

My goal as a teacher is to help students become what I term scientifically literate. By this I mean a state where the student is both cognisant of core information – major concepts, necessary facts, and required techniques – and comfortable with scientific, critical thinking. Scientific literacy enables the student to extrapolate from the core information when approaching any novel situation such that students switch from being externally directed to self-directed in their learning. I feel this is a worthwhile goal for students who want to continue on in academia and those, in the majority, who do not. Scientific literacy enables the student to spend the rest of their lives interacting critically with their world (academic or non-academic) from a scientific viewpoint long after they may have forgotten specific points from one of my courses.

To achieve scientific literacy students need to learn the core information. My approach to teaching therefore needs to increase the chances of this happening for all the students in my courses. I realise that different students learn best in different ways, so I strive to present material in different, reinforcing manners. For example, I have used standard lecture, group discussions, in-class writing assignments, computer simulations, web page authoring, essays, and hands on labs in my courses. I recognise that writing is an effective tool to encourage active learning and higher-order, critical thinking, so I use writing extensively for student learning and evaluation. For example, I have used small, in-class writing assignments in general ecology classes to test if students understand an important point. I understand that theory is best understood when linked to practice and that students learn best while doing, so I have my classes complete practical projects that are clearly related to theories or ideas that they are learning in class. For example, in my biostatistics courses labs have revolved around analysis, using computer software, of real biological data that are well suited to the statistical tests being discussed in lecture. I believe that students respond well to difficult challenges as long as they can see the reason behind the challenge and are provided clear instructions and support to help them achieve those challenges, so I challenge my students appropriately, clearly indicating to them why they are being challenged and what they will gain by meeting that challenge, and provide them the appropriate support to meet those challenges themselves. For example, in my introductory biology classes I have had students write critical review papers that they peer-review. In that course I spent a number of lectures discussing the skills the students would need and how those skills would serve them throughout their undergraduate career.

The other requirement for scientific literacy is learning scientific thinking. In my view, science education is often reduced to presenting science as a collection of facts. Science is not a static collection of facts; it is a dynamic process of asking and answering questions. It is only fair that students learn what science really is. To reach this goal I attempt to model how scientists think during lectures and discussions. I do this by focusing on the questions driving the discoveries of the facts and concepts, often spending some time on the historical development of the body of knowledge in a particular area. I also attempt to teach science as science is done. I do this by using experiments in the classroom, having the students work through thought experiments, and posing the students with questions or challenges instead of merely lecturing about facts. For example, in my general ecology course I often have students discuss in small groups how an idea (e.g., keystone species are important in structuring communities) might be tested. I also include as much practice doing science as is possible in each of my courses. I do this using open-ended labs and/or assignments that utilize real data and ask students to use real scientific approaches including erecting their own hypotheses and critically evaluating their own results. For example, in my population biology course I gave assignments that involved exploring the behaviour of a simulation model. In this case the questions are open ended and driven by the student's earlier findings.

I am interested in teaching courses in introductory biology, landscape ecology, general ecology, population ecology, ecological modeling and/or biostatistics. Syllabi for courses I have taught in the past are available upon request or from my web-site at <http://www.und.nodak.edu/instruct/bgoodwin/>.