

# The challenge of cross-disciplinary STEM instruction and communication

E. F. (Joe) Redish, Professor Emeritus  
Department of Physics, University of Maryland, USA

## Abstract:

Modern scientific fields often require strengths in multiple scientific disciplines. Cross-disciplinary instruction is common in STEM programs in universities. And there is pressure both at the tertiary and pre-tertiary levels to increase the interdisciplinarity of science instruction.

But cross-disciplinary communication and cross-disciplinary instruction can be harder than it looks. Scientific disciplines create distinct cultures – conventions, goals, expectations, and epistemologies – that can lead to serious challenges for an instructor trying to communicate across disciplines.<sup>1</sup>

Over the past decade, I have been involved in a project creating an introductory university physics class for life-science students.<sup>2</sup> From this experience, I learned much about cross-disciplinary communication that surprised me. In this talk, I use my experience as a case study to develop some insights and suggestions about cross-disciplinary communication.

<sup>1</sup> E. F. Redish and T. J. Cooke, Learning Each Other's Ropes: Negotiating interdisciplinary authenticity, *Cell Biology Education - Life Science Education*, 12 (June 3, 2013) 175-186. doi:10.1187/cbe.12-09-0147.

<sup>2</sup> E. F. Redish et al., NEXUS/Physics: An interdisciplinary repurposing of physics for biologists *Am. J. Phys.* 82:5 (2014) 368-377. doi: 10.1119/1.4870386.

## Brief bio

Redish received his undergraduate degree from Princeton University and his Ph.D. in theoretical nuclear physics from M.I.T. in 1968. His two-year postdoc at the University of Maryland turned into a 50-year career. For his first 20 years, he was an active researcher in nuclear reaction theory. But in the late '80s he learned about the new field of Physics Education Research (PER) and was enthralled by the surprises and interesting insights it was gaining, both about student learning and about thinking about physics. In 1993 he turned to PER full time, establishing a research group in the UMd Physics department. He is the winner of numerous awards for his work in PER, including from the APS, ICPE, the AAPT, and the NSF.



For the past decade, Redish has been involved in the rethinking of introductory physics for life science students and has created an innovative new course, NEXUS/Physics, designed to articulate with the program of biology majors. This has been a highly productive research environment for the group, leading to the publication of more than 30 research papers and 100's of pages of curriculum.

He officially transferred to Emeritus status in July 2020 and has been working on the topic of teaching non-physics students how to learn to use math in science.

Homepage: <http://umdpereg.pbworks.com/w/page/10511199/Joe%20Redish>