



Georgia NASEF Farmcraft® 2024 Project Based Learning: Preseason Challenge #3: Agriculture Tech with Regenerative Practices

Overview:

In this Project Based Learning (PBL) lesson, students will be tasked with researching how smart machinery is used to reduce environmental impact while promoting sustainable farming practices. Students will then present their learning by building and sharing a Minecraft world that displays and demonstrates their understanding and educates others on precision agriculture integrated with regenerative practices.

Focus Standards:

- NGSS Standards
 - MS-ESS3-2 Earth and Human Activity - Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.
- ITTEA Standards for Technological and Engineering Literacy –
 - STEL-1Q - Conduct research to inform intentional inventions and innovations that address specific needs and wants.
- ISTE Standards
 - 3 Knowledge Constructor - Students build knowledge by actively exploring real-world issues and problems, developing ideas and theories, and pursuing answers and solutions.
 - 6 Creative Communicator - 6c Students communicate complex ideas clearly and effectively by creating or using a variety of digital objects such as visualizations, models, or simulations.
 - 7 Global Collaborator - Students use digital tools to broaden their perspectives and enrich their learning by collaborating with others and working effectively in teams locally and globally.
- Georgia Agriculture Standards-
 - AFNR-SA-3 Define sustainability and discuss the principles and concepts of sustainable agriculture.
 - AFNR-PSB-19 Analyze the effect of plant production on the environment.
 - AFNR-SA-6 Identify the importance of crop management and its relationship to sustainable agriculture.



Objectives:

- Students will research both economic and environmental benefits of using precision agriculture.
- Students will investigate common methods of incorporating regenerative soil practices on commodities specific to Georgia.
- Students will design a Minecraft world that educates others on smart technologies and the utilization of regenerative agriculture practices.

Requirements/Task(s):

- Task 1: Complete a K-W-L chart (example provided below) of how smart technology is used by farmers in Georgia.
- Task 2: Research how to use regenerative agriculture practices with Georgia-specific crops and native species.
- Task 3: Build, narrate, and submit a Minecraft world that demonstrates learning and displays and demonstrates their understanding and educates others on creating a farm that utilizes regenerative practices and incorporates smart technology.

Procedure:

1. Students will tune into the livestream or watch the recording of the NASEF Farmcraft 2024 livestream, “GA NASEF Farmcraft 2024 Preseason Challenge #3.” It is recommended that the team sponsor/educator watch with the students.
 - a. Tuesday, March 12, 2024 @| 3:00pm ET
 - b. Livestream and recording [YouTube playlist link](#)
2. **Present the challenge to the students:**

Pre-Season Challenge 1: Agriculture Tech & Regenerative Practices

In order to promote soil health and reduce waste, there needs to be both efficient and convenient conservation strategies implemented by farmers. The utilization of new technologies, allow farmers to consider when and how much a resource is used on their farm.

Research the type of technology and tools used on farms in Georgia to optimize resource use. Build, narrate, and submit a Minecraft world that demonstrates your learning, displays your understanding, and educates others on smart technology tools and regenerative agriculture practices.

Some questions to consider when researching and developing your build:

How is precision agriculture, or sensor technology and data analytics, being used to optimize resource use?

What are challenges facing conventional agriculture?

What is regenerative agriculture and what are common strategies utilized to rebuild the soil?

What are common agricultural commodities grown and raised in Georgia, and how can regenerative practices be applied locally?

What are companion plants that can help attract pollinators to your fields?



Considering the questions above, **guide the students through the “K” and “W” portions of the K-W-L chart.** K-W-L charts are graphic organizers that guide students through organizing information before, during, and after a unit, project, or a lesson. They can be used to engage students in a new topic, activate prior knowledge, share unit objectives, and monitor students’ learning.

Ask students what they KNOW (or believe they know) This information may be incorrect, inaccurate, or misinformed. For this step of the process this is acceptable as their learning and research should be utilized to address misconceptions.

Ask student what they WANT to learn (or need to learn to effectively complete their project).

Learn more about K-W-L charts here: <https://www.lucidchart.com/blog/what-is-a-kwl-chart>

K-W-L Chart		
Topic:		
What I KNOW	What I WANT to Learn	What I LEARNED

3. Guided student research

Students will investigate and explore the information necessary to complete their project based on their responses to the first two columns of the K-W-L chart.



Possible Resources

Precision Agriculture:

- <https://www.nifa.usda.gov/grants/programs/precision-geospatial-sensor-technologies-programs/precision-agriculture-crop-production>
- <https://iipa.uga.edu/research/>
- <https://www.gpb.org/news/2023/04/27/precision-agriculture-technology-helps-farmers-they-need-help>
- <https://www.cubiclecom.com/blog/5g-agriculture-smart-farming/>

Regenerative Agriculture:

- <https://www.gpb.org/news/2022/11/03/big-food-companies-commit-regenerative-agriculture-skepticism-remains>
- <https://storymaps.arcgis.com/stories/119b66ab881c48c6b03648fd414317b6>
- <https://discover.caes.uga.edu/restoring-the-earth/index.html>
- <https://www.gfb.org/learn/abt-ga-ag>
- <https://sustainagga.caes.uga.edu/resources/production.html>
- https://secure.caes.uga.edu/extension/publications/files/pdf/B%201349_1.PDF
- <https://content.ces.ncsu.edu/composting-on-organic-farms>

Have students share their resources and findings. **Guide the students through completing the “L” portion of the K-W-L chart.** This should serve to inform their choices in their builds.

4. Project Build:

Review the challenge with the students.

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Students will work together with their team to complete the challenge in Minecraft Education Edition. Use this time to remind students to refer to their K-W-L chart to ensure they are including the information and discussion points they have discussed.

For technical support and regarding the use of Minecraft Education Edition for the challenge, please see the Using Minecraft: Education Edition NASEF Farmcraft Guide: <https://www.nasef.org/media/3678/nasef-farmcraft-using-minecraft-education-edition.pdf>

5. Submission:

To submit their projects, guide students to the NASEF Farmcraft 2024 Flip:
<https://flip.com/962a73de> and select Preseason Challenge #3

Before submission, students should be asked to consider the following regarding their videos:

- o Make sure we can see what you are showing us.
- o No shaking: Consider the viewer. Are you keeping the “camera” steady?
- o Can we hear you? Is the audio clear?
- o Make sure to have the team’s name in the title of the Flip submission

Special thanks to Dr. Wesley Porter, Associate Professor, Department of Crop & Soil Sciences, [Institute of Precision Agriculture](#) Extension Faculty at the University of Georgia (UGA), who helped consult on this challenge.



K-W-L Chart

Topic:

What I KNOW	What I WANT to Learn	What I LEARNED