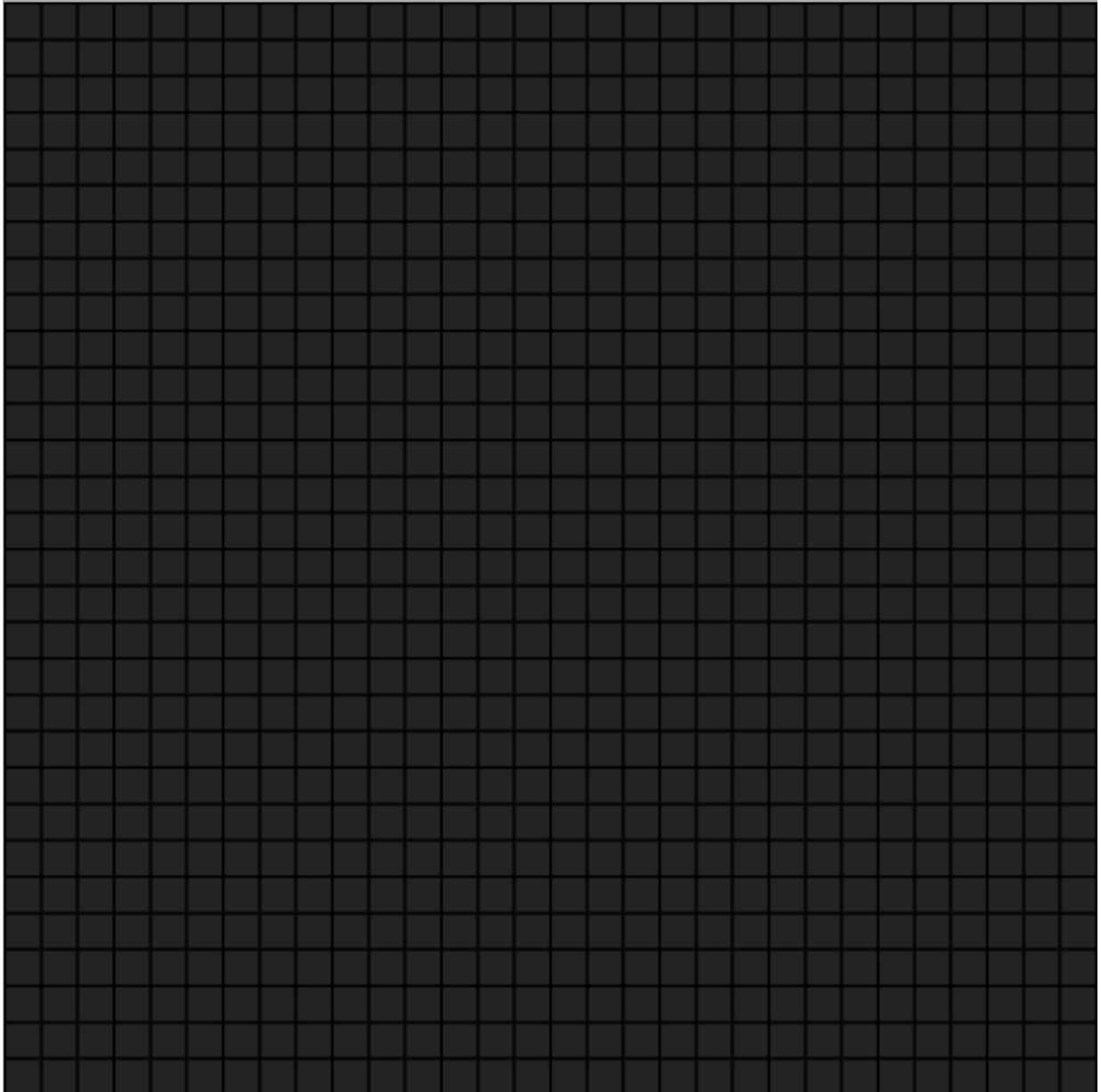


Online tool speeds up evolution education

February 5 2018, by Stefanie Sidortsova



Credit: Michigan Technological University

Students often learn best when they can apply what they're learning. In the world of science, that means engaging in the practice of science. But this can be a challenge for teachers when dealing with subjects that are hard to observe—like biological evolution. The solution? Digital evolution—computer software in which populations of digital organisms evolve.

Avida is a digital [evolution](#) software used by biologists and engineers in which [digital organisms](#) replicate, mutate and compete with other digital organisms for resources in their virtual environment. Avida is said to provide a true instance of evolution, not a simulation. Recognizing that Avida could be a powerful educational tool, researchers developed an educational version of the software called Avida-ED.

Amy Lark, an assistant professor of [science](#) education at Michigan Technological University, says Avida-ED is a more user-friendly program than Avida, a research platform for conducting and analyzing experiments with self-replicating and evolving computer programs. Avida-ED allows students to observe and experiment without any specialized computer science knowledge. Lark and colleagues at Michigan State University (MSU) recently published the results of a nationwide, multiple-case study in *The American Biology Teacher* detailing how Avida-ED curriculum was used in high school and college classrooms.

Lark's co-authors include Robert Pennock, developer of Avida-ED and a professor of philosophy at MSU; Gail Richmond, a professor of teacher education at MSU; Louise Mead, education director of MSU's BEACON Center for the Study of Evolution in Action; and Jim Smith, a professor of biology at MSU. Lark also co-authored a practitioner piece with Wendy Johnson, a biology teacher in Grand Rapids, Michigan, that

described how Johnson implemented Avida-ED in her AP Biology class; the practitioner piece was published as a companion to the multiple-case study in the same issue of *American Biology Teacher*.

Start with the Basics

Teaching the basics of evolution is difficult. To assess Avida-ED's effectiveness, as well as how it might impact understanding and even accepting evolution, the researchers selected 11 instructors teaching at eight different US institutions to implement the Avida-ED program into their classrooms.

Students started with a common assessment to gauge their understanding of the scientific principles of evolution. Teachers would then provide a tutorial on Avida-ED so that students would understand how to use the software and what they were seeing on their computer screens.

Lesson plans varied widely, but each instructor would cover the concepts of variation and randomness. To apply those concepts, students could, for example, predict what an organism would look like after replication, based on the mutation rate. After observing what happened at the individual level, they could consider what happens at the population level. After that, they might design an experiment of their own.

Grasp the Science

In using Avida-ED, students received structured lessons that targeted misconceptions—for instance, that evolution is completely random. The process shows the differences between random mutation and natural selection. As students set up experiments, they could observe that mutations are random, but selection is not.

Once the curriculum was over, students took the same common assessment they took at the start of the course. Lark and her colleagues would then compare changes in scores. In most instances, where content scores increased, so did acceptance of evolution.

"My interest is in effectively teaching the science," Lark says, explaining that understanding or learning about something and accepting it are not the same thing. "It's possible not to accept evolution, but understand the process and how it works. There are also people who accept evolution, but have no idea how it works. Avida-ED is an effective tool no matter the perspective you approach it from.

"The goal is not to change people's minds," Lark says. "The goal is to help them understand the science."

Lark is working with colleagues at Michigan Tech to potentially develop a program similar to Avida-ED that could be used for teaching climate science.

More information: Amy Lark et al, Exploring the Relationship between Experiences with Digital Evolution and Students' Scientific Understanding and Acceptance of Evolution, *The American Biology Teacher* (2018). [DOI: 10.1525/abt.2018.80.2.74](https://doi.org/10.1525/abt.2018.80.2.74)

Provided by Michigan Technological University

Citation: Online tool speeds up evolution education (2018, February 5) retrieved 25 April 2024 from <https://phys.org/news/2018-02-online-tool-evolution.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is

provided for information purposes only.