Abstract & Background

The International Genetically Engineered Machine (iGEM) competition is the premiere undergraduate synthetic biology competition and has grown from 5 teams in 2005 to over 170 teams in 2011. This showcase of a new generation of researchers focuses on open-source science, international collaboration, and novel solutions for today’s challenges. As the inaugural team from Arizona State University, we observed the nature of the iGEM phenomenon from within the competition.

We found that not only is this an open source environment ideal for scientific exchange, but also it presents a unique opportunity to discuss the responsibility we have as scientists to build the global knowledge society.

Currently this flow of knowledge to the general public is limited by the disparity between public interest in scientific matters and the scientific community’s presentation of relevant information. To address this issue, we implemented an international multi-community's presentation of relevant information. To address this issue,

Problem Decomposition

Students throughout the North American education system continue to exhibit a lack of interest in the subjects of science, technology, engineering, and mathematics (STEM). The field of synthetic biology offers a cornucopia of stimulating interdisciplinary material that can be presented in a classroom setting. How can we utilize this educational potential to increase student involvement with STEM education?

Innovating Approaches to STEM Education

The field of synthetic biology is revolutionizing the way in which scientists and engineers approach the world’s greatest problems. This rapidly developing area of research applies engineering principles to biological systems, effectively turning cells into molecular factories for a range of applications in industry, energy, medicine, and research. While this open-source field is undeniably transforming the landscape of collaborative research, its applications extend beyond the laboratory and into the classroom. In today’s rapidly expanding world, our education system is failing to adequately prepare students in science, technology, engineering, and mathematics fields. Our goal is to promote an initiative we’ve entitled SynBLOC (Synthetic Biology for Learning, Outreach and Collaboration). This university initiative offers a novel approach to innovation and education in STEM by utilizing hands-on methods in synthetic biology. This platform fosters student creativity and ingenuity by replacing the traditional paradigm of textbook-based learning with exciting and innovative do-it-yourself education.

High School Outreach

We believe that the high school division of iGEM has vast potential to stimulate current approaches to STEM education in high school.

Unfortunately, much of the perceived tediousness and rote memorization that defines many high school science classes is discouraging interest in up-and-coming scientific fields. iGEM, with its hands-on approach, could spark enthusiasm among high school students’ interest in STEM subjects.

Currently, the high school division of iGEM is centralized to the American Midwest, with sparse involvement from other regions. We aim to address this current predicament by introducing synthetic biology to high schools across the state of Arizona; we have already helped form two high school iGEM teams. We hope to spur curiosity towards the field and allow high school students to get involved in cutting-edge research opportunities.

Our vision for the future of the high school division involves a multitude of high schools across Arizona participating in the iGEM competition and spreading the competition to nearby states to transform the high school competition into one that spans the entire United States and possibly the world.