BIRDEE Unit 1 Lesson Plans

Unit 1 Modules & Themes tinyurl.com/birdeeunit1LP

Module 1 Launcher: Connecting Nature to the Engineering Design Process				
Connect Nature to Engineering	**Empathy & Customer Discovery**	**Reverse Engineering & Requirements**	**Define Problem Requirements**	**Ideate a Solution for Conceptual Design 1**

Module 2 Launcher: The Lotus Effect				
Benchtop Prototyping	**Testing the Lotus Effect**	**Conceptual Design 2**	**Design Review**	**Introduce EDPL**

Module 3 Design Challenge: Identify & Understand				
Design Challenge Intro: BID & EDP	**Understanding the Problem and EDPL**	**Understanding Existing Engineering Systems with SFM**	**Product Analysis and Reverse Engineering**	**Existing Products and Ideate**

Module 4 Design Challenge: Heat Transfer & Thermal Regulation				
Understanding Thermoregulation Systems in Nature with SFM	**Conceptual Design 1**	**Thermal Regulation Experiment Part 1: Intro & Setup**	**Thermal Regulation Experiment Part 2: Analyze Data**	**Thermal Regulation Part 3: Additional Data/BID Analogy**

Module 5 Design Challenge: Ideation & Evaluation				
Design Challenge Part II	**Conceptual Design 2**	**Ideate: Learn about the Morpho Matrix**	**Conceptual Design 3: Morpho Matrix**	**Evaluate to Prototype 1**

Module 6 Design Challenge: Prototype & Test				
Prototype 1: Build	**Prototype 1: Requirements Evaluation**	**Elaborate to Prototype 2**	**Prototype 2: Build**	**Finalize Design**

Module 7 Design Challenge: Communicate Solution

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Create a Pitch Presentation	**Class Presentations**			

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Unit 1 Module 7: Design Challenge Communicate Solution	Materials
Module 7 Overview: 1.7.1 Create a Pitch Presentation 1.7.2 Class Presentations	**EDPL** activity is to create a PDF of problem output from EDPL. Students practice **communicating** their final solution to the class this Module

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1.7.1. Create a Pitch Presentation

Students will have 1 class period to prepare their "Pitch" presentation. Because they have detailed notes, images, and a physical prototype in their EDPL, they should be able to complete a digital presentation in 1 class period. Alternatively, students may do poster presentations, which may require additional time and supplies.

Teacher Note: The presentation can be in different forms, one non-tech and one high-tech. If you prefer to have a high tech, you can create virtual presentations using PowerPoint slides and if you prefer going low-tech you can create posters. [If you have time, allow students to have conversations and make their decisions.]

Explain: 10 min *(Presentation)*

View: 1.7.1. Presentation Guidelines Slide

Today, you will work with your group to prepare a "Pitch" presentation. This is your chance to communicate your solution to your client and convince them that it solves the problem. Your presentation will be 2- 3 min long with 2 min to answer questions.

Your Pitch Presentation should include the following:
Explain the problem:

- Who is the client?
- Problem statement
- Problem requirements (can include those you considered, and final requirements)

Detailed description of your solution:

- Describe the mechanism and function of this solution.
- Pictures of your prototypes
- Final solution with components labeled.
- List the function each component serves.
- Share prototype testing sensor data.

Describe how this solution meets the clients needs:

- Refer back to clients' needs and the problem requirements.
- Explain how this solution addresses the problem.
- Explain how this solution is better than existing solutions
- Leave them with a final thought you want them to remember about your solution.

Explore: 40 min *(Group)*

Teacher Note: *The students will work on creating their presentation. Teachers circulate around and help students as needed.*

Student Handouts:

N/A

Student Materials:

N/A

Instructional PPT's & Materials:

1.7.1. Presentation Guidelines Slide

Teacher Resources:

N/A

Web Resources:

N/A

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1.7.2. Class Presentations

Students will give a presentation on their design. Students will reflect on the unit and what they learned about BID.

Before the Lesson: *Teachers will need to: make a copy of the* ***Sample Padlet****, get a sharable link, then share with students.*

Explain/EngageEvaluate: 35 min *(Student Presentation)*

Now it is time for presentations! Every group will have time to present their final design and prototype. You have 2-3 minutes to present and then there will be a 2 min Q&A session where myself and your classmates can ask questions.

You should listen to every presentation because you are required to give feedback on each group's design. After the Q&A session, you will have two minutes to give both a Glow and Grow feedback to the presenters on their design and presentation. A Glow is something you thought the group did well. A Grow is something you think the group could improve upon.

View: 1.7.2. Padlet Image

You will do this on the **1.7.2. Presentation Padlet .**There will be a column for each group so make sure you are posting in the correct column of the group you are giving feedback to.

Evaluate: 15 min *(Group)*

Now you will review the Padlet feedback on your design solution from other students. You will select 3 “Grows” (each from a different reviewer) and discuss with your group how you could incorporate them into your design/design process.

Then, you will complete the **1.7.2. Reflection** organizer reflecting on your project and what you learned about BID with your group.

Student Handouts:

1.7.2. Reflection

Student Materials:

N/A

Instructional PPT’s & Materials:

1.7.2. Presentation Padlet

1.7.2. Padlet Image

Teacher Resources:

N/A

Web Resources:

N/A