

Linking Teachers and Mathematicians: The AWM Teacher Partnership Program

Pao-sheng Hsu^{*}, Columbia Falls, ME

Suzanne Lenhart, University of Tennessee

Erica Voolich, Solomon Schechter Day School, Newton, MA

Abstract

Within a professional organization for women in mathematics in the US, two mathematicians and a middle school teacher organize a program to link teachers of students at the pre-university level with professionals in the mathematical sciences in and outside of academia to promote collaborations among different communities in the mathematics education of students. This paper describes the program and its operations, some of its experiences, as well as some results from a formative evaluation conducted for the program. Some recommendations are given for potential organizers of similar programs in other countries.

Introduction

Founded in 1971 in the United States, The Association for Women in Mathematics (AWM) aims

- To encourage women and girls to study and to have active careers in the mathematical sciences, and
- To promote equal treatment of women and girls in the mathematical sciences.

It has more than 3000 members; membership includes men and women. One of the many programs (see <http://www.awm-math.org/>) that the association runs is a Mentor Network that connects students or career novices in the mathematical sciences with an experienced professional for the purpose of mentoring. Such a program was an inspiration to connect mathematics teachers at the school level to practicing mathematical scientists. “The Mathematics Education of Teachers Project” team of the Conference Board of the Mathematics Sciences (<http://www.cbmsweb.org>) stated in their report that professional organizations of mathematicians have a critical role to play in the mathematical education of teachers by fostering discussion and encouraging greater involvement among its members. One of the recommendations in the report is that “There needs to be more collaboration between mathematics faculty and school mathematics teachers.” In considering a program that links teachers and mathematicians in an informal setting, the organizers of our program decided that it should be a collaborative instead of a mentoring one. Hence the AWM Teacher Partnership Program (TPP).

The Organizers

Pao-sheng Hsu, Suzanne Lenhart, and Erica Voolich, members of the AWM Education Committee, are the organizers of the TPP. Hsu is a mathematician who has engaged in research in mathematics education, and has worked with middle school students in informal mathematics programs. Lenhart is a researcher in mathematical biology, has worked in outreach programs to schools at her university, and was a past president of AWM. Voolich is middle school teacher and is the president and founder of The Somerville Mathematics Fund that encourages achievement in mathematics in Somerville, MA, by giving scholarships to students and awarding teacher grants for mathematics projects and events. We also have help from the AWM web editor. All of us volunteer our time.

Program description

On its webpage, <http://www.awm-math.org/teacherpartnership.html>, the program announces: The Association for Women in Mathematics (AWM) Teacher Partnership is intended to link teachers of mathematics in schools, museums, technical institutes, two-year colleges, and universities with other teachers working in an environment different from their own and with mathematicians working in business and industry. We invite individuals to join the partnership and will match members from different communities. Partnership activities will include:

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- electronic communications;
- teaching projects;
- classroom visits when feasible;
- informal educational activities.

The webpage also provides a request for a partner form for a prospective participant, together with a set of guidelines for participants and a disclaimer to release the program and organization of any liability. Participants in the program need not be AWM members.

How it is administered

The program was advertised in various newsletters and listservs of professional organizations of teachers and mathematicians** after the program was launched on the AWM website. When an applicant interested in joining the program fills out the “request for a partner” form, the organizers receive a copy. Periodically, the organizers meet on a telephone conference call to discuss possible matching of the applicants and other program issues. When a match is made, both sides are informed by an email that they should introduce themselves to each other.

A listserv was set up for the participants who have been matched to each other. In addition to being used to reach participants, it is also a forum for the participants to share their experiences and get information from each other.

History and our experiences

Almost immediately after the program was launched on the AWM website in August 2006, we received applications from interested people, including one from Azerbaijan and one from Turkmenistan. At the time of writing in April 2009, 125 people have requested a partner, and the program has made 68 matches involving 109 people. Requests came from Asia, Europe, Africa, and North America. In addition to the two from Central Asia mentioned above, other countries represented include China, India, Pakistan, Ghana, Cameroon, Uganda, Romania, Canada, and the United States.

In the original planning and proposal to AWM, we drafted a formative evaluation on the program to be administered after the program has run for a period of time. This we did in November 2008, using a tool, from SurveyMonkey.com, for which AWM has a subscription. Twenty-one participants of the program filled out a questionnaire that probed their experiences with the program.

What we have learned

Underlying the goals of the program—to connect teachers with mathematicians-- is the notion of building a community to enhance the education of children in mathematics. Teachers and practitioners in the mathematical sciences live in very different environments, each with a distinct culture and a language, and each has a sense of what is important. That “communication among communities” needs attention is indicated in the results of our formative evaluation: 8 of our 21 respondents reported that they had experienced some difficulty in communication. More significantly, “talking with someone outside of your milieu” is not part of these people’s daily routines; we are adding a component to the professional lives of these teachers and mathematicians. Demands in one’s usual professional and personal lives may take precedence of working with someone unfamiliar with your own situation, which may then become the first thing to be given up when other burdens are too pressing. In our various attempts to reach them, we realize that several of the partners have moved from their original addresses and that some participants have trouble reaching their partners. In the formative evaluation, 17 out of 21 respondents told us that they were not in touch of their partners at the time of the survey. To build a new collaboration needs our care. One respondent said, “...your email is what reminded me of what I had once done.”

The fact that they are no longer in touch with their partner does not mean necessarily that they do not want to work towards the goals of the program, in theory. Two out of the 17 respondents not in touch with their partners wanted to continue with the program with the same partner, 7 wanted to quit the program, and 8 wanted a different partner. Earlier, we had realized that we needed to

pay attention to this latter group who felt that their match was not workable. Our matching is limited to the pool of applicants that are available to us. One of our questions to applicants is whether they are interested in a partner working close to them geographically so that they could exchange visits. Some of our applicants indicated that they have such an interest, but we find ourselves able to satisfy this request only in a small minority of matches we make. Using a map as a guide, we had matched people who are within a couple of hundred miles from their schools. In one situation, the partners were able to meet at a professional meeting, but in most cases, partners reported that they were disappointed that visiting was practically not possible. Before we make a match that may be problematic from the point of view of the applicant, we have been asking them specific questions before a match is made. We also learned that sometimes an applicant may have expectations of the program other than what it offers. One of the respondents reported that she wanted to quit the program because her partner wanted a mentor and not a partner. One applicant left the program because he was expecting direct guidance from the organizers on what to do in the partnership.

One thing that seems to bind a person to the program is that the person has done a project for which the program has made a difference. An elementary teacher used our listserv to ask for ideas for doing a Science Fair in her school. Participants in the program responded. At the end of her event, she sent a message on the listserv, happily thanking people who had helped her to make the fair a success. She became convinced of the need for the program.

From the formative evaluation, we get a glimpse of how the program has been perceived by some of our participants. To the extent that the results we got from the 21 respondents represent those perceptions, we could say that, for at least some participants, the program has achieved many of its goals. That teachers and mathematicians would discuss together a mathematics topic (7 positive responses out of 20 who answered the question), an educational activity (12 positives out of 20), an issue related to teaching (11 positive responses out of 20), or issues related to life in our professions (7 positives out of 19 responses) was indeed one of the goals of the program. To a lesser degree, some of the participants also considered issues related to supporting students outside of the classroom (6 out of 20), gender issues in mathematics education (3 out of 20) and a joint project (3 out of 20)—activities suggested for the program.

What some of the participants have told us

To give some of the views of the participants, we quote some of the comments from our formative evaluation.

Eight out of the 17 respondents, who were not in touch with their partners at the time of the survey, wanted a different partner. Some who wrote said:

- At first we shared things of mutual interest. Then we got busy.
- The partner and I didn't have much in common. She was an administrator for elementary schools and I teach at the university level.

Seven respondents wanted to quit the program. Some of them said:

- My partner seemed to want a mentor rather than a partner.
- Seems like there is little time to do anything outside my teaching responsibilities. I honestly forgot about my pairing during the summer months and your e-mail is what reminded me of what I had once done.

Six of the 17 respondents wanted to continue with the same partner in the program. Some said:

- My position has changed in the last year making it difficult for me to take on new projects. My partner and I have become friends and now live closer, but I have even less time (I am not working much anymore and have limited daycare) making it harder for us to collaborate.
- All of the program participants have been helpful. I've received help from the listserv for my first Science Fair, which was a big success thanks for this group and their suggestions (even though I rarely spoke to my partner, mostly my fault). It does not matter if I have a partner, the whole group is helpful.

One successful partnership

We were fortunate in being able to match a high school teacher and an university faculty member working in close geographic vicinity that they could exchange visits. The mathematician visits the high school and talks with the students on mathematics and mathematical career choices. The high school has a team preparing students for the American Mathematics Competition (<http://www.unl.edu/amc>) and a contest in their state. The mathematician is now a member of the team and works with the students. The teacher has been invited to be a guest lecturer when the mathematician focused on a particular topic in his graduate course *Number and Number Theory* for students in the Mathematics Specialist Program (for K-8 teachers) in their state. (In the U.S., a teacher in a kindergarten through 5th grade class usually teaches all subjects; in some schools, mathematics in the 6th through 8th grades may be taught by a mathematics specialist.) Because of his prior experience, the mathematician introduced the teacher and students to a Science and Engineering Fair held regionally and nationally. Some students got very excited about some of the science and engineering projects he mentioned and started to work on them. Recently we got news from that partnership program that one of their student's project in Medicine & Health was the Grand Prize winner of the regional fair and is going to the 2009 Intel International Science and Engineering Fair (<http://www.societyforscience.org/ISEF/>) to be held in May. Another student is a runner-up or alternate to this national fair. Both students are female.

The students are the ultimate beneficiaries of the program. The story of this partnership is posted on the program website.

Recommendations

We feel that other countries would benefit from this kind of program for teachers and mathematicians in their local areas. Since there is definite benefit in partners exchanging visits, to be able to attract participants within a small area is an advantage.

Such a program needs a great deal of thought and nurturing. Keeping in touch with participants individually would be one way to help them to persist and the partnership to grow. Even though ultimately it is up to the people involved to work in their partnership in a direction of common interest to them, we wonder whether sometimes a little intervention may help in overcoming an impasse—something we have not tried.

Electronic communications is a big help: a listserv for the community to share its experiences and expertise. We also learned to use it with an awareness of its idiosyncrasies: the word “partnership” on the subject line of a message may trigger an anti-spamming tool to block the message; some people are just receiving too many incoming mails; sometimes we do not have a way of knowing when a message does not reach an intended person.

Collaboration requires a willingness to work with diverse perspectives and to negotiate an outcome that both sides are happy with. Even some of those respondents who wanted to continue working with the same partner reported that they had encountered some difficulty in communication. They seem to be telling us that the difficulty is not insurmountable. We should build on this wish that the benefits of a partnership will be worth the effort.

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- Pao-sheng Hsu, <mailto:hsupao@maine.edu> Suzanne Lenhart, <mailto:lenhart@math.utk.edu>
Erica Voolich, <mailto:voolich@aol.com>

** “Mathematicians” in this paper include all professionals in the mathematical sciences such as statisticians, computer scientists and people in operation research and in mathematics education.