

THE INSPARK SCIENCE NETWORK: USING ASTROBIOLOGY TO TEACH SCIENCE AS EXPLORATION OF THE UNKNOWN, NOT JUST MASTERY OF THE KNOWN. A. D. Anbar¹, D. Ben-Naim,² D. Schönstein², and L. Horodyskyj¹, and ¹School of Earth & Space Exploration, Arizona State University, Tempe, AZ 85284, ²Smart Sparrow LLC, 543 Howard St., San Francisco, CA 94105.

The STEM Crisis: It is widely agreed that STEM education at the introductory level in college is in crisis. These courses are where students drop out of STEM fields, a problem of major societal concern. Of equal concern but less well documented is that these courses do a poor job of teaching and motivating non-STEM majors. The end result is that fewer students enter STEM careers than needed, and those who do not enter these careers are left without the science literacy and awareness needed to meaningfully participate in and guide debates over major public challenges. These problems are especially acute for students from disadvantaged and low-income backgrounds.

A key problem is that science is too often taught as an encyclopedic collection of settled facts to be mastered rather than as a process of exploration that embraces curiosity, inquiry, testing, and communication to reduce uncertainty about the unknown. This problem is exacerbated by the continued prevalence of lecture-centric pedagogy, which promotes learning-from-authority and passive learning. Additionally, the traditional disciplinary curriculum does not seem relevant to modern students. While entry level science courses teach science in artificial disciplinary silos - e.g., biology, chemistry, physics - in their careers and lives students face challenges and questions that are inherently integrative and transdisciplinary.

Smart Courses: To address this challenge we are developing a suite of rich, interactive, adaptive online “smart courses”, modeled on the ASU, NAI-supported online course “Habitable Worlds”. A Smart Course centers on major, unanswered question, such as “Are we alone?”, that span the content of multiple introductory science courses, but are disaggregated into a suite of narrative “streams” in which students apply their knowledge in a project-based manner. Streams are discipline-specific, each mapping to the content and curriculum of a traditional introductory science. Streams are further subdivided into a series of “missions”, each of which embodies a coherent set of disciplinary learning outcomes that are taught in a project-based, problem-solving context. Each mission consists of rich, interactive, adaptive, and simulative learning activities, and is supplemented by supporting online learning resources that have been curated by world leading subject-matter experts.

The Inspark Science Network: Development, validation, and deployment of these courses at scale will be done by the Inspark Science Network, a *teaching network* that uses a unique digital platform to connect and empower scientists, educators, learning experts, and technologists who share the goal of transforming the teaching and learning of science. The network, established by Smart Sparrow in partnership with the Center for Education Through Exploration (ETX) and Arizona State University, supported by a grant by the Bill & Melinda Gates Foundation to Smart Sparrow, will provide tools that enable faculty to create and share digital courses, with an emphasis on allowing individual educators to exert pedagogical control and track student progress using sophisticated analytics. Hence, a distinctive design principle of Inspark is to empower educators to have control over online curriculum and pedagogy.