

Lesson #1: Ecological Sustainability

Name: Kim Coyle Subject: Intro to Tech Grade: 9/10
Date: Class Length: 45 Minutes

Unit Level Essential Question:

How can you retrofit your city to address population growth and ecological sustainability? (Reduce congestion, increase mass transit, greenways, and renewable energy resources)

Lesson Level Essential Question:

Given the impact of new laws enforcing stricter rules on emissions and use of petroleum based vehicles, how can we redesign our urban areas to incorporate a more ecologically sustainable transportation infrastructure?

Lesson Objectives:

- Describe the importance of Ecological Sustainability within an urban development.
- Design a more ecologically sustainable transportation infrastructure within your urban cityscape layout by reducing congestion and increasing mass transit, greenways, and renewable energy resources.

Transformative Teaching Context:

This would be a transformative lesson engaging the students in debate about which issues of ecological sustainability would have the most impact on their cityscape to move the city from a plan that did not consider sustainability to a redesigned city that has a higher level of sustainability.

Learner's Background:

The student's background in this area is expected to be of superficial content only. Students are not expected to have thought in depth about the impact of intermodal transportation on our consumerism practices and living space development. Students that have taken an earth sciences course or joined an EcoFriendly Club within the school may have some understanding of how sustainability impacts our lives and environment. Here we will tie in how the

transportation systems further impacts our ability or inability to become ecologically sustainable. Polling the students to see who has taken or been involved in these courses or clubs will give me an understanding on how much overview I would need to provide in order to move towards critical analysis as a whole.

State Standards Addressed:

- State:
 - Standard 5 – Students will develop an understanding of the effects of technology on the environment.
 - H – When new technologies are developed to reduce the use of resources, considerations of trade-offs are important
 - J – The alignment of technological processes with natural processes maximizes performance and reduces negative impacts on the environment.
 - K – Humans devise technologies to reduce the negative consequences of other technologies.
 - L – Decisions regarding the implementations of technologies involve the weighing of trade-offs between predicted positive and negative effects on the environment.

Classroom Climate:

I would first create a climate of understanding. The students can not critically think about changing a system until they understand the impacts of those changes. Once they understand what Ecological Sustainability is, then I would challenge their thinking on how it applies to their world by providing written articles and video that will encourage them to question how Ecological Sustainability can impact their lives through transportation and what they can do to move their city towards higher sustainability utilizing alternate methods of transportation.

Motivation/Initiation:

Students will be introduced to the concept of Ecological Sustainability through Teacher led/moderated discussion and then challenged in their thinking with the “Story of Stuff” and two adbusters articles. Prior to the initial discussion, they would be assigned the article “The Simple Life: How To Bring The Land Back To Us” by Clayton Dach to read. This will set a tone and provide background knowledge of past history of living off the land to begin to build an understanding on Ecological Sustainability.

Classroom discussion will focus on how our dependence moved from personal sustainability to commercially provided consumerism.

Questions posed might be:

- How much do we depend on intermodal transportation to sustain our current level of consumerism within our lives.
- What can we do in our own lives, yards, spaces to reduce dependence on the commercialized system and intermodal transportation?
- Is there an economic benefit/disadvantage to self sustainability?
- What if we are able to reduce our dependency on consumerism, how would that impact the transportation system?

Learning Experience:

- Video of “The Story of Stuff”
- Read and discuss AdBuster’s article on “True Cost”, <https://www.adbusters.org/magazine/85/true-cost.html>
- Read and discuss Adbuster #73, 22 Nov 2007, Clayton Dach, “The Simple Life: How To Bring The Land Back To Us”. https://www.adbusters.org/magazine/73/The_Simple_Life_How_To_Bring_The_Land_Back_To_Us.html
- Small expert group investigation on different methods of sustainability
- Mixed expert group discussion on how different methods of sustainability can impact the transportation system in positive and negative ways.

Meeting Diverse Needs of the Students:

This lesson involves a lot of discussion and thought on impact of both our personal lives, systems, and the planet. By having students work towards expert status on one facet of the discussion, it gives everyone valuable information to become confident and competent within the subject area. It also gives struggling students a point of contact and allowance to seek the help and advice of another expert in their area. This sets up the excelling students to become students as teachers as they assist the struggling students with their concept.

Type of Assessment Used:

- Informal:
 - Large group presentation and debate
 - Informal group discussion and participation.
 - Organize a reduce/reuse/recycle campaign to benefit a local charity or organization.
- Formal:

- RAFT on one change a person can make to move toward Ecological Sustainability and how it will impact the transportation system if that one change was done by one million people.

Lesson #2
Examination of Transportation Systems
and How They Connect Our Society (Intermodalism)
Lesson Plan

Name: Kim Coyle Subject: Intro to Tech Grade: 9/10
Date: Class Length: 45 Minutes

Unit Level Essential Question:

How can you retrofit your city to address population growth and ecological sustainability? (Reduce congestion, increase mass transit, greenways, and renewable energy resources)

Lesson Level Essential Question:

How do transportation systems effectively move product and people from point of origin to point of destination?

Lesson Objectives:

- Describe how transportation systems are connected and how that impacts our ability to send and receive products.
- Explain the process of how a vegetable travels from farm to plate or a product moves from manufacturing facility to your home.

Transformative Teaching Context:

This would be a transformative lesson evaluated through a critical and ecojustice lens analyzing the effect intermodalism has on the availability of products and goods that are not inherently available to a region.

Learner's Background:

This is a mid semester summative unit on Transportation Systems. Students have already proven proficiency on each individual system for air, sea, and land transportation and conveyor systems within a building. We are now connecting them together to see how as a mega system they affect our world. They know and understand flowcharting.

Based on the students' life experiences of living within an urban setting, they have already experience and utilized multiple transportation systems on a daily basis. They will use this knowledge to make connections between their life and the "life" of a cantaloupe or other fruit/vegetable that is not necessarily readily

available within our region. This knowledge is pre-assessed through opening conversations about travel in general.

State Standards Addressed:

- State:
 - Standard 13 – Students will develop the abilities to assess the impact of products and systems.
 - J – Collect information and evaluate its quality
 - K – Synthesis data, analyze trends, and draw conclusions regarding the effect of technology on the individual, society, and environment.
 - L – Use assessment techniques, such as trend analysis and experimentation, to make decisions about the future development of technology.
 - Standard 18 – Students will develop an understanding of and be able to select and use transportation technologies.
 - J – Transportation plays a vital role in the operation of other technologies, such as manufacturing, construction, communication, health and safety, and agriculture.
 - K – Intermodalism is the use of different modes of transportation, such as highways, railways, and waterways as part of an interconnected system that can move people and goods easily from one mode to another.
 - L – Transportation services and methods have led to a population that is regularly on the move.

Classroom Climate:

This lesson will challenge the students to look and think about objects and commercialism in a way that is outside of their current thought process. It will expand their idea of the food chain from “store to house” to “farm to distribution to store to house to landfill”. The lesson will cause them to feel tension and discomfort as they consider the implications of their lives verse how their lives can use products most efficiently and reduce waste and demand on the production and transportation systems. Discussion will have to be careful as to be sensitive to the opinions of students that already use mass transit as a primary means of transportation based on socioeconomic status. The discussion will need to be kept to a positive tone as to not alienate subsets of students and to reduce a hegemonic tone within the discussion. I don’t believe there would be any bureaucratic controls such as administrators that would challenge or alter this discussion. Students would be encouraged to look at this subject through a critical lens. Consideration will need to be taken for students ability to analyze this material through lenses as they will be in the early learning stages of how to analyze data in such a manner. B

Motivation/Initiation:

The lesson will begin with a series of questions of “Where did a particular item come from?” such as:

- Where do oranges come from?
- How did it get here?
- Where are coco beans grown?
- What are some of the processes used to move it from there to here?
- Can the process be made more efficient?
- Can that item be grown closer to us for production?

Questions will progressively push students to move past “the store” and really evaluate how a product moves from raw material through the manufacturing process to delivery, use and disposal. This will be an open large group discussion mediated by the teacher. Once the process is established, questions will ask “can we make that process more efficient?” “When looking at our map from 1920, could this product have traveled in the same manner?” “Who would have used this product and how has that use changed?”

Learning Experience:

The students will watch the videos of “Watch your (Fo)odometer” and “Public Transportation: Who needs it? Part I” to open the discussion of moving both people and product.

Read the story of Maria Carriaga (pg. 35-37 “When Technology Wounds” by Chellis Glendinning) and discuss the consequence of poor industry practice on the efforts of sustainability by the Carriaga family.

The class will break into groups to discuss and map out methods of transportation used in moving a common household product from raw material to home and then to disposal. Students will then be asked to map out movement of the same product 50 years earlier and to compare how movement may take place in a third world country where their transportation systems are not as advanced as those utilized within the United States.

Each group will present their product’s “life cycle” though a mapping and flowchart diagram showing types of transportation systems used to move the product from origin to disposal.

Meeting Diverse Needs of the Students:

1. This lesson is inherently socially, culturally and ecologically relevant by design, however during our discussions questions will be posed as to how a particular culture may have moved a similar item such as “We move a cantaloupe from farm to distribution center to market, what are ways in which a farmer in 1890 might have moved his product from his farm to the

- city market? How did the trade and barter system utilized by the American Indian's enable them to move their product efficiently in their time?"
2. By knowing the students backgrounds, questions can be tailored to the students or students can be asked to come up with a scenario where they can explain how an item moved from conception to purchase and disposal.
 3. Students who excel at these concepts can be given an object of multiple raw materials and asked to map out how each of those items comes together to form the item within production and then move through the transportation process to delivery, consumption and disposal.
 4. Students that struggle can take a simple item such as mailing a package to a friend and explain all the steps "literal and figurative" to moving the package from their home to their friends.
 5. Students that do not address their level of sociocultural privilege are forced to do so through the examination of how people of different cultures and time periods would move similar product without the advanced technological systems that we have today.

Type of Assessment Used:

Formal Assessment – Student will provide two written mappings/flowcharts describing a potential route of travel from point of origin to destination with multiple modes of transportation utilized for a single item in their house. (Ex. Asparagus harvested in California, Peru, and/or China delivered to your house) They are encouraged to locate the top producing location in the US and the largest exporters of the product as well. In this case, Asparagus is manufactured in California and Michigan so I chose California because it is further in distance. Peru, China and Mexico are the three leading exporters so I chose the first two on the list. I would be looking to see that they effectively utilized three modes of transportation and considered time as a factor in movement. Will their product spoil during transit?