**[Submit an essay](https://serc.carleton.edu/eddie/earthecosystems/eddieevents/workshops/barriers_solutions/submit_essay.html) (no longer than two pages)** **as part of registration on** the challenges, circumstances, program elements that contribute towards impeding student learning about quantitative reasoning and teaching with data in the classroom. What strategies have you found successful?

**Building student confidence in quantitative analyses using locally-relevant ecological data sets**

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One of the primary courses I teach in a general ecology class. The class is a 300-level course, often with a mix of sophomore, junior and senior students enrolled, with a range of prior quantitative abilities and a mix of confidence about tackling quantitative problems. Class size for the course is around 80 students, and the class does not have a separate lab.

When teaching quantitative reasoning and analyses in the class there are often several students that articulate anxiety about performing math, and either struggle or avoid being engaged in class activities. “Math Anxiety” is a widespread problem, over 93% of adults in the US have reported some level of anxiety (Luttenberger et al. 2018). One suggestion for reducing this anxiety is by relating problems to students’ lives and to daily-life situations, so they may be more motivated and potentially more engaged (ref).

My hope is to use a few long-term data sets that have been collected locally that students might relate to. Ideally, although there is not a separate lab, I would like students to collect data as a “citizen-science” style project, that would slowly build a long-term data set that students could use. I am also hoping to develop hands-on active learning modules using local data, such as information on water clarity & harmful algal blooms for nearby lakes, data on flooding of the Red River. Many of our students come from small rural towns and many students participate in hunting and fishing in this region.

Scaffolding: I hope to incorporate several activities over the semester that build on the same set or sets of data that build on their quantitative skills. For example, students could initially use a set of data to develop/improve basic data manipulation/use of spreadsheets, then use the same dataset to calculate simple statistics/summary information & data visualization, or develop basic coding skills (in R). They could also use organism survey data to look at population trends/data, communities, and later incorporate abiotic data to look at ecosystem level changes, using the same data sources to conduct multiple activities.

One challenge about building quantitative skills in my classes is my general lack of understanding of the baseline skills that students have. Next year, I am hoping to work with colleagues in my department whose research is focused on discipline-based education research to develop pre/post questionnaire to assess learning gains in quantitative literacy. I think that improving my assessment methods will both provide feedback to students on their learning and build competency, but provide valuable baseline information on how to improve my teaching approach.

References:

Luttenberger, S., Wimmer, S., & Paechter, M. (2018). Spotlight on math anxiety. *Psychology research and behavior management*, *11*, 311.