

ROOM
to GROW
student guide

ROOM TO GROW CHALLENGE

Identify a Problem

The world population is growing at a rate of 1.13% per year. The current average population change is estimated at around 80 million per year (www.worldometers.info). The expanding population is creating less and less growing space and there is a need for year-round production. There are limitations of available resources due to the factors of this growth. Around the world, there are remote locations with limited resources to allow for climatically controlled growing. Individuals in large urban areas struggle with finding the space to grow food.

Response to Problem

How can you contribute locally to the impact problems, such as population growth, limited space for growing food, access to resources, and year-round plant-based food production? What type of growing structure would help reduce the effects of a global or national problem such as the ones listed above?

Design, build, and utilize a growing structure that can be used in your unique location or situation to help maximize the availability and access of food.

This system must address the following needs:

- Produce a plant-based food source
- Maintain an environment that is suitable for plant life for a maximum of 90 days
- Must maximize production per square footage

Success will be determined by:

- Harvest an edible food product within 90 days or show progress of plant growth within the timeframe allotted for your specific situation
- Create and maintain an environment that is suitable for plant life
- Posting a picture or short presentation showcasing the team's prototype to social media using #PurplePlowChallenge.



1. IDENTIFY

PURPOSE OF STEP

Define the problem and how it is affecting life globally, nationally, and locally. Research and consider how others have approached solving the program. Describe why this problem needs a solution. Determine constraints (e.g., time, space, resources, etc.).

STUDENT PROMPTS AND GUIDING QUESTIONS

- How does population growth affect how plants are grown?
- What are the limitations for how food can be grown?
- What effect does population growth have on the available resources to grow foods?
- How can we be more efficient about where, what, and how plants are grown?
- What types of plants are being grown locally?
- What are the plant-based food needs in the local community?
- What is the accessibility to fresh plant-based foods in the local community?
- What types of plant-based foods could be produced year-round?
- Considering the local climate, what is the length of the growing season and how does that impact what types of plants can be grown?

SIGNS OF STEP COMPLETION

Present a description of the problem to the facilitator. Be sure to include how this problem affects communities globally, nationally, and locally. The description should also include ways in which others have addressed finding a solution and constraints to be considered (e.g., time, space, resources, etc.).



1. IDENTIFY REFLECTION

Important discoveries during this step:

Impacts to the global, national, and local community:

Plans for the next step (e.g., knowledge to gain, questions to answer, preparations to make, etc.):



2: IMAGINE

PURPOSE OF STEP

Brainstorm solutions to the problem. List all of your ideas – don't hold back! Discuss and select the best possible solution. **During this step, encourage students to utilize the "Room to Grow Content Packet" provided for this challenge.**

STUDENT PROMPTS AND GUIDING QUESTIONS

- What do plants need to grow?
- What space is available to grow plants year-round?
- What are some unique places to grow plants year-round?
- What structures can be used to grow plants?
- What types of climate fixtures (e.g., heating, cooling, lighting, ventilation, irrigation, etc.) are needed to grow plants?
- What materials can be used to build these growing structures?
- What types of materials are unique to the local community?

SIGNS OF STEP COMPLETION

Present a list of possible solutions to your identified problem to the facilitator.



2: IMAGINE REFLECTION

Important discoveries during this step:

Impacts to the global, national, and local community:

Plans for the next step (e.g., knowledge to gain, questions to answer, preparations to make, etc.):



3: DESIGN

PURPOSE OF STEP

Diagram the prototype. Identify the materials needed to build the prototype. Write out the steps to take. Describe the expected outcomes.

STUDENT PROMPTS AND GUIDING QUESTIONS

- Design a structure that meets the demands set forth in the challenge.
- Determine what specific materials would be used in the construction.
- Justify why particular design choices have been made.
- Justify why particular materials have been chosen.
- What crops will successfully grow in the growing structure?
- Create a supply list and budget.
 - What specific materials will be used to build the growing structure?
 - How will materials be obtained?
 - What is the cost of these materials?
- In what ways will the production of the growing structure be measured?
 - What will need to be observed (qualitative data)?
 - What information can be put into a chart or graph (quantitative data)?

SIGNS OF STEP COMPLETION

Present a detailed diagram of the prototype as well as a written plan of how it will be built. Be sure to include a materials list with budget, detailed directions, and expected outcomes.



3: DESIGN REFLECTION

Important discoveries during this step:

Impacts to the global, national, and local community:

Plans for the next step (e.g., knowledge to gain, questions to answer, preparations to make, etc.):



4: CREATE

PURPOSE OF STEP

Follow the design plan and build the prototype.

STUDENT PROMPTS AND GUIDING QUESTIONS

- Use all research, knowledge gained, and the design plan to create the growing structure.
- Repeat any of the previous steps should issues arise during the building process.
- Consider the parameters of the challenge and what needs to be accomplished for a successful challenge.

SIGNS OF STEP COMPLETION

Build the prototype and share with the facilitator.



4: CREATE REFLECTION

Important discoveries during this step:

Impacts to the global, national, and local community:

Plans for the next step (e.g., knowledge to gain, questions to answer, preparations to make, etc.):



5: TEST + IMPROVE

PURPOSE OF STEP

Test the design and collect quantitative and qualitative data. Discuss results and compare with the expected outcomes. Seek areas of improvement and make changes where needed.

STUDENT PROMPTS AND GUIDING QUESTIONS

- Analyze the production of the growing structure created.
- Create data tables, graphs, photographs showcasing production, etc.
- Calculate growth efficiency.
- Based on the data, what predictions can be made about the sustainability of the growing structure?

SIGNS OF STEP COMPLETION

Keep record of all test trials and share data with the facilitator. Entries should include both qualitative and quantitative data. Record any improvements made to your design prototype and the effect they had on outcomes.



5: TEST + IMPROVE REFLECTION

Important discoveries during this step:

Impacts to the global, national, and local community:

Plans for the next step (e.g., knowledge to gain, questions to answer, preparations to make, etc.):



6: SHARE

PURPOSE OF STEP

Communicate what was learned. Share the design, data, and conclusions. Present results.

STUDENT PROMPTS AND GUIDING QUESTIONS

- Develop a presentation including knowledge gained, design plans, materials used to create the structure, testing completed during challenge, and data analysis.

SIGNS OF STEP COMPLETION

Present what was learned through the design process. Share how the prototype addresses the problem, key aspects of design, data from test trials, and end results.

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