



Introduction

In this unit, learners explored apple preservation and packing within a community context through inquiry-based learning and project-based learning per the engineering design process. Learners explored the reasoning and science behind the choices that food scientists and packaging engineers make in their careers to address real-world concerns such as food waste and overproduction.

Target Audience: 4th-6th graders

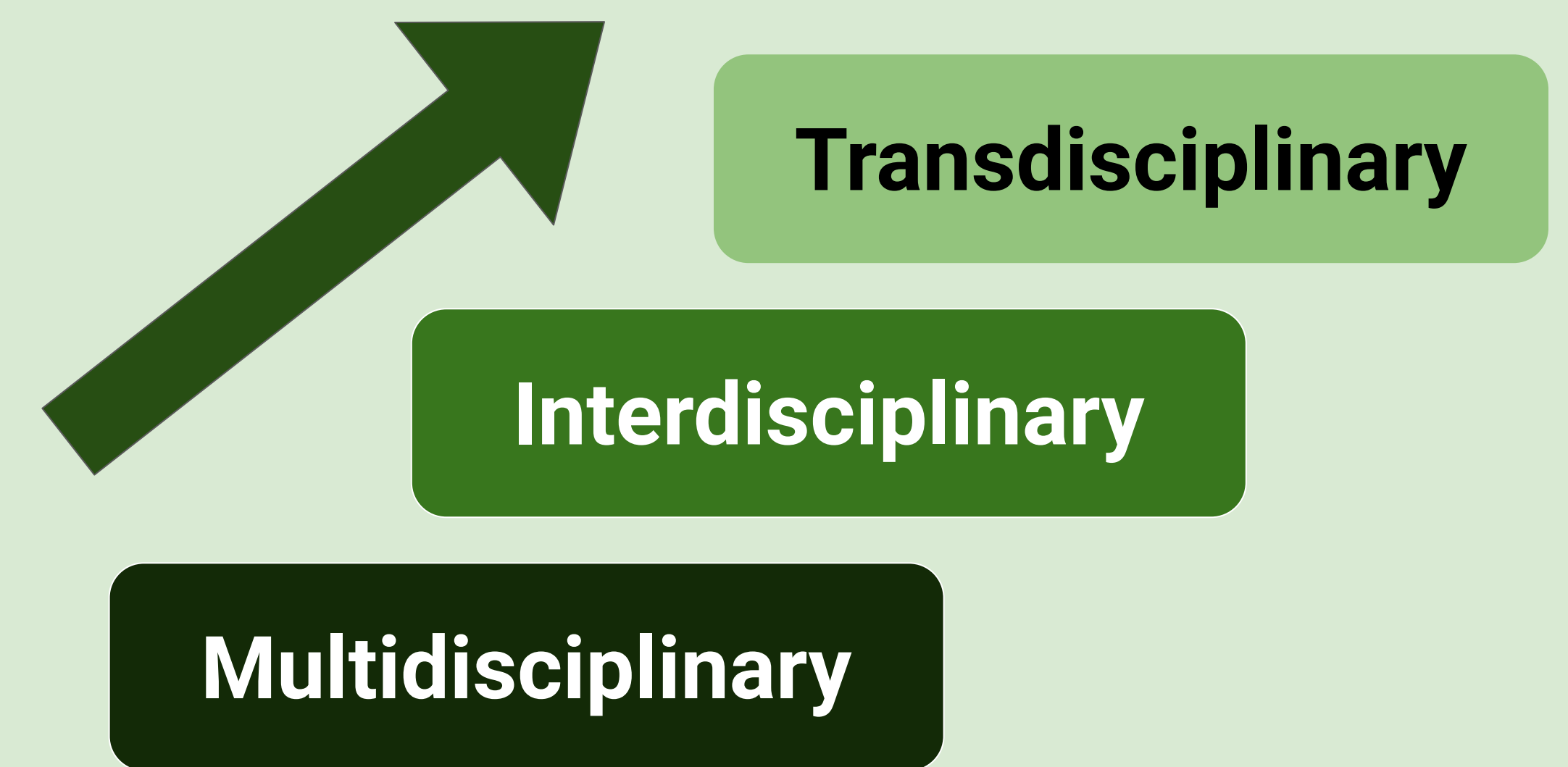
Estimated Time: (5) 45-minute classes for instruction, (1) 45-minute class for summative assessment

Unit Objectives

Students will be able to:

- Communicate all steps of their food packaging and preservation designs
- Navigate the engineering design process
- Defend their choice of anti-browning agent and materials
- Justify and evaluate design choices by describing how they meet the constraints and criteria and applying quantitative measures

STEM Integration



Lesson 1

Activate Prior Knowledge

- Students connected science and technology to items in their kitchens.
- Students explored how food packaging is a technology.
- Students compared packaging options for different applications.



Lesson 2

Inquiry Learning

- Students engaged in guided inquiry that requires them to design an experiment.
- Students tested various materials to observe and recorded how they affected a browning apple slice.
- Students gained foundational knowledge and evidence to make packaging design decisions.

Lesson 3

Inquiry Learning

- Students explored the purpose of packaging designs.
- Students engaged in guided inquiry to explore materials.
- Students identified the purposes and safety of packaging design.



Lesson 4

Engineering Design

- Students wrote a problem statement for the apple packaging project.
- Students co-created constraints and criteria.
- Students reviewed preservation practices learned during Lesson 2 and material properties learned during Lesson 3.
- Students designed and built packaging that met the constraints and criteria.

Lesson 5

Engineering Design

- Students co-developed tests to evaluate the criteria.
- Students tested their designs and collected evidence.
- Students used evidence to argue whether or not their design met the criteria.
- Students revised their design based on test results.



Assessment

Performance Outcomes

- Students wrote directions that communicated their preservation and packaging process.
- Students used evidence gathered throughout the unit to justify their design decisions

Resources & References



Acknowledgements

Thank you Dr. Hui Hui Wang and Dr. Neil Knobloch for building our foundation in STEM integration and the support along the way.

Thank you Lyn Treece Boys & Girls Club for allowing us to teach and interact with your learners and for sharing your space with us.

Agriculture, Food & Natural Resources (AFNR) Connections

Food production and packaging is the context for the unit. In this context, students explored community and career connections within AFNR.

Community Connections

- Personal experiences in the kitchen
- Design for a local orchard

Career Connections

- Food scientist
- Packaging Engineer
- Materials Engineer
- Microbiologist



Figure 1. Packaging Engineer | Curious About Careers. <https://www.pbs.org> Copyright PBS.



Pedagogical Strategies