

Nature of Science Simulation

Tim Erickson, Big Time Science • tim@ceps.com • 510.653.3377

We are developing a web-based simulation system in which students learn about the nature of science by being scientists in a simulated “world.” The system gives students tools to design and conduct experiments in the world, and tools to report their results and share their conjectures. Over the course of one or more sessions, the students as a group become a scientific community advancing a new area of knowledge; besides being fun, this provides fodder for reflecting on what scientists do and on the nature of science itself.

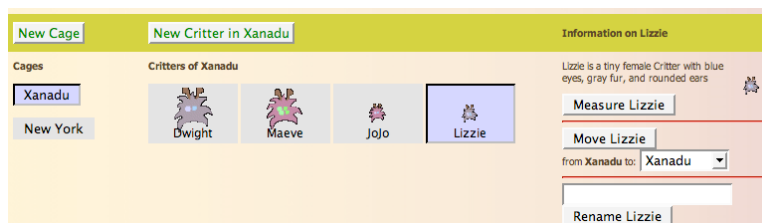
Individual students act as members of a research team; here, we identify the teams as institutions such as universities, corporations, or laboratories. (In a classroom, a team typically has two or three students. There have been as many as twelve of these “institutions” in the world.) The team has a budget—science costs money, after all—so they have to be judicious about what experiments to perform.

When the team discovers something interesting, they write it up as a very, very short paper and submit it to the “Journal” for publication. If the editors approve the paper, it gets published. The “editors” are typically the teacher, although they could be a group of students. This turns out to be the most interesting aspect of this simulation. Students love to publish, and seem to respond well to being asked for revisions. Furthermore, the Journal becomes a written record of the history of this scientific endeavor.

All of the teams in a world share the same reality, so papers help other teams understand the world; sharing information addresses the problem of scarce resources and limited budgets. But there can be any number of worlds (for example, for different classes) that may have different rules or patterns to discover.

There are also different *scenarios*. When you create a world for students, you choose what the underlying science is about. We currently (March 2008) have five scenarios, at least two of which work under our recently-revamped login system. These two are:

- **The four-color universe.** In this abstract cosmology scenario, the universe is a 12-by-12 array of cells, each of which is blue, orange, green, or red. To collect data, you specify a 3-by-3 subarray and learn the *distribution* of colors within those 9 cells (e.g., four blue, three red, two orange).
- **Extraterrestrial Critter Genetics.** We study furry critters on the surface of Eta Cassiopeiae IV, trying to learn what we can about their growth and genetics. We bring critters into cages in our lab, where—if conditions are right—they grow and breed.



This system is under development and in flux, but you are welcome to try them out at <http://www.bigtimescience.com>. Don't hesitate to contact me for help or additional information. This work is supported by the National Science Foundation under award OII-0620590.