**Lesson 5:** \***Researching Sustainable Resources**

(\*extensions- Trade-Offs)

**Problem statement:** How do companies decide which trade-offs are worth choosing?

**Learning objectives:** I can write an opinion paragraph by researching the pros and cons of using different packaging materials to demonstrate which trade-offs I believe are worth a company to use.

**Lesson standards (NGSS, CCSS, CTE):**

[CCSS.ELA-Literacy.RI.5.9](http://www.corestandards.org/ELA-Literacy/RI/5/9/)

Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.

[CCSS.ELA-Literacy.W.5.1](http://www.corestandards.org/ELA-Literacy/W/5/1/)

Write opinion pieces on topics or texts, supporting a point of view with reasons and information.

[CCSS.ELA-Literacy.SL.5.1.a](http://www.corestandards.org/ELA-Literacy/SL/5/1/a/)

Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.

[CCSS.ELA-Literacy.SL.5.1.d](http://www.corestandards.org/ELA-Literacy/SL/5/1/d/)

Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.

**Soft skills:**

Collaboration -working together to research the potential materials being used. Debating ideas before deciding on one.

Critical Thinking -choosing which materials would be best bought eco or non-eco friendly and then defending their answer

Communication -writing an opinion paper based on student’s research that effectively communicates their point of view.

**Locally and/or personally relevant for students:**

* Students have the opportunity to hear from local companies who have to make these decisions every day. They can also talk with the school’s supply ordering people and how they make the decision to buy specific products for the school...what are their priorities?
* All students have prior knowledge in sending, receiving, and opening packages making this project accessible to all.
* What is the science (chemicals that create the packaging, pollution to make it), math (cost to buy eco-friendly vs mass-produced not eco-friendly products), engineering (how is the packaging made? How do the machines mass produce it?) and tech (what tools are the engineers, scientists, mathematicians using to create, promote, and sell the packaging?

**Connections to career and educational pathways:**

Students will learn about all the different types of professions that the packaging department needs in order to be successful, such as:

* Graphic Designer
* Structural Engineers
* Program Managers
* Marketing
* Foriegn Languages

**Materials:**

* Computer
* Paper
* Pencil
* Small samples of each packaging material (from collected materials students brought in)
* Investigation Table (Appendix A)
* F[ormative Assessment Rubric](https://docs.google.com/document/d/1VhNeni7KI8KM5UVXNrkffLKiaPmIa5EpLygH8E4_vLs/edit?usp=sharing) (Appendix B)

**Lesson preparation:**

* **Several** weeks before the lesson, see if there are any local shipping companies that can talk to the students about the materials they use and why they use them (or national companies, such as UPS, FedEx, USPS).
  + There are a few companies that specialize in eco-friendly shipping products like GreenBlue and EcoEnclose that might be able to help with sample products and/or skyping
* Create a list of resources that students can use to find out how materials are made
* Find samples of both eco-friendly and not, to let the kids touch, twist, and experiment with
* Print out/copy Investigation Table for each student
* Print out formative assessment rubric (extension to lesson)

**Time required:** 45 mins to an hour not including a Skype session, if possible.

**Grouping of students for instruction:**

Students will be in their project groups

Roles:

**Engineer(s)** -in charge of experimentation of layering, folding, and bending materials to see which ones fit best for the purpose of protecting the package

**Graphic Design Artist(s)** -will decide how to use the packaging materials so that the package is aesthetically pleasing.

**Program Manager** -will keep track of time, make sure that everyone is doing their share of the work, lead the team in research and investigations

Academic Vocabulary to Teach:

Recyclable

Reusable

Biodegradable

Renewable Resources

**Understanding the Problem**

|  |  |
| --- | --- |
| **Teacher** | **Student** |
| **Introduction**: 3 minutes  Introducing the problem via video such as this: 7 Branded Products with Unique Eco-friendly Packaging  <https://www.bing.com/videos/search?q=eco+friendly+packaging+videos&view=detail&mid=C47358F9CD8D4493EE59C47358F9CD8D4493EE59&FORM=VIRE>  (note: the video does mention “champagne” as they are using some pretty amazing packaging alternatives) | Through turn and talk, students will brainstorm why companies may choose eco-friendly or not eco-friendly packaging materials. What may inhibit a company from using eco-friendly materials? |
| **Brainstorm**: 5 minutes  Writes down students’ ideas. Create a table for typical products that they have seen used in packaging. Add to the list the materials mentioned in the video. Have two more columns for students to share potential pros and cons of each | Ask them what else could help them decide if the trade-offs of using eco-friendly materials is worth it or not. What other info will we need to know or test to be able to answer that question? |

|  |  |
| --- | --- |
| **Teacher** | **Student** |
| **Exploring the Problem:** 15 minutes  Guides small groups as they investigate the materials and fills out the Pro/Cons Table (*Appendix A)*. Scaffold for students who may have trouble focusing and doing an equal share of the work. | Work in their groups to identify the different materials as eco-friendly or not eco-friendly. They can fold it, shape it, test it with stacks of books to see if it can hold its shape. Students fill out the table together |
| Provides resources to investigate the eco-friendliness of each material and its cost | Debate if they think each eco-friendly material is worth the extra cost. |

|  |  |
| --- | --- |
| **Teacher** | **Student** |
| Resolving the Problem: 10 minutes  Brings whole group back together to discuss findings | Use small post-it notes with their team name on it to vote with their team for each material (eco-friendly and not). Which one would they use? |
| Reviews results: 10-12 minutes  Discuss which materials would be best to use for their packaging needs? Why? What will their customers think? | Participate in the discussion. One student is in charge of keeping track on the white board which teams are sharing/participating in the discussion (one point for each share-out) |
| \*Extension to lesson: 15-30 minutes  Scaffolds to support students who cannot write independently -pulls them to the front carpet to write as a whole group | Each student writes a summary paragraph of which packaging materials their team plans to use and why. |

**Accommodations:**

The teacher will support students through small group opinion writing. Students will be allowed to write in the language they feel most comfortable in. Materials to touch will be provided for every group so that everyone has shared knowledge

**Extensions:**

* A field trip to a packaging plant
* A Skype session with companies like EcoEnclose and Blue Green who use only eco-friendly materials
* A visit from a shipping facility representative for the eco responsible packaging program
* More scientific exploration with the materials -can it withstand water? Heat? How long does it take to biodegrade?

**Assessment:**

Formative Assessment in the Lesson:

The opinion paragraph written by each student will be used as their formative assessment for this lesson based on this [rubric](https://docs.google.com/document/d/1VhNeni7KI8KM5UVXNrkffLKiaPmIa5EpLygH8E4_vLs/edit?usp=sharing) and designed for the CCSS listed above.

Summative Assessment for the Unit:

A reliable package designed by each small team that can withstand shipping operations and delights the customer upon arrive

**References/Resources:**

* [Biodegradable and Eco-Friendly Packing Materials](https://greenliving.lovetoknow.com/Biodegradable_and_Recyclable_Packaging_Material) (kid friendly language) <https://greenliving.lovetoknow.com/Biodegradable_and_Recyclable_Packaging_Material>
* [UPS’s Eco friendly Packaging Program](https://www.ups.com/us/en/services/sustainability/sustainable-services/sustainable-packaging/eco-responsible-packaging-program.page)

<https://www.ups.com/us/en/services/sustainability/sustainable-services/sustainable-packaging/eco-responsible-packaging-program.page>

* [8 eco-friendly packaging materials](http://www.geekexpos.com/8-types-of-packaging-with-eco-friendly-materials/)

<http://www.geekexpos.com/8-types-of-packaging-with-eco-friendly-materials/>

* [EcoEnclose product packaging alternatives](https://www.ecoenclose.com/)

<https://www.ecoenclose.com/>

*Appendix A*

Pros and Cons of Packaging Materials

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Material | Recyclable (Y/N) | Biodegradable? (Y/N) | From renewable resources? (Y/N) | Is it cheap or expensive? |
| Cardboard |  |  |  |  |
| Foil |  |  |  |  |
| Plastic clamshell |  |  |  |  |
| Styrofoam Peanuts |  |  |  |  |
| Bubblewrap |  |  |  |  |
| Alt option: |  |  |  |  |
| Alt option: |  |  |  |  |
| Alt option: |  |  |  |  |
| Alt option: |  |  |  |  |

*Appendix B*

**Rubric for Packaging Trade-offs Extension Lesson**

[CCSS.ELA-Literacy.RI.5.9](http://www.corestandards.org/ELA-Literacy/RI/5/9/)

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[CCSS.ELA-Literacy.W.5.1](http://www.corestandards.org/ELA-Literacy/W/5/1/)

Write opinion pieces on topics or texts, supporting a point of view with reasons and information.

|  |  |  |  |
| --- | --- | --- | --- |
|  | 2 | 1 | 0 |
| Information from different sources | In my opinion paper, I have referred to at least 2 different companies or websites that share their opinion of which packaging materials are better to use. | In my opinion paper, I have referred to at least 2 different companies or websites that use different types of packaging materials | I have not referred to any sources in my opinion paper |
| Writing an opinion piece with a point of view, reasons, and information | I take a strong stance on which materials I believe are better to use. I provide at least two reasons why I believe that new information I want to share with my audience | I have decided which materials I would use to package products for shipping, but don’t really explain why someone else should use them as well. I provide at least one reason why I believe what I believe | I haven’t said whether or not I think the materials listed would be good to use or not. I also forgot to include the reasons why I would choose one material over another. |