



Geology: A Problem-based graduate course in Hydrology

A course entitled Applied Hydrology by Dr. Laura Lourdes Sanders, Northeastern Illinois University (1994)

Course Design

Traditional courses in hydrology tend to promote a fragmented understanding of the subject not only because students are exposed to only the narrow scope of homework assignments but also because students work in isolation and receive little valuable feedback. In contrast, students in Applied Hydrology work in groups to characterize the hydrology of a real basin; they have no exams, but they submit numerous written assignments which are thoroughly critiqued and returned for resubmission. The writing assignments are part of a cumulative investigation of one basin. The ongoing project enables students to write a lengthy report involving the application of different analytical methods while receiving extensive feedback and occasional redirection.

The class is divided into small groups, and each group chooses a drainage basin in Illinois. The choice is limited to Illinois due to the availability of records and data through the state's geological and water surveys. Weekly open-ended problems encourage students to divide data gathering activities and to work as a team on homework assignments. Assignments revolve around the accurate collection and analysis of relevant data from their chosen basin. Students learn both how to access data and how to determine if it is relevant or not. The group projects enable students to gain an understanding of how work is done in the field, and they enable the instructor to be more thorough in assignment critiques than would normally be possible with more individual assignments to be evaluated. Weekly assignments are not graded; instead, they are thoroughly critiqued; teams resubmit their revised work the following week along with the new addition to the project. Each assignment builds upon the previous one to ultimately constitute a completed term paper that can be presented at the state-wide hydrology conference.

Higher Level Learning:

Weekly assignments enable students to work through the steps of characterizing the hydrology of a real water basin (**Acting**) while gaining a better understanding of how the different parts of the task fit together (**Connecting**). Students learn how to

address and write up open-ended problems and how to find, select, analyze, and report relevant data as they will be called upon to do once they are working in the field (**Learning**).

Active Learning:

The course is organized around cooperative group assignments (**Dialogue with Others**) in order to promote the kind of communication required of professionals. As they work together on real data sets, students not only gain the experience of practicing hydrologic methods on a real basin (**Doing**) but also of observing the manner in which other students frame and resolve similar problems (**Observing**).

Sanders, L. L. (1994). A Problem-Based Graduate-Level Course in Practical Hydrology. *Journal of Geological Education*, 42, pp.337-343.