

Interactive comment on “Training hydrologists to be ecohydrologists: a “how-you-can-do-it” example leveraging an active learning environment for studying plant-water interaction” by S. W. Lyon et al.

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The manuscript of Lyon et al. offers an unexpected, and welcomed, opportunity to continue the discussion begun by McClain et al in this same special issue. I appreciate the authors' efforts to add detail to the discussion and provide, as they say, a "how-you-can-do-it" example addressing both content and instructional approaches. The example they present is of a new (June 2012) three-week summer course offered to MSc-level students in a Hydrology, Hydrogeology and Water Resources program at

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Stockholm University. The course is entitled Ecohydrology: A Mediterranean Perspective and is divided into three main teaching and learning activities that consider the central concepts of ecohydrology and delve deeper into the process of evapotranspiration via classroom exercises and fieldwork. The course also utilizes an active learning approach, which stimulates the students to play more active roles in the learning process. The effectiveness of the approach is assessed through student evaluations of the course and the personal reflections of students and teachers. The assessment does not appear to have been designed as a formal investigation of the effectiveness of active teaching approaches but rather a basic evaluation typical of quality assurance in many educational programs.

Evaluating the merits of this course and the lessons learned in the context of the framework presented by McClain et al is not straight forward because the framework considers ecohydrology in a broader educational context and at the MSc level focuses on full programs rather than a single course on the subject. If the manuscript continues to feature this link, it would be helpful to describe the position and purpose of the course in the larger Hydrology, Hydrogeology and Water Resources MSc program at Stockholm University. How does this course fit into the learning objectives and design of the MSc program? Is it the only explicit consideration of ecohydrology in the program? I presume the course is elective given it is the first time it has been offered and it is taught in collaboration with another university. Are there plans for the future of the course in the program or for the future incorporation of more content in ecohydrology?

Considering the content of the course, I was struck by the absence of any real consideration of ecology - plant ecology in particular. Students will have encountered references to ecological processes in TLA #1 "What is Ecohydrology", but there were no recommended readings on plant water use, variations among species, variations among crops and 'wild' plants, etc. Moreover, the exercises in TLA#2 and research questions in TLA#3 (Table 3) deal only with physical factors influencing evapotranspiration (i.e. temperature, humidity, vapor pressure, soil moisture, and albedo). Did

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students learn anything about the ecological processes that influence and sometimes control these critical physical variables? The Mediterranean focus of the course is perfect for learning about unique plant adaptations to limited water availability, and the differences in water use between native plants and irrigated crops is fundamental to understanding differences in evapotranspiration. Landscape ecology and changing land use/land cover (i.e. species composition) would seem to offer another opportunity for learning about the interaction of ecology and hydrology in the Mediterranean region. In my opinion it is this explicit incorporation of ecological as well as hydrological concepts and approaches that distinguishes ecohydrology. From a content perspective (and excluding the literature review in TLA#1), how is this course different from the standard teaching of evapotranspiration in any hydrology program?

Turning to the assessment of instructional approaches used and the effectiveness of active learning approaches, the reviewers of the McClain et al manuscript emphasized that novel instructional techniques and attention to personal competencies are not unique to training in ecohydrology. I agree and am confident that Lyon et al acknowledge this as well. That said I found the results of the authors' assessment to be quite interesting. One must be cautious, however, to not over interpret or draw too-firm of conclusions from the feedback of such a small number of students in one course. I think Lyons et al present a fairly balanced analysis and discussion in this respect, although the statement in the Concluding Remarks that learning "can never be active enough" may cross the line.

The authors note that 5 of the 6 students were female which warrants a bit more attention given possible (or perceived) gender-based differences in learning styles. Another factor which was not mentioned in sufficient detail is the background of the students. On page 9347 it says the students have a "homogeneous prior educational background that likely typifies non-engineering hydrology Master's students most teachers would come across in an ecohydrology course." Academic culture varies considerably between countries and continents and the response of students to active learning ap-

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proaches may be influenced by this background. Were the students all Swedish (with undergraduate degrees from Swedish universities) or did they come from a diversity of cultural and educational backgrounds? If there is a lack of cultural diversity I recommend toning down the use of "typifies" and "most teachers" because the results may only apply to a narrow portion of the cultural academic spectrum. Time will tell.

Minor point: There are minor grammatical and typographical errors throughout the manuscript. The language is also at times too informal and imprecise (e.g "can never be active enough" comment). A careful revision and tightening up is needed.

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