

# Collaborating on Research with Mathematicians from Less Developed Countries

For a decade, I have collaborated on research with mathematicians from Jordan, Iran, Pakistan, India, and South Africa. Hardly any of my collaborators have high mathematical prestige or have positions at institutions that have it. By and large, these mathematicians make up for deficiencies that include high teaching loads and very poor libraries with enthusiasm, patience, goodwill, and hard work. Most, though not all, such efforts have led to publication in respectable journals published in western countries.

Common sense told me to expect that collaborating with mathematicians from other cultures using different technologies would bring me problems, but these problems were far more difficult than I expected.

Since the end of the Second World War, most published mathematics is written in English, which is a second language for most people. Even if your foreign co-author's knowledge of English is very good, it is often not idiomatic and needs to be corrected in a way that is effective without being pedantic or patronizing. Treat your co-author with respect and make it easy for your co-author to be critical of what you have written. A co-author's English may be less than perfect, a co-author from a poor country may know less mathematics than you do, but still may be extremely gifted. Once I overcame their reluctance to criticize my writing or mathematics because of their fear of being discourteous, my Third World co-authors could be very good at detecting errors.

Avoid political discussions or comparison of governments. Ignoring this, especially in writing, can get you into trouble. Stick to mathematics.

Keep in mind two differences in how mathematicians are "rewarded for publishing papers" in some countries. The author whose name appears first gets more of a reward (sometimes financial) than the remaining authors. There is also an Impact Factor assigned to journals that is ill understood. Publishing in a journal with a high impact factor gets a bigger reward.

Communication, electronic or otherwise, is difficult for a number of reasons. Email works most of the time, but power failures are much more frequent than in North America or Europe. Regular mail tends to be slow, and fax machines are usually turned off at night. Acknowledge all emails and encourage your co-authors to do the same. If possible, get a list of PDF files of your own publications to potential co-authors. Even governments you may not

like encourage their citizens to study and earn advanced degrees abroad. Should you visit your co-author, there are many books named "Culture Shock (name of country)" written to describe local customs with a view to warn you of things that might insult your hosts. For example, in many countries your host will feel obligated to urge you to accept as a gift something that you admire—and resent it when you accept.

One communication difficulty pertaining to mathematics is that few of these foreign co-authors have access to good library facilities or even an effective interlibrary loan system. References mailed to potential collaborators often result in a polite reply saying that some book or journal is unavailable. This is a serious problem everywhere because the number of distinct mathematics journals and books has grown substantially and gotten both more specialized and more expensive.

The best substitute for a poor library is a subscription to MathSciNet, which is an electronic version of *Math Reviews*. Its reviews and papers can be read and printed mostly, but not always, sometimes for an additional charge. Were it up to me, I would provide open access to MathSciNet to all Third World AMS members even if some dues had to be increased. The main problem for these mathematicians is cost.

I am most fearful at this prospect: The quantity of research in the less developed countries is growing rapidly, while many journals' articles are becoming available only in electronic form. In some countries ideology, economics, or technological limitations restrict a mathematician's access to Web portals. Commercial publisher-maintained sites are only available to subscribers at costs that some institutions cannot afford. Ignoring this trend may result in serious negative consequences for Third World authors, indeed for all of us.

We want a worldwide community of research mathematicians. Quality of published research in mathematics that is independent of geographic location or financial wealth should be our common goal. Perhaps there are less expensive methods for making mathematical research and thoughts readily available. What is most required is a desire to reach out to all mathematicians in all countries as a way to make our combined research efforts easier to implement.

Collaborating with international mathematicians is both important and rewarding. It is difficult to exaggerate the enjoyment I feel after a successful collaboration with someone from a different culture. I hope that a committee of the AMS will study this important problem.

—Melvin Henriksen

**Editor's Note:** Professor Henriksen died after a long illness on October 14, 2009.