

Integrated Project-based Learning: Combining PTE Standards and Academic Standards

Use this template for planning and sharing ideas for projects. This template is based on the 6 A's:

Authenticity Academic Rigor* Applied Learning* Active Exploration* Adult Connections* Assessment*

Project

Title of Project	Outside the Box with a Do-Nothing-Box
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School	Cassia Regional Technical Center & West Minico Middle
Pathway / Small Learning Community/Academy	Skilled and Technical Sciences, Mathematics
Course Title(s)	Electronics, Mathematics, Construction
Time Frame	6 weeks

Authenticity

Briefly describe your project. Include the key question and provide an overview of what students do and learn. Tell why the question is meaningful to the students and where one might see a similar question tackled by an adult in the workplace.

Key Question **How can students build a “Do Nothing Box” that can be sold to provide income for the programs involved.**

Overview **The project is designed to collaborate construction skills, electronics and math.**

Vocabulary/Key Terms

List vocabulary words and key terms essential to student understanding.

Troubleshooting, Amps, Current, Resistance, Microcontroller, Volts, Ohms, Ohm's law, photoresistor, short, Dado, rabbet, fractions, SawStop, joiner, planer, chop saw, router, CNC mill, sanding grits, rips, crosscuts, checks, bows, crowns, dimensions, fractions, radius, diameter, whole numbers, numerators, denominators.

Active Exploration * Applied Learning * Adult Connections

What classroom-based, community-based, and career-based activities does the project involve? Include a description of the active exploration, applied learning, and adult connections in the project (as needed).

Active Exploration: Students can use a wide variety of resources from the internet and local businesses to help brainstorm ideas. Collaboration is very important.

Applied Learning: Students can listen to guest speakers about the transferable skills from school to the workplace.

Adult Connections: Can bring in local talent from cabinet/ electronic companies. Bring in guest speakers.

Classroom Activities

blueprints, schematic designs
 make cut list build materials
 electrical parts
 build classroom prototypes
 testing and troubleshooting
 classroom prototype
 design changes and customizations
 to personal projects
 build final projects
 testing and troubleshooting
 individual projects
 cost estimation
 write up / posting projects

Community Activities

market final project

Career Activities

Academic/PTE Rigor

Standards Use the space below to list the state content standards and PTE industry standards addressed by the project. (A list of the content standards is available at <http://www.sde.idaho.gov/ContentStandards/default.asp>. This page, which includes selected high school level standards, is designed to let you easily create a list of standards you are addressing. You may then copy and paste the list into this template.)

Math

9-12.HSN-Q.A.2 Define appropriate quantities for the purpose of descriptive modeling.

9-12.HSN-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

HSG-CO.B8 Make formal geometric construction

HSN-Q.A.2 Reason quantitatively and use units to solve problems

Electronic:

1.1.1 Describe general shop safety rules and procedures (i.e., safety test).

1.2.4 Demonstrate proper cleaning, storage, and maintenance of tools. Performance Standard

1.3.1 Identify test equipment and their appropriate usage.

1.3.2 Demonstrate the proper techniques when using test equipment.

1.3.3 Demonstrate safe handling and use of appropriate test equipment.

1.3.4 Demonstrate proper cleaning, storage, and maintenance of test equipment.

2.1.2 Explain the characteristics of voltage, current, and resistance (i.e., unit of measure, letter/symbol).

3.1.1 Identify and explain the main purposes of electronic components.

3.2.1 Identify and utilize the basic units of electronic measurements

4.1.5 Calculate voltage, current, resistance, and power in a series circuit.

4.1.6 Construct, measure, and analyze simple series circuit

Construction:

Performance Standard 3.3: Perform calculations using fractions, decimals, and percentages

Performance Standard 3.5: Perform measuring operations used in the building trades

Perform Standards 13.1: Coordinating with other trades.

Perform Standard 2.1.3: Identify common defects in lumber.

Perform Standards 2.3.1: Types of hardwoods and softwoods used in millwork.

Perform Standard 4: Blueprint reading and drawing skills.

Perform Standard 5: Use and maintenance of hand and power tools

School to Career Competencies *Please check (x) the competencies addressed by the project*

Communicate and understand ideas and information

Collect, analyze and organize information

Identify and solve problems

Use technology

Initiate and complete entire activities

Act professionally

Interact with others

Understand all aspects of an industry

Take responsibility for career and life choices

Student Goal(s) **Once the project begins, ask students to generate one or two personal goals.**

Assessment

Groups will be graded by having a working Nothing box. Student driven evaluations can also be a possibility. Have them grade themselves.

Recommended Resources / Sample Products

Software or Materials Needed

Arduino IDE, wood, glue, hinge hardware, fasteners, servos, and other electronic components depending on personal design.

Teacher-Developed Materials

Project pros and cons of how the project worked and how it can be adapted for other programs.

Grading rubric, Lesson Plan

Student-Developed Materials

(Examples of products that can be shared with other classes. Please attach samples.)

Microcontrollers, photoresistor, resistor, LEDs solder, printed circuit board, wire, and ICs.

pine building materials

collaboration between box building and electronics. Bringing the skills together.

Websites Used

(Examples)

Youtube.com

Final Words

(In a sentence or two, highlight your project's overall value.)

These students are learning how to work together and gain knowledgeable experience. This class assignment will strongly reinforce the math area of study, while simultaneously allowing the students to become more familiar with both electronics and woodworking fields.

Teacher Tips/Extensions

(Use the first person to share a useful idea that helps with implementation and ensures success. Make it chatty, informal.)

Extensions

(List any ideas for students who may want to go deeper into the learning standards.)

This project could lead to a senior project and deeper understanding of 3D modeling, micro electronics, and cabinet making.

Timeline

What sequence of teaching and learning experiences will equip students to develop and demonstrate the PTE standards and the Academic standards?

Activities by day:

- Week 1: rules, and safety (both classes separately)
- Week 2: blueprints, schematic designs (both classes separately)
- Week 2 & 3: learning about electronic components and learning about woodworking skills. (both classes separately)
- Week 3: individual prototypes of similar designs. NOT the “do nothing box”. Students know of a project and group work between programs.
- Week 4: All students learn about the: “Do nothing box” project. Groups are formed and learned skills are brought together.
- Week 5 & 6: group collaboration and finalizations of projects
- Week 6: finished projects and evaluations are given

