

Introduction to Research Methodology

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I integrated the information learned at the PETE Institute into my Introduction to Research Methodology course. Throughout the course, students are taught study design and a wide range of experimental techniques. I began my lesson on water quality with a brief lecture on the importance of water quality and the different parameters that can be measured. I found the Field Manual for Water Quality Monitoring by Stapp and Mitchell, recommended at the Institute, to be very beneficial. It helped with background information for my lecture as well as provided an index to measure water quality. I introduced the students to the Water Quality Index (WQI) which summarizes 9 different measurements and provides a single number to monitor water quality. After I had introduced the topic of water quality and the parameters we would be testing, I took the class into the field. The first field day was spent measuring parameters of the water in a nearby canal. I wanted the students to get used to using the equipment and learn from their mistakes before designing our study. After the students were comfortable with the equipment, I asked them to select a site on the Missouri river to measure water quality.

The students choose to test water quality at 2 sites near the Tesoro Oil Refinery in Mandan, ND. Sites were chosen based on accessibility and time constraints. Site 1 was located about 0.25mi upstream from the refinery and site 2 was 0.25mi downstream. We had equipment to measure dissolved oxygen (DO), biochemical dissolved oxygen (BOD), pH, temperature, total nitrates, total phosphates, and turbidity. Dissolved oxygen, pH and temperature were measured on site using an Oakton deluxe DO/pH probe. Nitrates, total phosphates, and turbidity were tested using test kits from LaMotte. 300mL

samples were collected and wrapped in aluminum foil to prevent photosynthesis. Four days after collection we measured DO once again to calculate BOD.

Students calculated the WQI in the days following the field trip. Q-values were determined based on charts from the Field Manual for Water Quality Monitoring. The WQI is based on 9 parameters and because we only tested 7 of those parameters the WQI had to be adjusted accordingly. We were unable to test fecal coliforms or total solids. After the results were calculated the students were required to write up a formal lab report.

This was a very preliminary implementation of the material and I hope to further develop labs for this course as well as others. The equipment from the mini-grant monies is on order and will assist in getting more precise readings for our testing. The LaMotte kits are a good learning tool, but do not provide accurate data as they are based on a color scale. The phosphate probe will improve upon our current equipment and the coliscan kits will add new data that we previously were unable to collect.

Review

- 5 students participated in the project ranging in age from 23-33
- 2 faculty members benefited
- Students all completed a formal lab report and learned a great deal. One of the students said she'd like to take what she's learned back to her home reservation to do water quality testing there. Another student had done water quality testing before but said new techniques were learned.
- I plan to expand this project as I get more equipment and as I continue to learn more about water quality. I plan on incorporating a water quality lab into my Ecology class this spring that looks at macroinvertebrates. I will again use the lab manual recommended at the Fellows Institute as well as slides from Adam Sigler's PowerPoint presentations.