This talk addresses the growing realization that, broadly speaking, the scientific method is an essential ingredient in programming. This realization has important implications in computer science education, software development, and algorithm design.

The first part of the talk is a status report on a 20-year effort to develop an introductory course in computer science that is suitable for all students in the sciences and engineering. An important ingredient in the success of this effort is that it embraces, leverages, and supports the basic education in science and mathematics such students have nowadays.

The second part of the talk is an illustrative example centered on a fundamental problem that is solved by many classical algorithms that are elementary, widely taught, and widely used. But basic performance characteristics of these methods are actually poorly understood. Developing such understanding leads to the discovery of new approaches that are dramatically more effective than those in common use. This example illustrates that teachers, software developers, and algorithm designers who depend upon untested theories instead of scientific studies to evaluate program performance are taking risks and missing opportunities.

Concluding remarks briefly describe research directions in the field of analytic combinatorics, which provides the mathematical foundations in support of such studies.

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