Unit Plan: Green Technology

1) Unit Level Question
   a. How has the use of renewable energy, efficient energy management and the use of sustainable construction materials impact our local communities, different cultures, and global community?

2) Unit Level Objective
   a. Students will be able to identify how green technology affects our local and global community.

3) Unit Level Assessments (See attached Rubric)
   a. Formal Assessments
      i. RAFT Assignment
         1. Write a creative essay that incorporates all of the essential content from the in class lessons.
      ii. Design of Solar Vehicle Kit Car
         1. Develop conceptual designs for transportation, communications, and production. This will lead to the production of a prototype that meets requirements on the rubric.
      iii. Building of Solar Vehicle Kit Car
         1. Fabricate a Solar powered vehicle using provided solar panel, motor and gears that maximizes efficiency.
      iv. Presentation of Findings on Solar Vehicle
         1. Using oral and written communication, present ideas to the class and teacher that illustrate how their findings can be applied to the future of green technology.
   b. Informal Assessments
      i. Implication Exit Cards
         1. Students will fill out exit cards before they leave the classroom at the end of each lesson that detail what our in class discussions mean to them or society.
      ii. In-class discussions
         1. Teacher will assess learners understanding by encouraging discussion of topics, and monitoring students participation and thoughtful answers throughout the process.
      iii. Town Hall or Library Display
         1. Students will be responsible for contacting local officials and finding a site where they can display their vehicles and findings.

4) Calendar of Lessons
5) Abbreviated Lesson Plans

a. Lesson 1-Residential and Commercial Green Technology
   i. Lesson Questions
      1. How have green technologies (i.e. energy efficiencies and
         renewable energies, sustainable construction) influenced global
         and local communities?
      2. What are the construction systems in place that affect our
         relationship with natural resources?
      1. What areas of green technology show the most potential in terms
         of positively affecting our initiative toward global environmental
         sustainability?
   ii. Lesson Objectives
      1. Students will identify and describe the existing residential and
         commercial green technology systems.
   iii. Content Standards
      1. National
         a. Standard 5.G: Humans can devise technologies to conserve
            water, soil and energy through such techniques as reusing,
            reducing and recycling.
         b. Standard 5.H: When new technologies are developed to
            reduce the use of resources, consideration of trade-offs are
            important.
         c. Standard 5.L: Decisions regarding the implementation of
            technologies involve the weighing of trade-offs between
            predicted positive and negative effects on the environment.
d. Standard 7.H: Different cultures develop their own
technologies to satisfy their individual and shared needs,
wants and values.
e. Standard 7.I: A number of different factors, such as
advertising, the strength of the economy, the goals of a
company, and the latest fad contribute to shaping the design
of and demand for various technologies.

iv. Transformative Teaching Context
1. This would be a transformative lesson evaluated through a critical
and ecojustice lens analyzing the effect green technology has on
our environment, society, building trends and innovations. Lesson
will not only focus on western trends in green building technology
but how other cultures have approached resource conservation over
time and presently. It will also address the changing of traditional
building practices, and study the initial higher cost of emerging
technology but their cost effectiveness over time. Lesson will also
ask students to examine practices in their own life and how their
decisions influence the environment and our limited resources.

v. Learning Experience & Instructional Method
1. Lesson introduction will begin with having students read articles,
which will lead into a discussion about the inefficiencies in
building, and the true cost of “green” construction advancements.
Students will then participate in theater of the oppressed. In which
the scene is a male dominated construction site with one woman
that is constantly oppressed, objectified, and berated. Although
this scene will not be centrally focused on green technology it will
serve as a lead in activity with the intention that it will changes
students mindset that construction processes are not flawed. It will
inspire students to questions existing practices, how technologies
are developed, why projects are chosen, what bureaucratic
decisions impact product development and the true cost of the
materials that we consume.

vi. Assessment
1. Implication Exit Cards
   a. Students will fill out exit cards before they leave the
classroom at the end of each lesson that detail what our in
class discussions mean to them or society.

2. In-class discussions
   a. Teacher will assess learners understanding by encouraging
discussion of topics, and monitoring students participation
and thoughtful answers throughout the process.

3. RAFT Assignment
a. Write a creative essay that incorporates all of the essential content from the in class lesson. (See Rubric for Grading Criteria)
b. Lesson 2-History and Future of Green Technology
   i. Lesson Questions
      1. How has the use of renewable energy, efficient energy management and the use of sustainable construction materials impact our local communities, different cultures, and global community?
      2. How have past and current cultures contributed to ecojustice?
   ii. Lesson Objectives
      1. Students will discuss the relevant important figures, organizations, relationships between green technology and the environment as well as current limitations with green technology.
      2. Students will compare how sustainability is treated in different parts of the world.
   iii. Content Standards
      1. National
         a. Standard 3: Students will develop an understanding of the relationships among technologies and the connections between technology and other fields of study.
         b. Standard 5: Students will develop an understanding of the effects of technology on the environment.
         c. Standard 5.G: Humans can devise technologies to conserve water, soil and energy through such techniques as reusing, reducing and recycling.
         d. Standard 5.L: Decisions regarding the implementation of technologies involve the weighing of trade-offs between predicted positive and negative effects on the environment.
   iv. Transformative Teaching Context
      1. This would be a transformative lesson evaluated through a critical and ecojustice lens examining the idea of ecological sustainability, the technology that affects it and how other cultures (past and present) have worked to be a part of the ecology of their surroundings instead of draining the environment of resources. Lesson will go beyond simply discussing the western perception of “Going Green,” which can be considered to only encompass recycling, solar photovoltaic, wind energy, resource management or so called green manufacturing processes. The lesson will ask students to look at how other people outside of the western world have been ecologically responsible and how their contributions can help our local communities.
v. Learning Experience & Instructional Method

1. After initial exercise, and lead in discussion, teacher can explain the need for ecological practices reform. On a local and global community level people need to address the problems that plague our ecosystem. Discussion can begin about how we have gotten into this predicament, that is, how green house gasses caused by industry have affected global warming and how our destruction of ecosystems has affected the area, surrounding inhabitants and in turn the entire ecological system. Examination through this ecojustice lens will lend students the ability to examine how people have succeeded and failed at being ecologically conscious through the development of technology. Students and teacher will survey technological advances that fall into this category and examine their impact and implications. Selections from Power to the People, (Vaitheeswaran, Vijay V. Power to the People. New York: Farrar, Straus and Giroux, 2003) will be made available to students that highlight how we have gotten to this point in history, and the damage we will continue to inflict if no changes are made. Passages from the book will also show how organizations are trying to bring reliable, ecologically friendly power to undeveloped nations. A discussion can also examine in indigenous lens why some organizations feel the need to supply power to all people of the earth. The class can evaluate the necessity of people to have power, and how some indigenous people have survived without power up to this point. Students will also be asked to look at the website for Greensburg (http://planetgreen.discovery.com/tv/greensburg/) for homework in between classes. Students will be able to see how a town that was decimated was/is able to rebuild with sustainability in mind. This can give students a view of how our future may look. Students will be asked to examine the implications of building an ecologically centered community on an exit card for a closing activity.

vi. Assessment

1. Implication Exit Cards
   a. Students will fill out exit cards before they leave the classroom at the end of lesson that ask them to critically examine how/which ecologically minded technology will affect our future based on what they experienced through in class discussion and discoveries on website for Greensburg.

2. In-class discussions
a. Teacher will assess learners understanding by encouraging discussion of topics, and monitoring students participation and thoughtful answers throughout the process.

c. Lesson 3-Green Transportation
   i. Lesson Questions
      1. How do the existing transportation systems affect our relationship with renewable energy, efficient energy management and the use of sustainable construction materials?
      2. What areas of green technology show the most in terms of positively affecting our initiative toward global environmental sustainability?

   ii. Lesson Objective
      1. Students will design and build a solar vehicle that exemplifies their planning, design, and building abilities as well as their assessment and presentation skills.

   iii. Content Standards
      1. National
         a. Standard 5.L: Decisions regarding the implementation of technologies involve the weighing of trade-offs between predicted positive and negative effects on the environment.
         b. Standard 8.H: The design process include defining a problem, brainstorming, researching and generating ideas, identifying criteria and specifying constraints, exploring possibilities, selecting an approach, developing a design proposal, making a model or prototype, testing and evaluating the design using specification, refining the design, creating or making it and communicating processes and results.

   iv. Transformative Teaching Context
      1. This would be a transformative lesson evaluated through a critical and ecojustice lens examining the ideas of resource conservation, and how humans can lower their ecological impact with green transportation. Lesson will ask students to question the efficiencies and claims of so called green technology (e.g. ethanol derived from corn), the implications of such technology and will speculate on which areas show the most promise and why.

   v. Learning Experience & Instructional Method
      1. Before lesson students will be asked to research articles on The New York Times website for green technology that pertain to transportation. http://greeninc.blogs.nytimes.com/ Students will be asked to bring in a relevant article to share with the class. Discussion will follow about the impact and implications of green
transportation and how it relates to our future on the local and community level. Lesson will also discuss in detail green transportation power systems such as: solar power, fuel cells, biodiesel, electricity. Students will then be asked to design, and a solar powered vehicle that takes into consideration use of renewable resources and their ecological impact. Students will then have to present the design, building, results and implications, as well as contact the local town hall to find a suitable location to display the vehicles so the community can witness the schools ecologically minded programs.

vi. Assessment

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5. Presentation of Findings on Solar Vehicle
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6. Town Hall or Library Display
   a. Students will be responsible for contacting local officials and finding a site where they can display their vehicles and findings

6) Resources

a. Articles
   i. Adbusters-Micah White, “Progress Isn’t Green,” May 4, 2009

b. Websites

c. Books

d. Activity Resource

e. Town Hall Resource
   i. Students will talk to local town/city hall to see if there is an applicable setting where they can display their solar cars and findings.