

SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)  
New Worlds - Innovative Space Education And Outreach (5)

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HUNTING FOR HABITABLE WORLDS: ENGAGING STUDENTS IN AN ADAPTIVE ONLINE  
SETTING**Abstract**

The field of astrobiology, through its breadth of scope and high level of public interest, offers a unique prospect for introductory science curricula, particularly at the undergraduate level. Traditional university-level science instruction consists of lectures and accompanying lab courses that are highly scripted to emphasize correct replication of results rather than inquiry-driven exploration. These methodologies give students the impression that science is an authoritative list of abstract concepts and experimental results requiring memorization, rather than a methodology for narrowing uncertainties in our knowledge. Additionally, this particular class structure does not take advantage of many new and emerging online multimedia technologies.

To address the shortcomings of current pedagogical approaches, we are adapting the Arizona State University introductory-level course "Habitable Worlds" for online delivery in the fall semester of 2011. This course is built around the Drake Equation, which allows us to introduce non-science students to the basics of scientific thought and methodology while exploring disciplines as diverse as astronomy, geology, biology, and sustainability in an integrated manner. The online version of this course is structured around a habitable-worlds-hunting quest, where each student is provided with an individualized universe and tasked with finding scientifically realistic computer-generated inhabited planets around real stars. In order to successfully complete this mission, students work their way through the course curriculum via interactive exercises that focus on the discovery of basic scientific concepts followed by the mathematics and models that explain them, hence inverting the lecture-lab paradigm.

The "Habitable Worlds" course is being built on the Adaptive eLearning Platform (AeLP), an innovative educational technology that provides a "tutor over the shoulder" learning experience for students. Our focus is on engaging students with rich interactions (such as data collection using Google Earth, virtual field trips, and simulations) while providing them with intelligent and adaptive feedback and lesson structure. As such, advanced students proceed quickly and are kept engaged, while students with difficulty receive the appropriate remediation and support they need. The AeLP's analytics engine allows instructors to explore large datasets of students' interaction, and assists in identifying problematic concepts or flaws in instructional design. Subsequently, instructors can further adapt and improve the content to their students' specific needs.

This type of adaptive astrobiology course, targeted at a general education audience and which additionally provides data on student interaction and misconceptions, is the next logical step for the NASA Astrobiology Institute's virtualization efforts.