PRACTICING WHAT YOU PREACH
OR

"DO AS I SAY, NOT AS I DO!"

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Let me share some problems with you.

1) Show: \( \int_0^\infty \left( \ln \left( \frac{x}{x+a} \right) \right)^2 \, dx = \frac{a^2}{3} \)

2) Swimming Pool Problem: You are to cover a 42' diameter swimming pool so that the cover sags 2' in the center. What is the length of the cover from rim to rim?

3) Golf Problem: 16 people are to play for 5 days, 4 foursomes per day. Each person is to play with each other exactly once. Determine how this may be done.

What goes through your mind when you read these problems? I hope that you are not intimidated by them. You may not remember all of your calculus needed to solve some of them, but should this forgetfulness make you feel inadequate to attempt a solution? Certainly not!

I am very concerned, however, that during the course of my high school teaching career, I have had the word "dumb" used twice in conversation with me. Once was with respect to a department meeting and once again when I was putting a 'problem of the day' in the teachers' mailboxes. The only response was the statement (in all innocence), "Are you trying to show how smart you are or how dumb we are?" Of course, neither, but how hurt I was that someone's attitude toward problem solving was that of apprehension and suspicion instead of viewing seeking a solution as a chance to do some mathematics. This after having taught at the college level where faculty seminars and colloquia were a way of academic life.

SUPPLY AND DEMAND IN MATHEMATICAL SCIENCES

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The employment picture is quite bright for students majoring in mathematical sciences, but the trend in decreasing student interest in mathematical sciences does not bode well for the nation as it tries to remain competitive in business and industry.

Student Interest
Most students interested in mathematics express interest in majoring in mathematics, statistics or engineering in college. The graph in Figure 1 shows the interest expressed by students when taking the SAT test in their senior year in high school [2]. As the graph indicates, there has been a steady decrease in interest in mathematical sciences and engineering over the past five years, with a precipitous decrease in interest in computer and information sciences.

Since trends in numbers of graduates will lag trends in interest among high school students, we will continue to see a decline in the number of graduates in mathematical sciences and engineering for at least another five years despite any efforts to reverse this trend.

A more careful examination of the data (see Figure 2) reveals that, of those expressing interest in computer or information sciences, the percentage of women
tangible support such as small amounts of released time, control of materials budget, discretionary travel funds, and responsibility for scheduling professional activities related to mathematics. Further enhancements can include extra travel allocations for the teacher-leaders, support for further training through conferences, courses and workshops, and support for establishing and maintaining a professional library. Even if these benefits are necessarily small, their existence conveys a sincere administrative commitment to improving the elementary mathematics program.

Not all schools or all districts can immediately have teacher-leaders or resources as described here, but all schools and all districts must begin and work toward filling this role, toward meeting this need. Existence of active elementary mathematics teacher-leaders is essential to the successful and timely implementation of programs such as those envisioned by the Standards.

Bibliography


I have a philosophy that if students do not see a teacher practice what s/he preaches, then what reason do they have to listen to a teacher preach? Thus, for example, music teachers should play music; art teachers should exhibit in public art shows; literature teachers should be publishing or be seen reading. In other words, a teacher should participate in the field in which s/he teaches! Our principal recently sent out a memo with the sage advice, "If you don't do it, you don't believe it." How true. If we are to develop mathematical power in our students, as the NCTM Curriculum and Evaluation Standards (Standards) is proposing, then it had better start with us.

Teachers at all levels of mathematics must be comfortable with mathematics in order to develop their own power to pass this attribute on the students. It is disheartening to hear (as I have) an elementary teacher say, "I hate math!". It appears that before we try to sell mathematics to our students, we must be sold on it ourselves!

I've read an article showing that a group of education majors did not have a grasp of the concept of "zero". Another stated that junior high teachers could get by with a minor or less in mathematics. I know of a teacher who got very frustrated in the classroom one day and told the students, "Don't ask me any question I can't answer!". Given this set of circumstances, are high school teachers unwilling to put their mathematical knowledge on the line and in the open, even in front of the students? Is this the reason some teachers are locked into the textbook, and thus reluctant to do mathematics?

The *Standards* are portraying a new attitude about teaching and learning — a classroom where the teacher becomes a FACILITATOR while the students become the DOERS! Paul Halmos stated that

*A teacher who is not always thinking about solving problems — ones he does not know the answer to — is psychologically not prepared to teach problem solving to his students.* [Halmos, p. 322].

Teachers of all levels must be familiar enough with mathematics and the applications of mathematics in order to convey its beauty, interest, and utility to students.

I would like to leave you with two questions which I think teachers of mathematics must answer before they can be serious about their teaching. **"What does mathematics mean to me?"** The second question deals with a question often
posed by the students. "When am I ever gonna use this stuff?" I don't believe most teachers can, or even should, answer for anyone but themselves. Thus, every teacher of mathematics should ask him/herself, "When do I use this stuff?"

To be ignorant of many things is expected.
To know you are ignorant of many things is the beginning of wisdom.
To know a category of things of which you are ignorant is the beginning of learning.
To know the details of that category of things of which you were ignorant is to no longer be ignorant.

 Phenella in The Unwritten Comedy
 [Duncan, p. 220]

Bibliography

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NOTE: I wish to thank the referees for their valuable assistance in suggesting certain modifications of this article.

An important characteristic of such a leader is the ability to listen, to listen to a teacher's ideas and especially to listen to a problem that is difficult to verbalize.

An effective teacher-leader must be knowledgeable about outside professional resources. These resources include such things as consultants, professional meetings, publications, materials, and catalogues. Thus, the teacher-leader brings the outside professional world into the building.

Equal in importance to the preceding characteristic is the ability to encourage active teacher participation in professional activities, local, regional and national.

The teacher-leader must be skilled in conducting inservice activities for peers and for other adult groups. Closely related is the need for this leader to take responsibility for communication with administrations, parents and other community groups.

As a further characteristic, it should be recognized that the teacher-leader may be most effective in informal unscheduled one-to-one contacts.

Although these characteristics may not be exhaustive, they are ambitious and may seem intimidating to the prospective holder of the teacher-leader position, but all are seen as important by a significant portion of the teachers participating in the interviews. Teachers with an interest in elementary mathematics should recognize the importance of the teacher-leader and seek the role. Lack of any one of the characteristics listed above can be overcome by a commitment to work toward acquisition of that characteristic while other significant contributions continue.

Building level and district administrators must recognize the benefits that can accrue from the presence of a teacher-leader as improvements in the elementary mathematics program are sought. Interviews with teacher-leaders as well as teachers produced a number of simple ways in which administrators can enhance the effectiveness of the person willing to accept the leadership role. A clear designation of who is to fill the role needs to be made. This designation should include a job description which makes it clear to all concerned that the leader is in a supporting role. This designation should be further strengthened, perhaps gradually, by