

RET Lesson Implementation Report

Lesson Details

Name: *Karl Ernsberger*

School and grade level: *Lumos Arts Academy, K-12*

Lesson Title: *Mars Regolith Remediation Project*

Implementation Date(s): *Aug 15, 2023-Sept 28, 2023*

Reflection

Implementation

Students started on August 15th, with an overview of projects available, including Mars Regolith conditioning, Making Sandstone, and Homes with Roots, and compared the potential connections between those projects and the skills they needed to master (students previously received an overview of course goals). They then selected their project based on the best match between the project, skills to master, and personal interest.

Three teams chose to work on the Mars Soil project, each with a different approach.

One decided to look at the survivability of Mars soil for established desert plants in a carbonate-rich atmosphere.

One decided to look at the viability of Nitrate-contaminated soils (a chemical relative of Perchlorate) for germinating new seeds.

One decided to revisit prior attempts at filtering out Perchlorate (via the Nitrate analog) using solvents.

Each team received research methods training, and then conducted their trials.

Each team compiled results and presented findings to the other teams for review and comment.

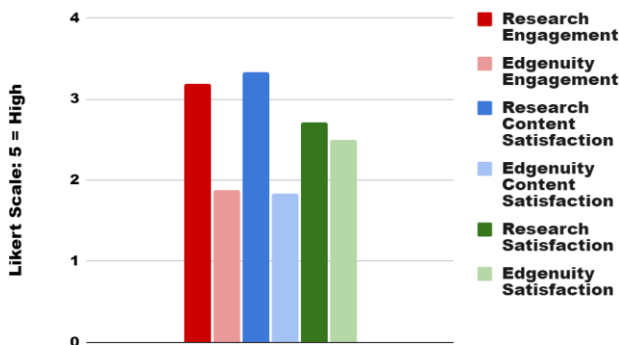
Student Outcomes

*Student engagement was high for the duration of the project training cycle, and students did achieve *most* of the learning goals they selected.*

Students generally preferred to use the prebuilt trial kits, though one team opted to separate trials into smaller tupperware containers (so the gasses of each trial would not commingle).

Students asynchronously tracked their project process by posting documentation through preset forms and templates as their projects progressed. The forms and report templates auto-populated points awards for achieving a stated goal through a homebuilt Wordpress grading automation system, incorporating ChatGPT assessment prompts for larger documents. At the end of the project cycle and training, students provided feedback comparing their experience with the alternative option available to them. The chart below summarizes their average response, showing their preference for the research-styled program over the video lecture method.

Survey Averages: Edgenuity VS. STEM Program



Revisions

The points system I implemented for tracking student achievement needed some revision and refining. In the future, I will have the points system finished and student accounts available before beginning the research process. I intend to continue refining the grading automation system, the ChatGPT prompts, and the research orientation module as students gain experience in the process and provide feedback on needs and challenges.

I might also revise the kits a bit, to include the option of separable containers along with the main tub, some seeds and sample soil, a cold pack (for the Ammonium Nitrate to use as a Perchlorate analogue) and not as many Arduino components (as most teams preferred to use soil testing kits instead of the Arduino systems)