Project: Developing 3D models with high school students for plant and agriculture science education

BACKGROUND

This project addresses the disconnect between science, design, and technology through the creation of plant 3D models. High school students benefit from innovative learning experiences in plant and agriculture sciences that allow them to gain the interest and skills needed for future STEM careers.

GOALS

- Generate awareness that design and technology are part of science and vice versa.
- Promote collaboration through teams of art-, science-, and tech-oriented students working on the creation of 3D plant models.
- Collaborate with scientists from the Donald Danforth Plant Science Center (DDPSC).
- Develop communication skills through presentations in public and scientific events and writings of worksheets.
- Learn about the applications of 3D models in augmented and virtual reality (AVR) environments.
- Foster knowledge and appreciation of plants and plant science.
- Inspire interest in STEM and provide skills for a future STEM career.
- Contribute to education research by participating in surveys and sharing artifacts (e.g., 3D models, photos, drawings, etc.).

DURATION OF THE PROJECT

~4 weeks, a quarter, or a semester:

- 1 week for student training in 3D modeling, set up teams, choose species, and complete education research pre-surveys.
- 2.5 weeks to design, create, and test the 3D models, prepare team presentations and worksheets, and experience in-person the application of 3D models in augmented and virtual reality devices.
- 0.5 week to present group projects and complete education research post-surveys.

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MATERIALS AND COMMITMENTS

Provided by the DDPSC	Provided by the schools
8 zSpace AIOs with 1 camera	Proper area to display the zSpaces (well-ventilated room, away from direct sunlight, with sturdy surfaces to place the zSpaces)
8 3D glasses, 16 2D glasses	Continuous electrical source to keep the zSpaces on for continuous updates
5 Oculus Quest	Care and safe use of the zSpace and Oculus equipment
Protocols and cleaning supplies	Maintenance and cleaning of the equipment to prevent infectious diseases


PROJECT STEPS

1. Guide student 3D modeling training using videos of Tinkercad and Fusion 360 software.
2. Establish student teams compose of art-, tech- and science- oriented students.
3. Support student teams in planning their projects to design, create, and test 3D models related to plants and agricultural science.
4. Collaborate with Danforth scientists to support teams in the creation of the 3D models.
5. Introduce the zSpace and the Oculus platforms to the students and the use of 3D models in these environments (in-person).
6. Guide the teams to prepare presentations of their projects and write worksheets.
7. Coordinate with the teams to present projects at scientific and education events with the Danforth Center.
8. Share student artifacts with the DDPSC and complete the education research surveys for both the teacher(s) and students.

THINGS TO DO TO IMPLEMENT THIS PROJECT

Mark the tasks as you complete them.

- ☐ Contact the project manager to coordinate the implementation of the activity (Dr. Sandra Arango-Caro, sarango-caro@danforthcenter.org).
- ☐ Access your Google Classroom space using the link provided by e-mail.
- ☐ Read the assigned material.
- ☐ Read, sign, and return the photo release and responsibility forms.
- ☐ Follow the detailed project steps provided in protocols.
- ☐ Share the artifacts generated (e.g., photos, 3D models, student presentations, student worksheets).
- ☐ Complete with your students the education research pre- and post-surveys.
- ☐ Coordinate the return of the equipment and materials.

CONTACT INFORMATION

Project Manager
Dr. Sandra Arango-Caro
Education Researcher
Education Research and Outreach Laboratory
Donald Danforth Plant Science Center
Sarango-caro@danforthcenter.org

Director of Education
Dr. Kristine Callis-Duehl
Education Research and Outreach Laboratory
Donald Danforth Plant Science Center
KCallis-Duehl@danforthcenter.org

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