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3-2015

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Recommended Citation

Borowski, W.S., M.P. Frisbie, B. Riley, R. Riley, T.L. Shepperson, L. Frost, 2015. Project-based science for general education college students and seventh graders: Pitfalls and pointers. *GSA Abstracts with Programs*, 47(2):32.

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Project-based science for general education college students and seventh graders: Pitfalls and pointers

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We teach a general-education science course for honors students, who in turn mentor disadvantaged seventh graders through a water quality investigation of a local stream. Activities for both groups involve all aspects of a scientific project: scientific background, local context, project design, data collection and analysis, and communication of scientific results. On successive weeks, we first lead our college students through each step in the process then the honors students mentor middle school students through those same steps. College and middle school teachers act as facilitators, and each honors student is responsible for about 6 to 8 middle schoolers. The college students and 7th graders often form strong bonds during their work together.

The project explores nutrient (ammonium, NH₄; nitrate, NO₃, phosphate, PO₄) and fecal microbe (*Escherichia coli*) contamination within the stream, as well as macroinvertebrate distribution and abundance, which is affected by overall water quality. Both student groups are responsible for documenting project activities in a project notebook. Once we establish background principles and context, both college and middle school students sample stream water and fauna. Selected students measure nutrient and *E. coli* concentrations in water samples, whereas all students pick and identify macroinvertebrates from 4 stations. Students then analyze all data to identify probable contamination sources and to assess water quality using established macroinvertebrate indices. Honors students give oral group presentations on their project findings in class. The project culminates when the 7th graders come to campus and present their work with oral and poster presentations. We invite parents, interested water-quality experts, and local dignitaries to the presentation event.

Coordination of supporting college class content, supporting middle school class content, and project activities for both student groups - especially the middle school sampling trip to the stream - requires careful planning, shuffling of middle school schedules, and enthusiastic support by all instructors and administrative educators. Also, preparatory instruction and practice for college students in project activities is key, so they feel more comfortable in mentoring 7th graders.

Geological Society of America, Southeastern Section, 18 March 2015, *GSA Abstracts with Programs*, 47(2):32.