On-Ramps to more effective teaching: Quick-start guides to strategies for actively engaging students in the classroom to improve learning

Barbara Tewksbury¹, Florian Fusséis², Phillip Resor³, Jennifer Wenner⁴, Kim Blisniuk⁵, Cailey Condit⁶, Anne Egger⁷, Kyle Fredrick⁸, Jamie Kirkpatrick⁹, Sara Mana¹⁰, Kendra Murray¹¹, Beth Pratt-Sitaula¹², Christine Regalla¹³, and Carolyn Tewksbury-Christle¹⁴

¹Department of Geosciences, Hamilton College, Clinton, NY, 13323 USA (btewksbu@hamilton.edu)
²School of Geosciences, University of Edinburgh, Edinburgh, EH9 3FE UK
³Department of Earth and Environmental Sciences, Wesleyan University, Middletown, CT 06459 USA
⁴Department of Geology, University of Wisconsin (Oshkosh), Oshkosh, WI 54901 USA
⁵Geology Department, San Jose State University, San Jose, CA 95192 USA
⁶Department of Earth and Space Sciences, University of Washington, Seattle, WA 98195 USA
⁷Department of Geological Sciences, Central Washington University, Ellensburg, WA 98926 USA
⁸Department of Earth Sciences, California University of Pennsylvania, California, PA 15419 USA
⁹Department of Earth and Planetary Sciences, McGill University, Montréal, QC H3A 0E8 Canada
¹⁰Department of Geological Science, Salem State University, Salem, MA 01970 USA
¹¹Department of Geosciences, Idaho State University, Pocatello, ID 83209 USA
¹²UNAVCO, 6350 Nautilus Drive, Suite B/C, Boulder, CO 80301 USA
¹³Earth and Environment Department, Boston University, Boston, MA 02215 USA
¹⁴Department of Earth Sciences, ETH Zürich, Zürich 8092 Switzerland

The landscape of college and university teaching in the geosciences has changed over the past 20 years. Research has documented 1) that faculty in the U.S. now spend less time lecturing and more time actively engaging students in the classroom, and 2) that active engagement is more common in geoscience classrooms than it is in biology, chemistry, physics, or engineering. The web sites of Teach the Earth and On the Cutting Edge have thousands of web pages of resources for geoscience faculty who want to more actively engage their students in the classroom. But what if you want to incorporate more active learning but aren’t sure where to start or how these techniques might work in your courses? Or what if you are looking for new approaches or fresh ideas to add to techniques that you already use?

On-Ramps are quick-start guides designed to bring you up to speed in effective strategies for engaging students more actively in the classroom. Each 2-page On-Ramp focuses on a particular teaching strategy, rather than on how to teach a particular topic. The current On-Ramps cover interactive lecture, brainstorming, concept sketches, jigsaws, discussions, quantitative skill-building, just-in-time approaches, case studies, and re-thinking course coverage and linearity. Each On-Ramp includes a simple example that illustrates the strategy, why the technique is valuable,
implementation tips, additional examples and modifications, and links to activities, supporting research, and other resources. On-Ramps will be available at the poster and can also be downloaded as pdfs from serc.carleton.edu/onramps/index.html

On-Ramps originated from the 2018 community vision report to US National Science Foundation on *Challenges and Opportunities for Research in Tectonics*, and their development was supported with a grant from NSF. The On-Ramps writing team is a group of geoscientists at a variety of career levels with specialties across the range of subdisciplines that regularly address tectonic problems. Although examples currently focus on the broad field of tectonics, On-Ramps can be easily adapted for courses in other geoscience disciplines at all levels.