Enhancing Equity in STEM Disciplines through Interdisciplinary Course Design

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Current literature shows inequities in access to STEM education and that social-psychological factors, as well as disparities related to race and gender, influence both participation in and completion of STEM courses and degree plans (Xie, Fang, and Shauman, 2015). Biology, Physics, and Philosophy faculty collaborated at the University of Central Arkansas to develop an elective course that addresses these issues. Our general education core is created around four pillars, with lower and upper division requirements in each area: critical inquiry, communication, diversity, and responsible living. While traditional science curricula can easily address critical inquiry and communication, courses that address diversity issues are rare. Therefore, using LEAP principles of social responsibility, intercultural knowledge, civic engagement, and service-learning, we intentionally designed a course that would deliver STEM content, but also step into the diversity gap. Women and Minorities in STEM explores contributions to scientific history and achievements from underrepresented groups.

Course Goals
1. Students will gain a broader and more complex understanding regarding the contributions of women, minorities, and individuals from non-Western cultures to the STEM disciplines.
2. Students will challenge their current worldviews in order to increase their intercultural knowledge and competence.
3. Students will analyze the ethical, social, and environmental components of global STEM-related problems and develop personal and socially responsible actions, informed by interdisciplinary knowledge, cultural differences, and multiple worldviews.

Student Learning Outcomes
1. Students will articulate, orally and in writing, the perspectives of multiple worldviews within the context of STEM disciplines.
2. Students will be able to analyze historical and contemporary issues in the STEM disciplines related to gender, race, class, religion, and culture.
3. Students will be able to utilize interdisciplinary thinking to address areas of inequity in the STEM disciplines across gender, race, class, religion, and culture.
4. Students will be able to identify and explain contributions to the STEM disciplines from various groups, particularly women, minorities, and individuals from non-Western cultures.

Journal Prompts and Student Reflections
Prompt: Reflect on the meaning of “science.” Based on what we have been reading and discussing, do you consider what the ancient civilizations did to be science? Why or why not? What has been the most interesting aspect of what you’ve learned so far?

Student: One of my favorite things we’ve talked and read about is Tapputi. The first woman chemist making perfume and developed the distillation technique which is something we still do in chemistry today! I love that I can relate to what she did based on my past experiences.

Prompt: Do you think the most interesting thing I have learned is that after reflecting on the past two weeks of this course I have learned that there is a hidden history of science that we are not taught.

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Assessment
Evidence collected from our students show that they feel more connected to their chosen field of study, have broadened their worldviews, and are more prepared to advocate for equity regarding access to and representation of underrepresented groups in STEM fields. The readings and assignments undertaken in the course are carefully designed to challenge students’ ethnocentrism and acceptance of androcentrism. A common question we hear from students is, “Why have I never learned this before?” which gives us an opportunity to talk about the ways privilege, power, politics, philosophy, and religion not only shape current events, but also what events in history are written down and shared.

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References
Bennett, S. V. (2008). Women, a science, and myth. Gender Relativity from antiquity to the present. Abilene, TX.