

SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)  
ON TRACK - UNDERGRADUATE AND POSTGRADUATE SPACE EDUCATION (2)

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## COLLABORATIVE LEARNING IN AN ASTROBIOLOGY CLASS

**Abstract**

An important component of the burgeoning field of astrobiology is student interest and involvement, especially during the early undergraduate years. Traditional instruction in large classrooms involves lectures, exams, and occasional in-class exercises. However, collaborative exercises may be an interesting new approach for large classes, especially if the collaborative exercises include an individual component followed by a collaborative component that builds upon the individual effort. Several new exercises in an introductory Earth system history course demonstrated the benefits of such an approach. One such exercise, "Planetary Habitability", effectively addressed the factors that contribute to planetary habitability, including stellar luminosity, planetary size, and atmospheric composition. Students completed an exercise on Earth habitability individually, then worked with other students to apply what they had learned to other planets, including Venus, Mars, and the extreme example of tidally locked planets around M dwarf stars. Other exercises explored the more biological and geological themes of astrobiology, allowing students to incorporate more creativity in exploring complex problems. For example, one exercise, "Make/Kill-a-Critter", demonstrated ecosystem interactions and evolution in response to environmental change. Each student designed a creature of his or her own choosing and during the collaborative component, was required to test the viability of the creature in light of interactions with other students' creatures as well as a changing environment. In another exercise, students were required to reconstruct the instructor's daily life by utilizing pictures taken every 30 minutes, then compare the reconstruction with those of fellow students. In addition to learning about record reconstruction and time resolution, vast differences in reconstructions and student assumptions triggered a class discussion on the scientific method, personal bias, and peer review. Lessons learned during the course of these exercises were well retained over the course of the semester. Future refinement of these exercises, as well as the addition of new ones, may help encourage learning in large classes by allowing students to focus on their strengths while on their own, and then addressing weaknesses in concept comprehension through group activities.