

## Preparing Pre-K–12 Teachers of Statistics

A Joint Position Statement of the American Statistical Association (ASA)  
and the National Council of Teachers of Mathematics (NCTM)

**Question:** What preparation and support do teachers need to successfully support students' learning of statistics in the pre-K–12 curriculum?

### ASA/NCTM Position

Students, teachers, administrators, employers, and others increasingly recognize statistics as an important scientific field of study. Mathematics content standards emphasize that the development of statistical thinking begins in the early grades and extends into and beyond high school. To successfully develop students' statistical thinking, teachers must have deep knowledge and understanding of statistics and the way that students learn statistics. Consequently, the need is critical for high-quality preservice and in-service preparation and professional development that supports pre-K–12 teachers of mathematics, new and experienced, in developing their own statistical proficiency as well as their students' understanding of and skill in working with statistics.

Statistics informs and enhances important skills, such as thinking critically and scientifically, understanding data and charts, making decisions in the presence of uncertainty, and assessing risk. As our society becomes increasingly data intense and information based, statistical literacy skills are all the more important for today's citizens and a competitive work force.

To meet the challenge of preparing teachers to teach statistics:

- School administrators need to provide professional development opportunities specifically related to statistics content for mathematics teachers and others who will teach statistics. Furthermore, administrators must offer support for teachers to attend such professional development opportunities.
- Professional development courses and workshops for future and current teachers need to model effective pedagogies for teaching statistics, in addition to focusing on developing understanding of statistical concepts, mastery of statistical content, and knowledge of the essential ideas of statistical thinking and problem solving. Providing such courses and workshops may require universities to expand (or initiate) preservice and outreach offerings in statistics.
- Faculty teaching statistics courses and workshops need to be familiar with pedagogies appropriate for the pre-K–12 classroom, as outlined by the American Statistical Association (ASA) and the National Council of Teachers of Mathematics (NCTM), among others, and usefully detailed in *Guidelines for Assessment and Instruction in Statistics Education (GAISE) Report* (Franklin et al., 2007), *Principles and Standards for School Mathematics* (NCTM, 2000), *Common Core State Standards for Mathematics*

(National Governors Association Center for Best Practices and Council of Chief State School Officers, 2010), and *The Mathematical Education of Teachers II* (Conference Board of the Mathematical Sciences, 2010).

- Faculty who teach statistics need to work together with education faculty to provide coursework that emphasizes stronger conceptual knowledge of statistics and the essential ideas of statistical thinking and problem solving.
- State departments of education need to work together with national professional organizations such as ASA, NCTM, the Association of Mathematics Teacher Educators (AMTE), the National Council of Supervisors of Mathematics (NCSM), and the Mathematical Association of America (MAA) to ensure the development of uniform resources, assessments, and delivery models of professional development in statistics.

ASA and NCTM are committed to taking appropriate action within the structures of their organizations to assist in guiding the implementation of these recommendations.

## References

Conference Board of the Mathematical Sciences. (2010). *The mathematical education of teachers II*. Issues in Mathematics Education, Vol. 17. Providence, RI: American Mathematical Society; Washington, DC: Mathematical Association of America.

Franklin, C., Kader, G., Mewborn, D., Moreno, J., Peck, R., Perry, M., & Scheaffer, R. (2007). *Guidelines for assessment and instruction in statistics education (GAISE) report: A pre-K–12 curriculum framework*. Alexandria, VA: American Statistical Association.  
[http://www.amstat.org/education/gaise/GAISEPreK-12\\_Full.pdf](http://www.amstat.org/education/gaise/GAISEPreK-12_Full.pdf)

National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics*. Reston, VA: Author.

National Governors Association Center for Best Practices and Council of Chief State School Officers. (2010). *Common core state standards for mathematics. Common core state standards (college and career-readiness standards and K–12 standards in English language arts and math)*. Washington, DC: Author. <http://www.corestandards.org>

## Resources

The following publications and other resources offer additional support for this joint statement of NCTM and ASA:

American Statistical Association. StatisticsEducationWeb (STEW). Online peer-reviewed lesson plans. Alexandria, VA: Author. <http://www.amstat.org/education/stew/>

American Statistical Association–National Council of Teachers of Mathematics Joint Committee on Curriculum in Statistics and Probability for Grades K–12. (1982–). *The Statistics Teacher*

*Network*. Newsletter published three times a year. Alexandria, VA: American Statistical Association. <http://www.amstat.org/education/stn/>

Hopfensperger, P., Jacobbe, T., Lurie, D., & Moreno, J. (2012). *Bridging the gap between common core state standards and teaching statistics*. Alexandria, VA: American Statistical Association.  
<http://www.amstat.org/eseries/scriptcontent/BEWeb/orders/ProductDetail.cfm?pc=BTG>

House, P. (Ed). (2001–2009). *Principles and Standards for School Mathematics* Navigations Series. Reston, VA: National Council of Teachers of Mathematics.

National Council of Teachers of Mathematics. (2009). *Focus in high school mathematics: Reasoning and sense making*. Reston, VA: Author.

Peck, R., & Starnes, D. S. (2009). *Making Sense of Statistical Studies*. Alexandria, VA: American Statistical Association. <http://www.amstat.org/education/msss/>

Zbiek, R. M. (Ed.). (2010–). *Essential Understanding Series*. Reston, VA: National Council of Teachers of Mathematics.