Statistical Literacy in Pre-K–12 Education

The American Statistical Association (ASA) is a scientific and educational society of 18,000 members that works to improve statistical education at all levels and use the statistics discipline to enhance human welfare. We recognize that statistical literacy is a vital component of mathematics education.

What Is Quantitative and Statistical Literacy?

- Statistical literacy— the understanding and using the basic language and tools of statistics, recognizing and being able to interpret different representations of data in a context, and knowing how to ask critical questions about the design and conclusions of a study — is a vital component of mathematics education. It includes the understanding and interpretation of data and graphs, including the ability to make rational decisions in the face of uncertainty.
- Quantitative literacy includes statistical literacy, but also addresses understanding mathematical relations (e.g., investment income growth) and number sense (e.g., What is the per capita share of a $700 billion bailout debt spread among 300 million citizens?)
- Effective statistics education, including data analysis and probability, are described in the *Guidelines for Assessment and Instruction in Statistics Education (GAISE) Report: A Pre-K–12 Curriculum Framework* (www.amstat.org/education/gaise), published by the ASA.

Why Is Statistical Literacy Important?

- Media sources confront us with statistical information on topics such as the economy, education, food, medicine, public opinion, entertainment, and social behavior. A foundation in statistical thinking helps guide our decisions and enables us to meet our responsibilities as citizens.
- Data analysis strategies and other related concepts learned as part of becoming statistically literate are essential parts of mathematics education because of their relevance to life and their role in motivating student interest in mathematics, more broadly.
- National mathematics standards and benchmarks from Achieve, the College Board, and the National Council for Teachers of Mathematics support data analysis and probability as an essential component of mathematics education, but many K–12 teachers have not received the necessary training at the appropriate level to teach statistical literacy in their classrooms.
- Most state guidelines also include statistics and probability, but the topic tends to be skipped because of the lack of teacher preparation and proper emphasis on the topic in state assessments.
- Excellence in mathematics education, including quantitative and statistical literacy, is vital to our nation's economic prosperity, global competitiveness, and homeland security.

Economy: Can we predict businesses at the greatest risk of bankruptcy? Will a bail out lessen this risk?

National Security: What is the risk of contaminated/malicious containers being imported into the United States? Can we suggest a sampling plan for examining containers? Will this plan prevent any from being imported?

Energy: What are the options for providing energy to U.S. citizens? How can we estimate the fraction of energy demands met by these various sources?

Health: Suppose you are identified as having high cholesterol or high blood pressure. You can choose to do nothing, change your diet, exercise more, take medications, or do some combination of these choices. There is risk associated with each of these options. What do the numbers mean? Which option should you select? What are the consequences of selecting a particular option?

Two missions of the ASA are to work for the improvement of statistical education at all levels and to use our discipline to enhance human welfare. Providing teachers the tools and resources to effectively teach statistics to students is a cornerstone of the ASA's strategy on reaching these aims. The ASA offers outreach activities such as teacher professional development, student competitions, and publications. For more information, visit *www.amstat.org/education* or contact Rebecca Nichols at *rebecca@amstat.org* or (703) 302-1877.