CIAEM⁽⁹⁾, or other international entities.

b. The increased globalization in the field of mathematics education.

This is evidenced by the increasing number of international projects, including well-known ones such as PISA, TIMSS, and the study of mathematics teachers’ knowledge; and many others such as those of the European Union and other agencies. Good practice requires that mathematicians’, teachers’, and mathematics education researchers’ voices are present in all phases, and at all levels of these sorts of projects. Acceptance and uptake of findings require that these ‘voices’ are representative of, and connected to, the relevant professional constituencies (i.e. through associations). Achieving this requires international structure and connections between professional associations.

c. The evidence from ICME-11 Plenary Lecture 2 and ICME-11 Survey Team 3 that there is a substantial disconnection between researchers and research findings, and policy makers, practitioners and ‘real’ classrooms.

Open and effective communication between researchers on the one hand, and policy makers and teachers on the other, is essential for shortening the gaps in the knowledge bases. Communication needs to be two-way. Projects will come and go — associations, on the other hand, have a long-term

presence and are therefore a key vehicle for promoting and sustaining the necessary communication. This ‘disconnection’ is best seen as an international phenomenon, given that no one country can ‘have all the answers’. Hence international structures and connections between professional associations will be beneficial.

d. One outcome of globalization is increased awareness of the disparities between the educational provisions in different countries.

Many members of professional associations in rich, developed countries feel a responsibility to assist the professional work of colleagues in developing countries. This desire to help others results from the collegiality between educational professionals. Current arrangements make any responses *ad hoc* at best, and impractical at worst. Again, international structures and connections between professional associations will provide a practical mechanism.

The Internet offers a fantastic vehicle for each association to provide resources and information to mathematics educators, mathematicians, and teachers. Each association could set up a portal (international page) containing access to documents, interactive mathematics tools, summaries of national issues, position statements, and selected articles from its journals. All that is needed is a single Web address that would link to the “international pages” of other associations. If each of the associations created such a page and publicized the resource to its members, then international dialogue would be accelerated and the flow of ideas would be enhanced.

With a small amount of coordination, this concept could rapidly grow to constitute a significant contribution to the work of teachers of mathematics, teacher educators and others in a wide range of countries. National associations could identify a contact person who speaks English as a contact able to foster person-to-person links as appropriate.

Conclusion

The work of DG28 at ICME-11 has identified some common themes in the work of professional associations committed to mathematics education around the world. The current context of increasing globalisation highlights the need for greater connections between these organisations — electronic communications provide cost-effective means for building these connections. Now is the time to look forward to create new opportunities for learning about from mathematics educators from around the world. Professional associations can lead the way.

Strategic leadership is required. We believe that ICMI needs to create a focus on building international collaboration between associations of mathematics education professionals.

We recommend that:

- 1. The ICMI Executive Committee appoint a ‘liaison and coordination officer’ to explore and foster international collaboration between national professional associations.*
- 2. A report on the feasibility and benefits of establishing an international association of mathematics teacher associations be prepared and considered by the ICMI General Assembly in 2012.*
- 3. A page be created on the ICMI website for information about national and international professional associations. The page should contain links to the websites of organisations and other information and resources, as identified and negotiated by the ‘liaison and coordination officer’.*

Appendix 1: List of respondents in Spanish

*This list includes ten different societies from Spain (marked with *), each one with a specific regional area of influence, and two federations (marked with **).*

Sociedad Matemática de Nicaragua
Asociación Matemática Venezolana
Asociación Venezolana de Educación Matemática
Asociación Colombiana de Matemática Educativa
Sociedad Chilena de Educación Matemática
Sociedad Argentina de Educación Matemática
Societat Balear de Matemàtiques*
Federación Iberoamericana de Sociedades de Educación Matemática**
Sociedad Boliviana de Educación Matemática
Asociación Castellano y Leonesa de Educación Matemática*
Sociedad Cubana de Matemática y Computación
Federació d'Entitats per a l'Ensenyament de les Matemàtiques a Catalunya*
Sociedad Castellano-Manchega de Profesores de Matemáticas*
Sociedad Matemática de Profesores de Cantabria*
Sociedad Canaria de Profesores de Matemáticas*
Federación Española de Sociedades de Profesores de Matemáticas**
Comité de Educación Matemática del Paraguay
Sociedad Peruana de Educación Matemática
Sociedad Riojana de Profesores de Matemáticas*
Societat d'Educació Matemàtica de la Comunitat Valenciana*
Sociedad Melillense de Educación Matemática*
Sociedad de Educación Matemática de la Región de Murcia*
Sociedad de Educación Matemática Uruguaya
Asociación Nacional de Profesores de Matemáticas (México)

Appendix 2: List of respondents in English

International Commission for the Study and Improvement of Mathematics Teaching (CIEAEM; international)
Inter-American Committee on Mathematics Education (IACME/CIAEM; international)
Math in School is Art for Social Change (international)
Irish Mathematical Society (Ireland)
British Society for Research into Learning Mathematics (BSRLM; UK)
Swedish Association of Mathematics Teachers (SMaL; Sweden)
The Mathematical Association (UK)
ApaMMs - Asociacion de professors i Mestres de Matematiques (Catalunya, Spain)
National Council of Teachers of Mathematics (USA)
Sociedade Portuguesa de Matemática (Portuguese Mathematical Society)
Canadian Mathematics Education Study Group (Canada)
Math-teachers organization (Denmark)
Associação de Professores de Matemática (APM; Portugal)
Forum for Research in Mathematics Education (Denmark)
Institute of Mathematics and Its Applications (UK) – the Irish branch also responded
Greek Association of Researchers in Mathematics Education
SESAMATH (France)
Gruppo di Ricerca sull'Insegnamento delle Matematiche (GRIM; Sicily, Italy)
Real Sociedad Matemática Española (RSME; Spain)
The Royal Statistical Society (UK) – a response was also received from the Royal Statistical Society Centre for Statistical Education (RSSCSE)
APMEP: Association des Professeurs de Mathématiques de l'Enseignement Public (free public education mathematics teachers society; France)
Gesellschaft für Didaktik der Mathematik (GDM; Germany)
Australian Association of Mathematics Teachers Inc. (AAMT; Australia)
Auckland Mathematical Association (New Zealand)
Saskatchewan Mathematics Teachers' Society (SMTS; Canada)
The Quebec Association of Mathematics Teachers (Canada)
British Columbia Association of Mathematics Teachers (an affiliate of NCTM; Canada)
Association of Mathematics Educators of South Africa (AMESA; South Africa)

Notes

- (1) A different version of this paper has already been published (in Spanish) in the electronic journal *UNION*, no. 16, Dec. 2008 (see <http://www.fisem.org/paginas/union/revista.php?id=35#indice>), edited by FISEM (*Federación Iberoamericana de Sociedades de Educación Matemática*).
- (2) Corinne Hahn (France) and Will Morony (Australia) as team co-chairs, with Tomás Recio (Spain), Diana Jaramillo (Colombia) and Lindi Tshabalala (South Africa) as team members.
- (3) <http://dg.icme11.org/tsg/show/29#inner-26>
- (4) In Spanish, *Profesor* does not mean precisely the same as Professor in English, as it addresses both a teacher at elementary level or a professor at university level.
- (5) As a historical note, a number of the groups formed in the states (provinces) of Australia were originally direct affiliates of the Mathematical Association in the UK, as a vestige of prior colonial status. This is probably the cause of this type of naming.
- (6) It may be that some respondents were not clear that the related question was seeking this information.
- (7) There were no replies to the Survey from UMALCA (*Unión Matemática de América Latina y el Caribe*).
- (8) Note that this is the main aim of CIEAEM (*Commission internationale pour l'étude et l'amélioration de l'enseignement des mathématiques*).
- (9) CIAEM stands for *Comité Interamericano de Educación Matemática*.

Corinne Hahn

ESCP-EAP

79, avenue de la République

75543 Paris cedex 11, France

hahn@escpeurope.eu

Will Morony

Australian Association of Mathematics Teachers

GPO Box 1729

Adelaide SA 5001, Australia

wmorony@aamt.edu.au

Tomás Recio

Departamento de Matemáticas, Estadística y Computación

Universidad de Cantabria

Avenida de los Castros, s/n

39071 Santander, España

tomas.recio@unican.es