Journal of the California Mathematics Project
Volume **8**, Fall 2017

Book Review

Teaching Mathematics: A Sourcebook of Aids, Activities, and Strategies, by Max A. Sobel and Evan M. Maletsky, 3^{rd} edition, is hardly a new book, but the third edition differs considerably from its first edition in the 1970s. This book is designed to be used both as a textbook in a methods course for secondary teachers and also, as the subtitle indicates, as a sourcebook of ideas for teachers. After introductory chapters, *The Art of Teaching, Motivation of Mathematical Learning*, and *Motivating Problem-Solving Instruction* (based on the NCTM's *An Agenda for Action: Recommendations for School Mathematics of the 1980s*), the remaining chapters are organized by mathematical topics: "numerical concepts," algebra, geometry, and probability and statistics. A final chapter is devoted to *Iteration and Fractal Activities.* This organization is reasonable, but the activities presented, interesting though they are, often stray from it. A few examples:

- The famous problem of the Bridges of Königsberg is the first example given to illustrate trial and error as a method of problem solving, but this problem was solved only when Euler, aware that trial and error had not solved this problem, invented what today are known as vertices and edges of graphs and used those ideas to prove which graphs are traversable. That is not trial and error!
- As a follow-up to the above activity, students are asked to discover Euler's formula for the regions, vertices, and edges of a network $R + V = E + 2$ (counting the exterior as a region), by counting the regions, vertices, and edges of a few examples and then tabulating the results. This illustrates the strategy "make a list, table, or chart" (subject of a later section) but not trial and error. This section ignores the warning given in chapter 1, on the dangers of placing too much confidence in a result based on just a few observations. It would have been worthwhile to include Euler's extensive testing of his hypotheses for polyhedra, as presented in Polya's *Induction and Analogy in Mathematics.*

It is easy to illustrate trial and error as a problem-solving strategy (e.g., I have 18 coins, some quarters and the rest nickels, worth $2.30 in all. How many are nickels?) but no such problems are given in the section on trial and error. The section on algebra includes an example of the "rule of false position" but does not cite it as trial and error. An area in which trial and error could be used very well in the classroom is in finding square roots, but, curiously, square roots are not treated in this book or even listed in the index.

Perhaps the strangest feature of the chapter on problem solving is the complete omission of a particularly powerful and widely used strategy: Express the problem in a different language. That strategy underlies the power of algebra for problem solving as well as the power of computers for problem-solving. It is not discussed in the chapter on algebra either.

Despite the many omissions and quirks like those mentioned above, the book offers many ideas and activities that merit the attention of anyone interested in teaching mathematics in grades 6–12. Some of the material, especially on calculators and computers is necessarily dated because it was written before today's computer programs for exploring algebra, geometry, and statistics, but this book will reward any teacher who does the work needed to adapt the ideas to her/his classroom.

Contributed by: Bob Stein.