

Supporting Teamwork In MIT's *Project Lab In Mathematics*

Susan Ruff, Writing Across the Curriculum, MIT



In MIT's Project Lab in Mathematics students work together in teams of 3 to conduct research. Today I'll present one of the ways in which we support teamwork: at the beginning of the term we have a teamwork workshop in which we provide the students with strategies for maximizing the chances that their teams work well. But first I'll give some context about the course and of my role in it.

I'm from MIT's Writing Across the Curriculum and I have a BA in mathematics. I'm available to help the students to communicate mathematics: to give math presentations, write math papers, and communicate in teams. I've been involved in this course for almost a decade, and I lead the teamwork workshop.

This is Haynes Miller. He, along with Mike Artin, designed this course a decade ago, and he taught it again last term for the first time in a long time. It was a delight to work with him again.

The students shown here have just completed a team activity. Before the activity, we tell students that the activity is intended not only as an ice breaker, but also as an opportunity to start thinking about teams they've been on in the past: in what ways can teams work well together and in what ways can teamwork be problematic? The activity is then followed by the most important part of the workshop: a class discussion on how students can improve the chances that their team functions well, both in this class and in future team contexts.

Teamwork Workshop: Class discussion

What can cause teams to fail?

How can you maximize the chances that teams you are on work well?

Students volunteer problems & solutions.

Hands-up votes to see (dis)agreement.

Take-away: Different people have different teamwork preferences.
Ask your teammates theirs!

Suggest strategies as appropriate.



I ask students in what ways teamwork can be problematic. For each issue, I ask students what they can do to prevent or address the issue. For each solution, I take a class vote to check how many students agree.

The takeaway is that students shouldn't assume that their teammates have the same expectation for how the teams should work---they probably don't. So it's important for the teammates to talk to each other to decide as a team how the team should function.

As we have this discussion, there are opportunities for me to suggest strategies that the students don't already know. For the past few terms, at the end of the term we've asked students which of these strategies they found to be most helpful.

Top 5 strategies, per students

#5 Active listening

Re-phrase it to check understanding
Ask questions

#4 Turn-taking pauses

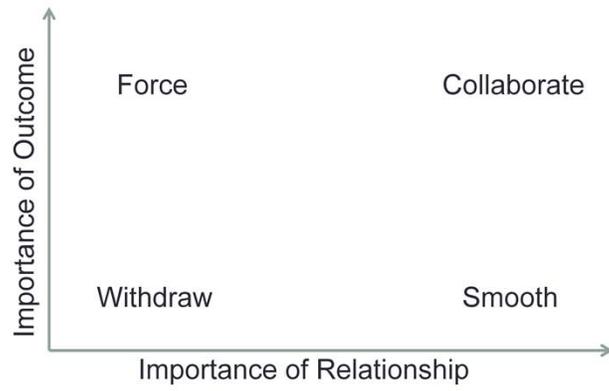
With silent teammate, ask questions and pause
With interrupting teammate, OK to interrupt too

#3 Expect and tolerate differences

You don't have to like your teammates to succeed.
Remain professional.

[For this and the next two slides, I gave the explanations summarized on mathcomm.org.]

#2 Choose how to address issues



Based on Blake and Mouton, 1970; stories via J. Connor

Top 5 suggested strategies

- #5 Active listening
- #4 Turn-taking pauses
- #3 Expect and tolerate differences
- #2 Choose how to address issues
- #1 Focus on the team's goal

MathDL Mathematical Communication
mathcomm.org

This and the remaining slides are backup for Q & A.

MIT's Project Lab in Mathematics

Developed by: Michael Artin and Haynes Miller

Offered: 17 times (since 2004)

Objective: experience with research
(including teamwork and communication)

Students: ≤ 27 senior and junior majors, **in 9 teams of 3**

Team mentors: 1 faculty lead
2 postdocs or grad students

Tasks: 3 open-ended projects (~ 4 wks each)
e.g., behavior of points in plane attracted to each other.
As a team, write & revise papers and present to class.



The course has been offered 17 times and I've been involved in it about 15 times. The objective is to give students experience with research: both the challenge of being stuck and the exhilaration of making progress. It's a challenge for the team mentors to restrain themselves from being prescriptive: they've got to let the students struggle a little bit with the research. There are three mentors and 9 teams. During the semester, each team works on 3 open-ended projects.

Priorities for forming teams

- Teammate preferences
- Overlapping mathematical interests
- Comparable backgrounds
- *Roughly* comparable “procrastination index”

I tend to procrastinate.

*Strongly
Disagree*

*Strongly
Agree*

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