



Preparing to Teach: Teaching with Technology



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GAISE College Report

<https://www.amstat.org/asa/education/Guidelines-for-Assessment-and-Instruction-in-Statistics-Education-Reports.aspx>

Technology has changed the practice of statistics and hence should change what and how we teach. By technologies, we refer to a range of hardware and software that can do far more than handle the computational burden of analysis. By adopting the best available tools (subject to institutional constraints), we allow students to do analysis more easily and therefore open up time to focus on interpretation of results and testing of conditions, rather than on computational mechanics. Technology should aid students in learning to think statistically and to discover concepts. It should also facilitate access to real (and often large) datasets, foster active learning, and embed assessment into course activities.

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Statistics is practiced with computers and usually with specially designed computer software. Students should learn to use a statistical software package if possible. Calculators can provide some limited functionality for smaller datasets, but their use should be supplemented with experience reading typical computer results. Regardless of the tools used, it is important to view the use of technology not just as a way to generate statistical output but as a way to explore conceptual ideas and enhance student learning. **We caution against using technology merely for the sake of using technology** or for pseudo-accuracy (carrying out results to many decimal places). Not all technology tools will have all desired features.

Best practices and useful guidance

- Perform routine computations using technology to allow greater emphasis on interpretation of results.
- View the primary goal as discovering concepts rather than covering methods.
- Implement computer-intensive methods to find p-values and de-emphasize t-, normal and other probability tables.
- Analyze large, real, data sets.
- Generate and modify appropriate statistical graphics, including relatively recent innovations like motion charts and maps.
- Perform simulations to illustrate abstract concepts.
- Explore “what happens if...” questions.
- Create reports.
- Harness the impact of interactive, real-time visualizations to engage students in the investigative process and in multivariable thinking.
- Use real-time response systems for formative assessment.
- Use games and virtual environments to engage students, teach concepts and gather data.

Beth's guidance: Predict and test

Predict and Test
with Water



Nick's thoughts: teaching multivariate thinking with R

1. Keep it simple (e.g., mosaic or formula interface, <https://cran.r-project.org/web/packages/mosaic/vignettes/mosaic-resources.html>). You are not teaching R as a language, but using it to illustrate concepts
2. Utilize cloud based solutions (RStudio Workbench, free for teaching use; RStudio.cloud, affordable option) to allow students to “bring a browser” (see Wang et al, TISE, <https://escholarship.org/uc/item/84v3774z>)
3. Other scaffolding (e.g., student assistants) to help support the 20-30% of students who require additional structure to see potential

Questions? Reflections? Discussion...
