

# Direct Instruction in Learning Outcomes for More Meaningful Assessment of Students of the Environment

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As is the case for many academic programs, instructors and administrators of environmental majors are increasingly building learning outcomes and assessment into their curricula. However, there is much discussion about how to design activities that move beyond assessment as a “bureaucratic machine” to more directly serve students and inform pedagogy (Lederman, 2019). One approach for more meaningful assessment has been developed by the Valid Assessment of Learning in Undergraduate Education (VALUE) project, which provides tools for students to directly demonstrate, and thus for institutions to evaluate, proficiency in critical learning outcomes (Rhodes, 2009). However, learning outcomes included in the VALUE project focus primarily on general education learning outcomes, leaving a gap for disciplinary-specific assessment tools.

For environmental disciplines, it can be particularly challenging to design informative assessment because of the highly interdisciplinary nature of the curricula, the substantial body of foundational knowledge required, and the applied focus of most learning outcomes. For example, while many environmental science programs focus their instruction on a large body of *knowledge* that students of the environment are expected to master (e.g. ecology, biology, chemistry, atmospheric science, geology, hydrology, soil science, etc.), published learning outcomes for those same programs focus more on applied skills (e.g. problem solving, quantitative literacy, science communication) that may not be *directly* taught within the curriculum.

Many environmental programs promote instruction that directly supports learning outcomes within required coursework. When such efforts are well designed and scaffolded, students are exposed to and practice these skills with increasing complexity throughout their program. However, assessment best practices suggest that the most effective way to *engage* and *include* students in mastering learning outcomes is to *directly* teach frameworks for applying learning outcomes and then practice these skills with clear guidelines about what differentiates competency from novice to mastery levels.

A new text published by Springer provides such a tool for direct instruction and assessment of common learning outcomes for environmental programs. ***Critical Skills for Environmental Professionals: Putting Knowledge into Practice*** is designed to provide direct instruction and assessment tools for environmental majors. Selection of content for this book was based on a review of learning outcomes published by leading environmental programs across the United States. Several common themes emerged that were focused on training students to apply their disciplinary knowledge base, with an emphasis on environmental problem solving.

# Viewpoint

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For example, students of the environment are typically expected to be able to:

- critically evaluate the quality and relevance of information and use critical reasoning to develop and assess possible conclusions (**Critical Thinking**)
- apply appropriate approaches to scientific inquiry to address and evaluate environmental issues (**Scientific Method**)
- reason, solve, and communicate quantitative information in a variety of contexts (**Quantitative Literacy**)
- clearly articulate scientific evidence and effectively engage a diverse group of stakeholders around key environmental issues (**Science Communication**)
- employ a systems approach that considers environmental issues holistically, including connections across key biophysical, ecological, and social components of the system (**Systems Thinking**)

This book has been designed to serve as a tool for direct student instruction in thirteen common environmental program-level learning outcomes. This approach could be deployed as a “stand-alone” skills course, as modules embedded within existing courses, or as a 1-credit lab/discussion section for existing lecture-based courses.

In order to introduce students to the learning outcome concepts, engage them in their application, and provide practice and assessment tools, each chapter includes:

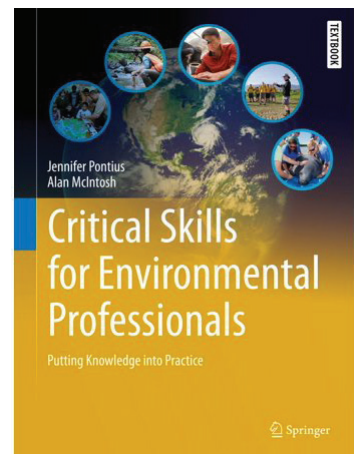
- an overview of the relevance of the skill to environmental professionals (WHY),
- a framework for applying the skill (HOW),
- examples of the skill applied to real-world issues students of the environment are generally passionate about (ENGAGE),
- assessment exercises for students to practice each skill at varying levels of difficulty (PRACTICE), and
- a clear learning outcome rubric for assessment (ASSESS).

These rubrics also ensure that students understand what the learning outcomes should look like in practice and what differentiates various levels of competency.

In addition to supporting direct student instruction in learning outcomes, this text is also designed to serve as an assessment tool at the program-level. Because the book incorporates assessment exercises at novice, competent, advanced and professional levels, students can be evaluated over the course of their tenure in a program to assess their progress and inform curricula. The rubrics provided meet the criteria for high-quality assessment activities identified by Arum, Roksa, and Cook (2016) that include quantifiable “measures of student learning that are rigorous, high quality and should yield data that allow for comparisons over time and across institutions” (p. 10). These exercises could be embedded throughout program curricula to assess student progress and inform pedagogies.

There are hundreds of environmental science and studies majors in the nation’s institutions of higher learning. These students follow diverse curricula to complete their degrees; however, the overarching learning outcomes of these different degree programs overlap in key areas. We hope that this approach of direct instruction for discipline-specific learning outcomes will help ensure that students graduating from these programs will have the common set of skills needed to succeed in their careers.

*Critical Skills for Environmental Professionals: Putting Knowledge into Practice* is designed to provide direct instruction and assessment tools for environmental majors.

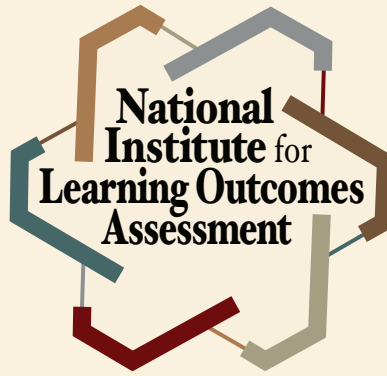


## References

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