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Building the Research-Teaching Nexus in Ecology: Three Courses to Get There

Øyvind Fiksen, Sigrunn Eliassen, Øystein Varpe

Higher education aims at developing students' critical and autonomous thinking skills through the research-teaching nexus. This includes engaging students in research-related (sensu Magi and Beerkens, 2016) activities from when they enter campus to their graduation, and building core competencies such as ability to use the scientific method, understand how scientific knowledge is built and how science functions, also in service of society (AAAS, 2011). Simply including scientific content into the curriculum (research-led teaching) may not fully capture the potential for reciprocity between research and teaching (Griffiths, 2004); students need to do research or encounter the research process, producing knowledge themselves (Brew, 2013). Developing these competencies involves practical training in a suite of methods, skills and knowledge needed to read and evaluate science, ask scientific questions, apply scientific methods, solve problems and think critically. How can we, the teachers, do this, in practice, in class? Here, we present three course designs for undergraduate ecology level courses that include specific learning activities to connect research and teaching. In the courses, students learn content knowledge along with practical training in doing science (research-based teaching), including designing experiments, navigating the scientific literature, and solving significant problems with their peers. Other learning activities promote the ability to recognize quality knowledge, the nature and characteristics of scientific activity (research-oriented teaching). Our examples include training students in the use of models and theory to make predictions about natural systems, formulate scientific questions and design experiments to test them, plan and perform experiments with live animals (beetles, birds), do field work and participate in research projects. Students also analyse their results and present posters or write term papers with student-to-student peer-review and comment on texts. Each of these activities are active learning, and are examples of the teaching and research nexus in classrooms.