
PROJECT TITLE – STEAM SCHOOL GARDEN

Steam Integration:

STEAM Integration		
Science	Engineering	Design

Topic:

This project brings together science and engineering with design in the form of a school garden that students plan out and construct together

Targeted Age Group:

6-8th Grade students, can scale down to 4-5th grade

Lesson/Project/Unit Overview (Summary):

Work on this project starts in the fall with students researching their growing zone, determining what plants/vegetables are best suited to their location, and working together to decide on a list of things to plan in the spring semester. Student groups should begin keeping detailed journals or workbooks to document their progress. Students will reference the vegetable planting calendar and make note of when their chosen vegetables should be started indoors and when they should be transplanted outside.

From here, students will learn about the design of garden beds and how to best arrange their chosen plants. Additionally, students will focus on design and aesthetics. They will make plans to incorporate their garden into an existing green/outdoor space on the school campus, with special focus being given to design choices that make the gardens a pleasant addition. For the rest of the fall semester, time will be spent constructing the garden beds and preparing them for planting.

In some cases seeds can be started indoors as soon as the spring semester starts, and students will follow their plan outlined in the fall for starting and transplanting.

At this point, student groups should be assigned duties for plant maintenance and care. Additionally, there are several other mini-projects that can be done as the vegetables are growing, including a couple different computer science/engineering-focused projects that focus on soil moisture content.

Project Length:

This project is best approached as a year-long effort

Learning Goals

STEM Learning Goals	Arts Learning Goals
<ul style="list-style-type: none"> • Students will learn about planting various vegetables most suited to their geographic location and why the location is important • Students will learn about constructing garden beds, implementing engineering methods and applying math 	<ul style="list-style-type: none"> • Students will learn about how to arrange visual elements in a physical space • Students will learn how to document their ideas by sketching out initial designs • Students will

Learning Standards

National Standards

International Society for Technology in Education (ISTE)

1.4 Innovative Designer - Students use a variety of technologies within a design process to identify and solve problems by creating new, useful, or imaginative solutions.

1.4.a - Students know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts, or solving authentic problems.

1.4.b - Students select and use digital tools to plan and manage a design process that considers design constraints and calculated risks.

State Grade Level Standards

S6E6.b Design and evaluate solutions for sustaining the quality and supply of natural resources such as water, soil, and air.

AFNR-MSAGED6-2 Importance of Agriculture Demonstrate the importance of agriculture.

STEM-FET-6 Apply fundamental principles of the engineering design process.

STEM-FET-6.1 Understand and apply the engineering design process through project based learning activities.

STEM-FET-6.2 Conduct technical research to develop possible solutions to a stated engineering problem.

STEM-FET-6.3 Refine a design by using technical sketches, prototypes and modeling to ensure quality, efficiency, and productivity of the final product.

Vocabulary

Background knowledge required of teachers/students

Teachers should be aware of the resources they give to students, but it is okay to start this project with expert knowledge of gardens or vegetables. A lot of the initial work that students do as part of this project is research-based, so the class can work together to learn.

[Planting Calendar](#): Students will use this to identify their geographic location and determine what vegetables to grow, when to start seeds, and when to transplant them.

[Guide to Vegetable Gardening in Georgia](#): In-depth guide. Contains a detailed planting chart for the state of Georgia. Highly recommended to find a resource like this for your state if it exists.

[Basic Guide on Constructing a Garden Bed](#): Useful in helping to guide students in their own garden bed design

[Guide to seed starters](#): This is a comprehensive walkthrough on how to making seed starters

[Guide to transplanting seeds \(indoors to outdoors\)](#): Consult this guide when the time for transplanting seeds is drawing close, contains instructions for when and how to safely transfer seedlings outdoors

DRIVING QUESTION:

ENGAGE:

Section Goal: Students are introduced to the project and will participate in planning activities that foster interest in the garden. Students should be able to explain the benefits of accessible vegetable gardens and the impact they can have on a community.

Section Activities (2-3 class periods):

- Initial research into vegetable gardens
 - How does a garden fit into the existing ecosystem of the school?
 - Why is affordable access to vegetables important to communities?
- Show students example of different vegetable gardens, ranging from personal gardens to community efforts to city projects
- Establishing class or club leadership for the project

EXPLORE:

Section Goals: Students will research their growing zone and determine what vegetables are best suited for their location and climate. They will be able to explain the geographic conditions that contribute to certain vegetables being better choices than others. Students will decide on a list of vegetables to grow in the school garden and create a planting calendar with their choices.

Section Activities (1-2 weeks):

- Students research their growing zone
- Student groups choose one to two vegetables (depending on size of group) and research them with the intent to pitch their vegetables to the class as candidates for the garden
 - Pitches can take any form, but a powerpoint or poster presentation is recommended
 - The class/club should decide on a batch of vegetables to plant. Depending on the size of the group and the size of the space available, it is recommended to choose anywhere from 3-6 vegetables.

Resources:

- [Link to planting schedules based on zones](#)

EXPLAIN:

Section Goals: Students will be guided through the process of constructing garden beds in preparation for planting in the spring semester.

Section Activities (2-4 weeks):

- Students should first be given the opportunity to design what they think should be the layout for the school garden, then present their ideas to the class/club. Students should explain:
 - Their arrangement of the garden beds
 - How they integrate the design of the garden into the existing school green space
- Teacher will guide the class towards a design that incorporates input/ideas from the students
- Teacher walks through the process of constructing garden beds, construction takes place before end of fall semester so that beds are ready for spring planting
 - Can finish in early January since most vegetables will be seed starters at that point

Resources:

- [Guide to constructing garden beds](#)

ELABORATE:

Section Goals: Students will apply what they've learned in the fall semester to plant their chosen vegetables.

Section Activities (2-3 months spring semester):

- Students prepare seed starters indoors for their chosen vegetables. It is recommended to use either **plastic seedling trays** or **styrofoam cups**. Styrofoam cups can be much easier to manage individually - consider having each student prepare their own seed starter and write their name on it. Then, they can track the progress of their vegetable through the entire growing process.
 - Have students keep track of their seedlings' growth in their notebooks



- When the seedlings begin to outgrow their initial containers (after 4-6 weeks when they're around 2-3 inches high with some leaves), it is time to transfer them outside. Ideally this takes place on an overcast day so that the plants are not exposed to harsh sunlight before they get settled in.
 - Consider using plastic plant tags to have students label which plants came from the seedlings they prepared
- Repeat the above processes for each vegetable - it is likely that they will be started and transplanted at different times.
- While the vegetables are growing outside, have students take periodic measurements (1-3 times per week)
 - Soil moisture content
 - Height

- o Temperature for the day
- Additionally, students should have assigned care/maintenance days - ensuring that the vegetables receive an appropriate amount of watering

Resources:

- [Guide to seed starters](#) - this guide contains a materials list
- [Guide to transplanting seeds \(indoors to outdoors\)](#)

EVALUATE:

Section Goals: Students will develop an end of year presentation to reflect on their efforts on the garden project and what they accomplished.

Section Activities (1-3 days):

- If the timing works out for some vegetables (those with May harvests), consider hosting a showcase where the class/club can show off what they grew and harvested.
- Students should use their documentation from the school year to present the construction of the garden from beginning to end.