Habitable Worlds: Astrobiology Meets Sustainability in the Virtual Realm. A. D. Anbar[1] [1]School of Earth & Space Exploration and Department of Chemistry & Biochemistry, Arizona State University, Tempe, AZ, 85287, USA.

We live in a unique era of human history. We are the first to realize that humans are changing the environment on a planetary scale. At the same time, by exploring the Solar System and beyond we have come to realize that life may exist on planets other than our own. Both realizations compel us to understand how habitable worlds work.

It is therefore not surprising that scientists studying global change find that they have much in common with scientists studying the prospects for life beyond Earth. Climatologists and sustainability scientists integrate basic concepts in physics, astronomy, chemistry, biology and geology to understand the future of our world. Astrobiologists and planetary scientists integrate many of the same basic concepts in many of the same ways to guide the search for life on other worlds.

At ASU we are developing a new course centered on this unifying theme of planetary habitability as a vehicle to teach basic science concepts and the practice of science to freshman non-STEM majors. This course, *Habitable Worlds*, is being designed from the ground up to leverage developments in information technologies that have radically advanced our ability to present and connect disparate forms of information. Pedagogically, these technologies provide an as yet unrealized opportunity to teach science in an integrated manner, and to do so in a way that embraces the growing need to develop college courses that can be offered online.

The philosophy underlying *Habitable Worlds* is not just that it is important to teach this material to the next generation, but also that that the importance and excitement of understanding planetary habitability will motivate non-science students to master basic scientific concepts, quantitative reasoning and integrative thinking much more thoroughly than is typical in introductory college science courses. *Habitable Worlds* is therefore intended to pioneer a powerful new approach to general STEM education.

Google Earth (GE) and its extensions to the Moon, Mars and Sky, provide a technology platform that is exceptionally well suited for *Habitable Worlds*. We envision teaching science concepts by having students interact with GE's compelling and easy-to-navigate virtual environments, enriched with embedded imagery and data. Some of these enrichments will consist of "virtual fieldtrips", involving high resolution imagery. Others will involve exploration of regional or global datasets imported to GE. Ideally, these interactions would be enhanced by social networking technologies that would permit students to interact with GE as virtual teams.

Working individually or in networked teams, students would explore these environments in a loosely guided inquiry-based mode to discover key scientific concepts. Instructors would develop GE tutorial "guided tours" to deepen understanding of these concepts beyond the level that most students can discover on their own. Student mastery of concepts would be reinforced, and perhaps evaluated, through competitive game-like "quests" in these environments, where subject knowledge would be the key to success.