

Teaching to Learn and Learning to Teach: Education in Rangeland Ecology and Management

By John Tanaka, Chris Call, Laurie Abbott, and Karen Hickman

eaching in our rangeland ecology and management discipline is continuously evolving to address emerging issues and meet the needs of our students and their potential employers. The core curriculum in many range science education programs is strongly influenced by current accreditation standardsⁱ set by the Society for Range Management (SRM). These are based upon the standards developed by the Range Science Education Council (RSEC) and federal Office of Personnel Management (OPM) for employment as rangeland management specialists with federal land management agencies (GS-0454 seriesⁱⁱ). However, a recent survey of range professionals revealed some gaps between what our students are learning and what potential employers and other stakeholders need and value.1 These findings prompted RSEC to begin a fresh examination of the knowledge, skills, and abilities needed by modern rangeland professionals, and our educational approaches to address these needs.

As one result, the idea for symposia and a special issue of *Rangelands* was born. Our focus is not on the SRM accreditation standards or the Office of Personnel Management requirements. Our goal is to examine how teaching and learning occur and how both can be improved using innovative methods. In this issue are papers covering different aspects of teaching. Our target audience is anyone who is interested in how to teach better so that students also learn better. Students in this case are broadly defined to include K–12 students, college and university students, and adult learners.

The Range Science Education Council has for years recognized the top undergraduate teachers in our profession. This issue and the symposia held at the 65th Annual SRM Meeting in Spokane, Washington, seek to capture some of the innovative ideas and methods that are being used by these faculty and other educators. We are all "teachers" in some capacity, and there are many ideas in these articles for you to consider implementing in your teaching program. We are not saying that you have to use every one of these ideas to be a great teacher. We encourage you to consider new ideas and approaches, and figure out what works for you and your students.

The specific objectives of this special issue are to: 1) highlight innovative teaching methods in a variety of learning settings; 2) highlight innovative teaching methods on a variety of topics within a rangeland ecology and management curriculum; and 3) begin a dialogue on innovative teaching methods within the profession. We will bring current ideas on teaching and learning into one place for future reference by members of our profession. Brief abstracts of each paper are provided here. We encourage you to read each paper, because there is a wealth of ideas in each one.

Learning and Teaching in College: An Ecological Perspective

Learning in college can be enhanced if range educators have a better understanding of underlying learning and teaching concepts and processes. We can find similarities between the structure and function of ecosystems and learning environments by using analogies and familiar models. State-andtransition models describe the dynamics of plant community development, as well as student intellectual and faculty teaching development. Similarities exist between the acquisition, transformation, storage, retrieval, and use of nutrients by plants and knowledge by humans. Curriculum, instruction, and assessment can be viewed in a successional management framework similar to one developed for invasive plant management on rangelands.

Teaching Across Disciplines and Institutions

Current rangeland ecology and management programs are being challenged by: 1) the shifting demographics of range-

¹See the SRM University Accreditation Program Handbook available at: http://www.rangelands.org/accreditation/SRM%20Accreditation% 20Handbook%20approved%20revised_April%202011%20_2_.pdf

ⁱⁱ See the OPM Standards for the Rangeland Management Series available at: http://www.opm.gov/qualifications/standards/IORs/gs0400/0454.htm.

land programs to students who are predominantly urban and have little to no rangeland experience; 2) pressure to provide broad-based courses for a wider audience with the goal of increasing student enrollment; 3) the need for greater accessibility of high quality teaching materials/opportunities for educators who have little experience in traditional range management programs; and 4) increasing focus on importance of interdisciplinary education to produce effective rangeland managers and researchers. This article discusses ways to approach these issues at both the undergraduate and graduate levels.

Drivers and Outcomes of Innovations in Demand-Driven and Student-Centered Learning

This paper outlines a series of highly strategic, innovative, and "best practice" approaches to curriculum and course development adopted by Rangelands Australia, as well as innovations to attract and retain mature age students, and their outcomes. This is a unique graduate degree and certificate program because it reaches practitioners in the field through a combination of online and hybrid intensive (online + field) courses. It is demand-driven because it is based on findings from numerous focus groups (with a variety of stakeholders) conducted across all of Australia. Several of the forwardlooking, core courses are new courses that were created based on visions of what rangeland issues and industries, and their management would look like 10–15 years in the future. This innovative approach and curriculum can serve as a model for other rangeland ecology and management programs.

Building a Teaching Technology Toolbox for Rangeland Ecology

The world is becoming more connected and integrated by the minute with technology, and the academic world is no exception. Our students are of the digital age, and faculty struggle to keep up. Despite the technological literacy of students, schools and universities still provide the scientific background and applicable tools for natural resources careers. Thus, instructors can use technology as learning tools to develop students' understanding of scientific fundamentals, core competences, and practical skills necessary for the workplace. The authors discuss the reasons to use technology, provide examples applicable to rangeland ecology and management, and discuss considerations when employing technology.

Tired of Teaching to the Test? Alternative Approaches to Assessing Student Learning

Despite its pivotal role in the educational process, assessment of student learning is often regarded negatively by teachers and students because of its strong association with judgment and grades. Alternative assessment approaches provide opportunities for teachers to determine how well students are learning; to provide essential feedback to students during the learning process; and to evaluate knowledge, skills, and abilities that are difficult to assess using traditional assessment methods. Alternative assessment approaches are described that can be adapted by range science educators to facilitate alignment of desired learning outcomes, learning activities, and assessment to promote student learning.

Using Rangelands on the Web as a Teaching Resource

Information from on-line sources can be a rich and rewarding resource. There are several new sources of vetted information becoming available, including RangelandsWest, Global Rangelands, eXtension Rangelands, Range Science Information System, and reusable teaching/learning objects. In this paper, the authors discuss how these different on-line tools can be used as learning resources for classroom teaching and lifelong learning.

Innovative Outreach Methods for Adult Education in the 21st Century: Knowing Your Audience and Moving from the Centerpiece to the Sideline

As professionals and educators in the field of natural resources, our job is to provide information to the general public, a poorly defined audience with a wide range of ages, cultures, interests, and educational backgrounds. Furthermore, most educators are limited in time and resources, which raises the question of how educators can reach the general public more effectively and efficiently. The authors advocate that audience identification is the most important aspect in effective outreach. Individuals learn in a variety of ways, and identifying the audience and their preferred mode of learning can make educational efforts more successful with greater impacts.

Learning in Government Agencies: The Bureau of Land Management National Training Center

The Bureau of Land Management (BLM) manages about 245 million acres of public lands for multiple uses throughout the western United States and Alaska. To manage and administer the rangeland management program, BLM employs specialists that have some combination of technical and/or administrative responsibilities. BLM employees involved in rangeland management benefit from training. This article describes how one federal agency addresses training and education needs of its workforce.

Rangelands in the Classroom: Increasing Rangeland Understanding of Students and Teachers

Rangeland professionals are often frustrated that most people have little awareness or understanding of rangelands. A commonly proposed solution to raising the rangeland literacy of community members, fellow citizens, and voters is to start by teaching kids about rangelands in their schools. This is a laudable goal that can only be addressed by understanding the education requirements of teachers and incorporating rangeland topics into activities to meet these standards. Fortunately, rangeland topics and activities can be developed to address many of these educational standards, and rangeland topics can become implicit in the work of teachers and understanding of students.

Home on a Transitioning Range: A Ranch Simulation Game Demonstrating STMs

State and transitions models (STMs) are becoming a preferred method for monitoring rangeland ecosystems and a key input in adaptive management strategies. Yet, land managers do not readily adopt these tools. The authors suggest a creative means for increasing awareness of STMs through active participation in a ranch management game accompanying an STM workshop. Recent evaluations indicate successful transmission of key concepts, but adoption of STMs will take time to measure. The article reviews the impetus for developing the STM game, describes the workshop/simulation game structure, and concludes with notable limitations and next steps.

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Authors are Dept Head and Professor, Department of Ecosystem Science and Management, University of Wyoming, Laramie WY 82071, USA, jtanaka@uwyo.edu (Tanaka); Professor, Department of Wildland Resources, Utah State University, Logan, Utah 84322, USA (Call); Associate Professor, Department of Animal and Range Sciences, New Mexico State University, Las Cruces, NM 88003, USA (Abbott); and Professor, Department of Natural Resource Ecology and Management, Oklahoma State University, Stillwater, OK 74078, USA (Hickman).



Aariculture

United States National Institute Department of of Food and Agriculture

Rangelands and grasslands cover about 70% of the world's land area.

Rangelands and grasslands are broadly defined as uncultivated land with the potential to support grazing by domestic animals. Through research on water quality, erosion, wildlife habitat needs and prevention of habitat fragmentation, NIFA's investment in rangeland and grassland science is helping owners better understand the land and make appropriate land-use decisions.



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