



All About Discovery!
New Mexico State University
nmsu.edu

Interactive Virtual Sorption Lab Teaches Soil and Environmental Science

Project Objectives:

Produce educational **animations, simulations, and lab activities** that are virtual, interactive, engage students, and **enhance science learning**.

Target audience:

Undergraduate students.

Potential Outcomes:

Build understanding of **concepts in soil and environmental sciences**

Topics

- Why measure adsorption? • When an adsorption experiment is appropriate. • What is adsorption? • How to do a batch sorption experiment • Number and range of samples • Experiment design
- Familiarity with equipment • How to interpret data • When to start over • Inner and outer sphere complexation.

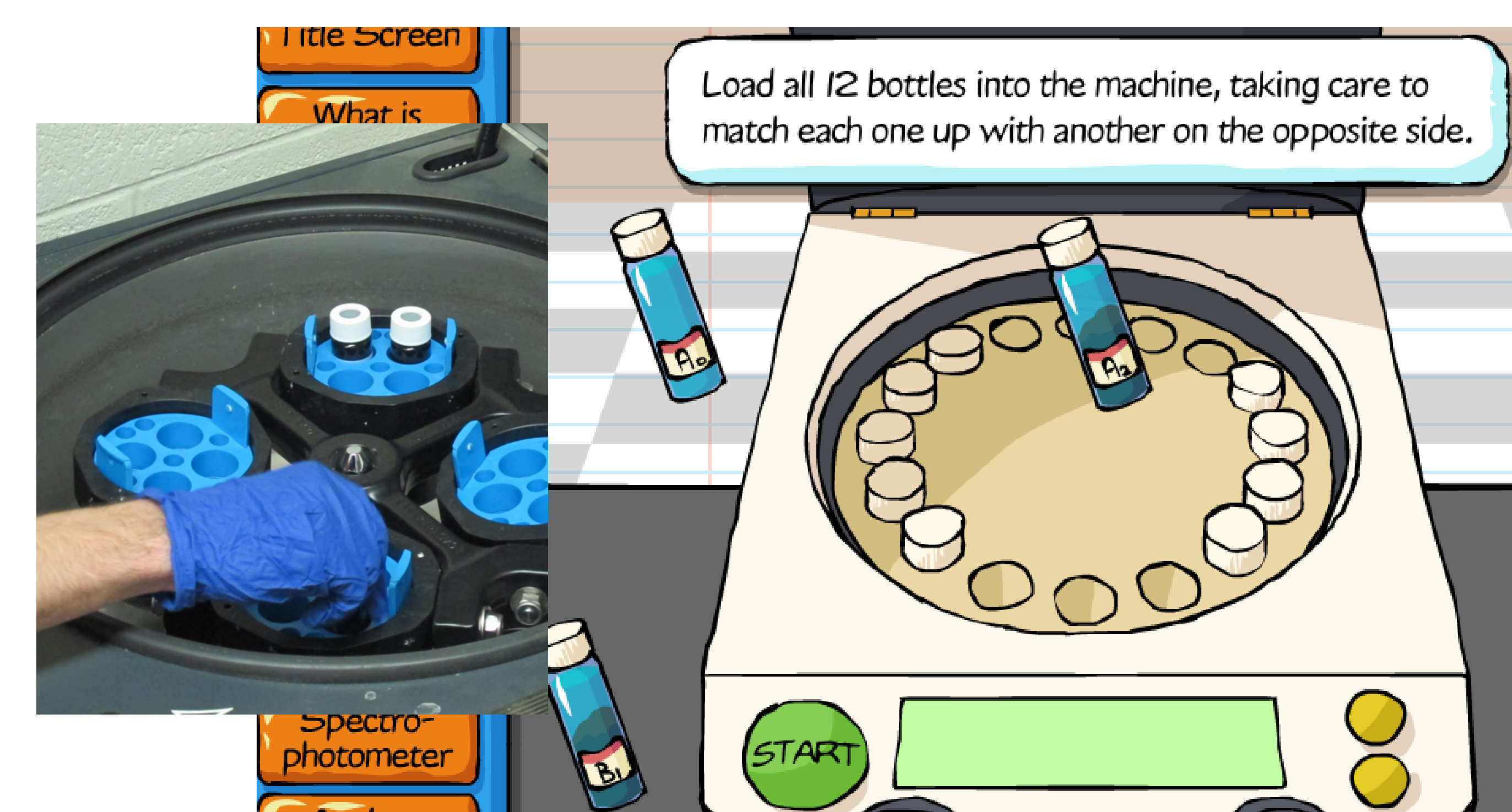
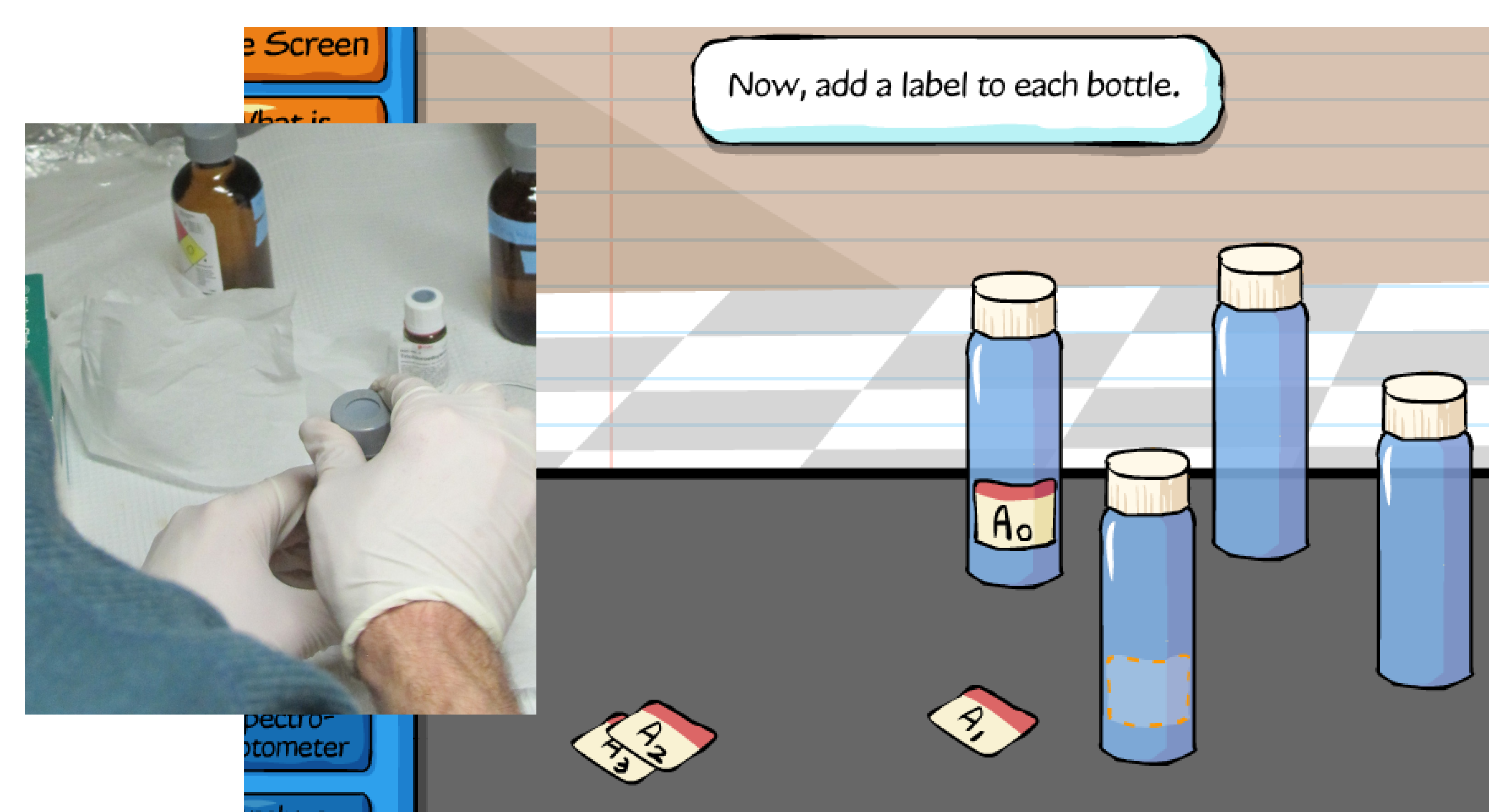
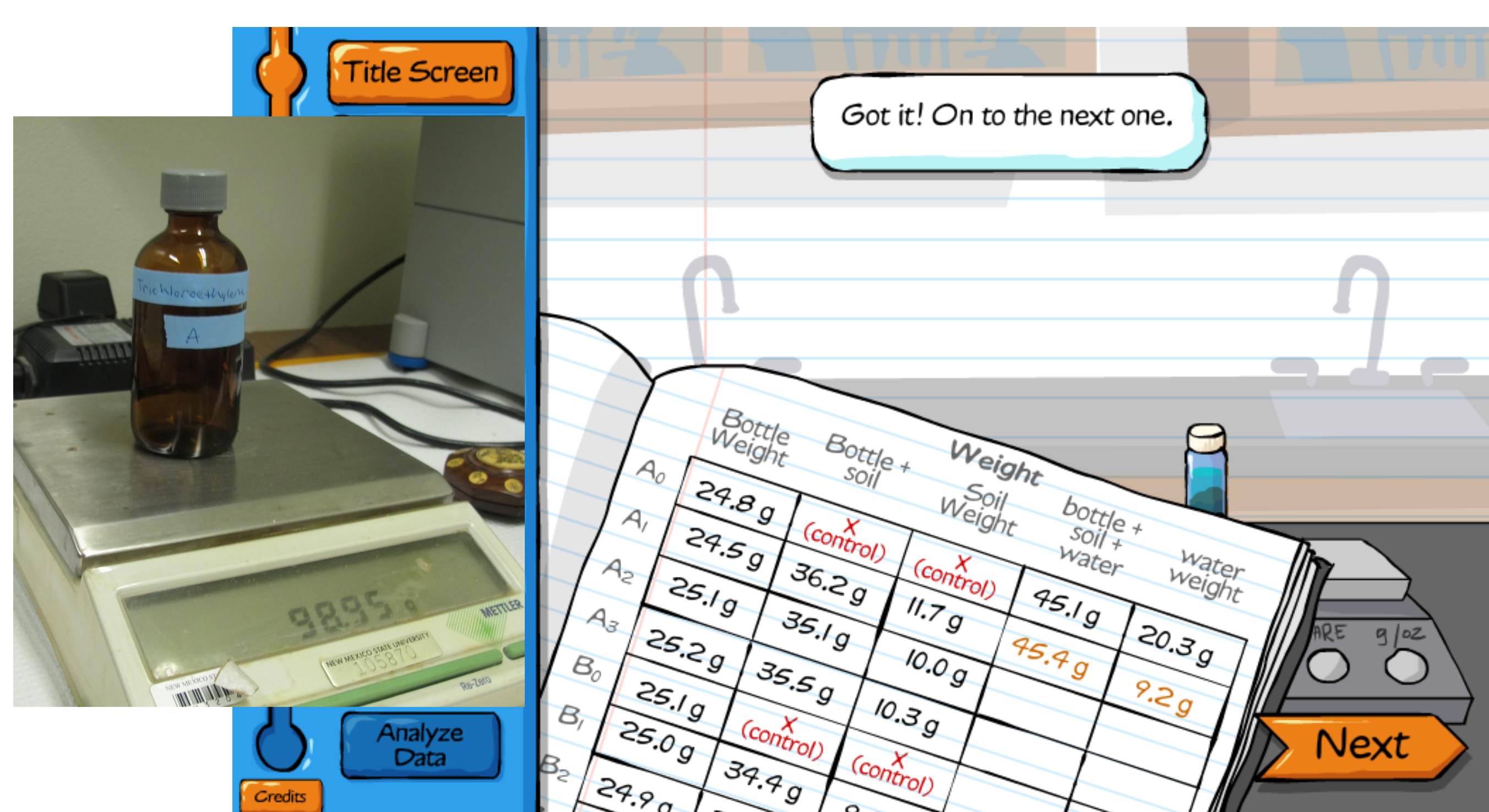
Students in soil science (SOIL) and Environmental Science (ES) used interactive modules and animated videos and gave feedback on them.

Experiential learning helps to motivate and develop new scientists, yet large classes, time constraints, and funding often limit student access to science lab facilities. In addition, some soil chemistry labs, such as adsorption or cation exchange capacity, may feel tedious, repetitive or overly time-consuming and may discourage students rather than inspire them. Online virtual labs offer a **safe environment** through which students can **interactively explore scientific concepts, lab equipment, and proper lab techniques** in mere hours rather than days. Animated videos illustrating molecular scale processes tie in with interactive modules, **enhance student comprehension** and serve as a valuable learning tool.

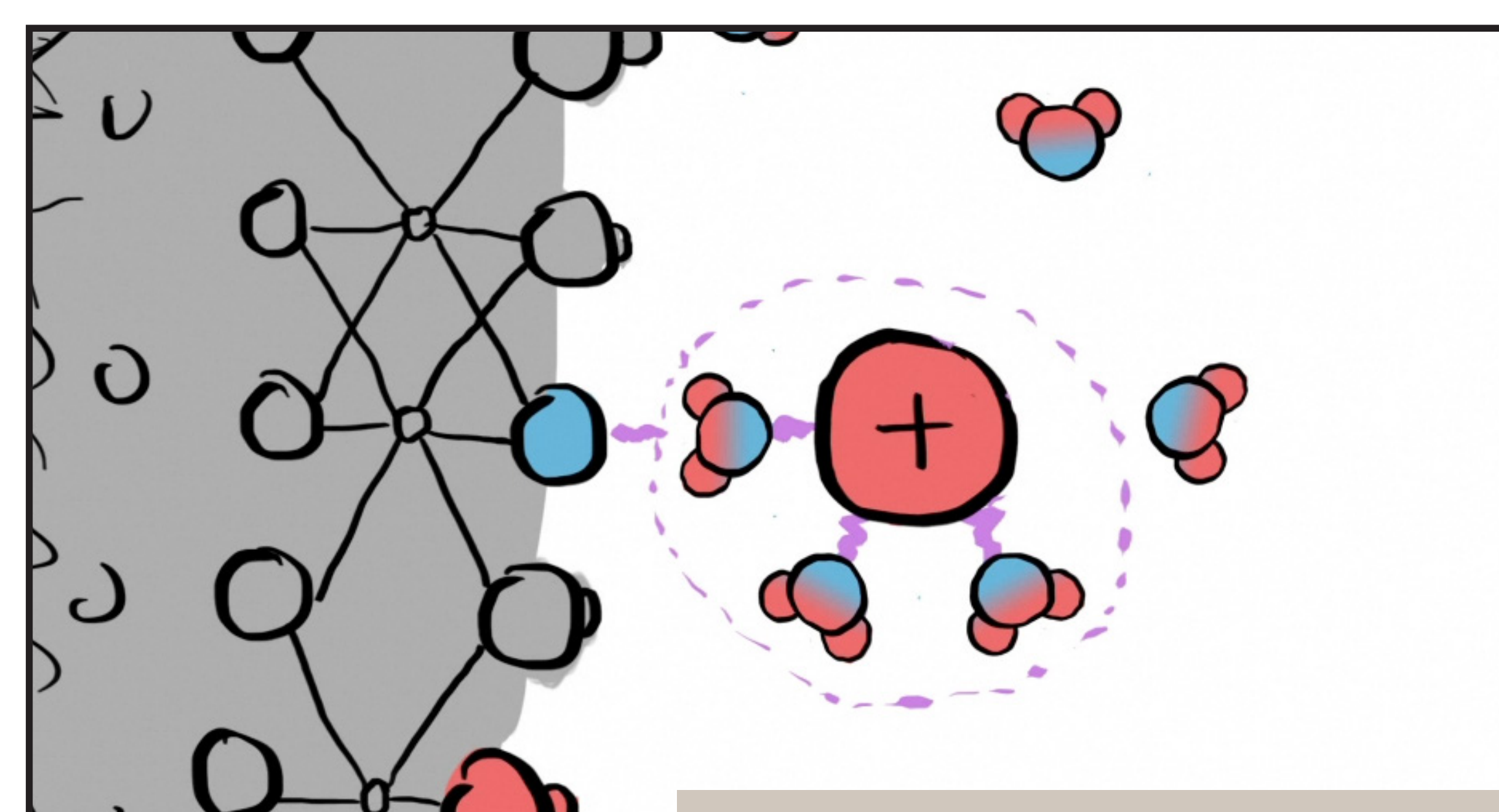
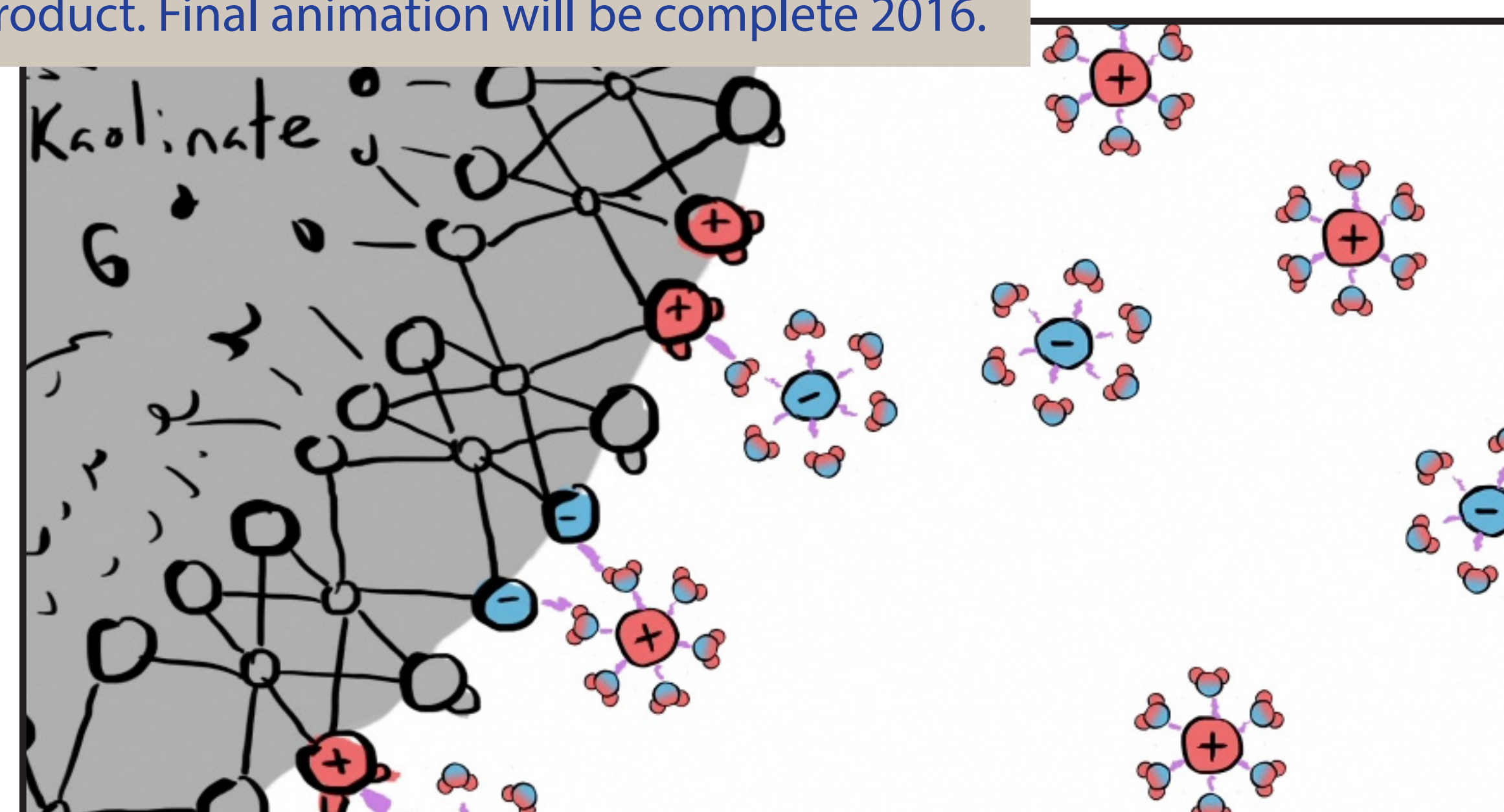
All modules are **Free online** at scienceofsoil.org

See other virtual labs at virtuallabs.nmsu.edu

The virtual labs were modeled after work done by our graduate student lab assistant. The design team followed him around as he worked in the lab, to accurately express the details of lab procedures.



These are storyboard art and not the final product. Final animation will be complete 2016.



Animations allow students to view chemical and soil processes at a molecular level

Summary

- Online interactive modules, or **virtual labs, support student learning beyond the classroom** and can be used to **supplement instruction and reinforce difficult concepts** that are more easily visualized via animation.
- Interactive, non-time-limited, application-based virtual labs are **novel methods for reaching students** of different cultures, languages, and learning styles.
- Online learning tools support students who speak English as a second language or students who just need more time to learn. **Inclusion and support** of these students supports continued student diversity and **retention of students that reflect diversity**.

April Ulery, PhD
575-646-2219
aulery@nmsu.edu

Kenneth Carroll, PhD
575-646-5929
kccarr@nmsu.edu

Barbara Chamberlin, PhD
575-646-2848
bchamber@nmsu.edu

Jeanne Gleason, EdD
575-646-5658
jgleason@nmsu.edu

Adam Dettmer
adett@nmsu.edu



Learning Games Lab
learninggameslab.org