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Analyzing Schools

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**Topic:** Shrinking your Carbon Footprint

**Introduction:**

During our placements in 7th and 8th science classrooms, we have constantly heard students complain about the lack of environmental education and have seen the lack of resources used to teach this subject. Environmental Science is a subject that will be vital to have a knowledge of in the upcoming years as the global climate continues to change. There has been a significant negative impact on the Earth caused by humans and in order to battle this people have to be educated on better behaviors to reduce their impact. We decided to create a week curriculum that focuses on carbon footprints and how students may reduce them in their own lives. We will have various activities that introduce carbon emissions, that have students calculate their own carbon footprint, and that look at the effect of emissions on a global scale. Our intention is for students to learn through group work and a hands on approach on how to apply techniques to reduce their own carbon footprint. The overall grade for the week will be broken up evenly into three sections: participation, worksheets, and poster. Each section will account for $\frac{1}{3}$ of the student's overall grade for the week. The final project will have heterogeneous ability pair partners making a poster to propose how they could reduce their carbon footprint. The students will then present the posters to their classmates, who will peer evaluate for a portion of their poster presentation, and the posters will be hung up around the
school to allow the information to be seen by the whole school so that other students may read them and make the changes in their daily lives. Throughout the week students will be doing a variety of worksheets to demonstrate their understanding from a short writing exercise to a worksheet examining two global maps and the significance of the information presented on them. The students will also self evaluate their week class participation along with the teacher based on multiple criteria using a rubric given to them in the beginning of the week. The rubric will allow the shy students to know their expectation for the week and will help them participate actively throughout the week. It will also help the students give themselves an accurate grade based on their efforts. The rubric also examines attitude so that students with negative attitudes towards a topic will be able to accurately assess themselves on it. When students are responsible for self evaluating themselves based on the rubric it will make them hold themselves more accountable throughout the whole week and will lead them to do better in the class. These activities and self evaluation will help the students throughout the week be held accountable and will allow them to learn how they may reduce their own carbon footprint in their daily lives.

**Context:**

The curriculum is designed for an 8th grade science classroom at Environmental Sciences Magnet School at Mary Hooker and will take place over five days (Monday-Friday). The class will consist of 20-25 students and each class period is 70 minutes long, and the process will be put into effect through hands on activities. These activities include a field trip, group discussions, and personal reflection. The class is made up of a heterogeneous ability group students, which will allow for multiple opinions on interpretation of the information given and will allow the teacher to be able to have the students work in heterogeneous pairs. The heterogeneous pairs will
get students to reach out of their comfort zone and learn to help each other fully understand the information and task at hand. The process of working with someone that they are not familiar with may lead the students to see each other in a different view because the poster allows the students to express their artistic, public speaking, and academic strengths.

**Objectives:**

- Students will broaden their understandings of their own impact on the planet through carbon pollution.
- Students will learn how to use library resources including librarians, encyclopedias, online sources, and will learn how to cite sources properly.
- Students will learn what a carbon footprint is and how to calculate it.
- Students will compare the effects of carbon emissions on a global scale, seeing the disparity between who emits carbon and who is affected by it.
- Students will work together to develop a poster project that will be used in educating others on how to reduce their carbon footprint.

We strategically picked our objectives to allow the 8th grade science students to get involved in the environmental aspect of their school once more. For this reason we designed our objectives to be about ways they may make a daily impact in their own lives to help reduce their own carbon footprint. The week plan correlates with bloom’s taxonomy fifth level within the cognitive domain of synthesis, which is, “Analyze, appraise, calculate, categorize, compare, contrast, criticize, differentiate, discriminate, distinguish, examine, experiment, question, test” (Summary of Bloom’s Taxonomy 1). It correlates because we have the students not only learn about carbon footprints but also ways to lower their own carbon footprints in their daily lives. Also by hanging the posters up around the school it allows them to spread the knowledge they
learned to the whole school community so that others may read it and make the change in their own lives to lower their carbon footprint too. We also picked our objectives because Lev Vygotsky believed that children learn better with the aid from peers and adults instead of working alone (Phillips and Soltis 58). By having the students work together for their poster it allows children to reach their full zone proximal development (ZPD), which is defined as the difference in a student's learning when they are on their own to their potential of learning when they are able to receive help from a peer or adult (Phillips and Soltis 58)). Together the student are able to bounce ideas off one another to complete the poster properly and efficiently (Phillips and Soltis 58). Finally we decided to give the students time in the library to learn how to use online resources and cite them properly because in high school and beyond. By teaching them to use online resources during 8th grade it will help them pick good sources for not only the poster, but for the rest of their academic career.

Activities:

Monday:

On Monday, it is our intention for students to be introduced to the causes, effects, and ways to battle carbon emissions. First students will watch a video called “What’s the Deal with Carbon” [see pg. 2, fig.1]. This gives a brief introduction to the causes and effects of carbon pollution. In this video the students will also be introduced to what a carbon footprint it. Students will then be handed a cartoon concerning a carbon footprint [see pg.2, fig. 2]. The paper will be printed at the school and copied for every member of the class. Students will then do a short free write on what they think the cartoon means. We will then have a class discussion on what the cartoon portrays. They will then sit down at their desks to find a paper outlining a short writing exercise on what they think the cartoon means. Then students will be initially introduced to their
poster project and assigned their heterogeneous ability pairs, so that they may begin initial work for their presentation of it on Friday. Ability grouping is the placement of students, “according to their abilities as perceived by school personnel” (deMarrais and LeCompte 237). The teacher will group the students in heterogeneous ability pairs based on their assessment of his/her’s ability because it will allow students to be able to work with partners they may not usually pick and will help the students see the strengths in their peers in multiple ways. Both partners will be given both poster and presentation guidelines to adhere to [see pg. 3]. Students will also be given a sample poster so that they could get a feel as to what their presentations should look like [see pg. 4]. Students will also be given two rubrics. One will be the rubric that both the teacher and their peers will use to evaluate their final poster presentation [see pg. 5]. The other will be a rubric that the teacher and the students, themselves will use to assess at the end of the week their participation throughout the week [see pg. 6]. Finally before the students go they will be reminded to hand in field trip forms that were handed out two weeks prior, and the fact that tomorrow is the last day to collect them.

We intend to hand out on Monday not only a rubric for the presentation, guidelines, and a sample poster, but also for their participation because it will allow the students to see what is expected of them throughout the week to earn a good grade. The sample poster is given to the students with the intention that the students will have an idea of how their poster should look and thus they can start brainstorming ideas. Therefore when students imitate their mentors, as theorists Lev Vygotsky believed, they begin to, “develop higher mental functions,” which grows into, “coded information” that they use to replicate in their own actions (Phillips and Soltis 59-60).
Tuesday:

In the second session the teacher will provide students and their partner’s time to work on their poster presentation. During this lesson students will be able to utilize library resources. Our library is equipped with encyclopedias, desktops for each student, and many print resources including books, magazines, and pamphlets concerning all subjects. We will have the librarian(s) come in and give a presentation on how to find reliable information, how to cite sources, and how to summarize and use information in their presentations. Students will then work with their partners to gather information and put together their poster presentation. The librarian(s) as well as the teacher will be there to guide the students and answer any questions the students may run into. The students will then work in their pairs to research and make their poster using quality resources. The students will gather information and will begin to make their posters.

Wednesday:

The third day will be a field trip to the CT Science Center. There they will get to explore the science center. We will visit the Energy City Exhibit. At this exhibit students will be able to explore and learn interactively with materials about energy conservation and clean energy production. There students will be given a worksheet to complete with guided questions [see pg.8]. This worksheet will require the students to explore Energy City and alternative clean energy sources and find the benefits of them. Students will also be able to use a virtual carbon footprint calculator to calculate their own personal footprint. They will also be asked to experiment with the calculator and find two “smart energy” behaviors that will reduce their carbon footprint.
“Under no circumstances was just telling the student about a new idea very effective-- the student would come to learn this new thing by rote, but would be unlikely to understand it or see its relevance and connection to other ideas. The best way to learn a new idea, according to Dewey -- was through the process of communication in which the learner was interacting with others in purposeful activities or investigations of common interest” (Philips and Soltis 56). We wanted our students to learn in a very interactive way with others just as Dewey theorized, which is why we molded our Wednesday curriculum to be a field trip to the CT Science center. There students will have the chance to interactively learn with others how they calculate their carbon footprint and how they could find different ‘smart behaviors,’ to reduce it.

Thursday:

In the fourth session students will initially have a classroom discussion on their feelings about the field trip to the Connecticut Science center, and share one fun fact they learned about carbon emissions. In this lesson students will fill out a worksheet with two different maps. Through this we want students to fulfill our fourth objective of comparing the effects of carbon emissions on a global scale, seeing the disparity between who emits carbon and who is affected by it. The worksheet will have two maps with guided questions [see pg. 9]. This worksheet will be printed, copied, and distributed to each student in the classroom. The map on the left will show the areas that are emitting the most carbon dioxide, therefore having the largest carbon footprint. These are the more developed countries: North America, many countries in Europe, Australia, and China. The map on the left will show the areas that are most affected by the carbon emissions. These are less developed countries: many countries in Latin America and countries in southern Asia. Students will be asked to identify the countries that emit the most and least carbon and will be asked the most and least vulnerable countries to the impact of carbon emissions.
pollution. Students will then discuss their opinions on how they think this affects the areas that are most impacted by carbon emissions. This will then lead to a class discussion on how students feel about the information they just received. We want students to think critically about why the countries that emit the most carbon are not the ones impacted the most by it. This coincides with the Next Generation Science Standards on Human Impact (MS-ESS3-2) (MS-ESS3-3). These standards support our lesson because it talks about the destruction of the natural habitat due to carbon pollution.

Dewey believed the relationship between students and others around them was the key to their academic success because they were able to actively construct their knowledge of the topic at hand (Phillips and Soltis 56). Dewey thought the best way for students to learn an idea was through real life problems instead of through abstract work (Phillips and Soltis 56). We aimed to model our Thursday curriculum after this idea’s of Dewey. The best way for students to learn about the negative effects of carbon is to see the gap between which areas emit carbon and which areas are affected by these emissions. These are real world applications in which students can see the inequality that exists between more developed and lesser developed countries.

Friday:

On day five students, with their partners, will present their posters to the whole class. These posters will be a capstone project and they will be hung around the school. Therefore their posters will serve as a reminder to not only the students in the class but also to students and teachers throughout the school on how to be more environmentally aware of their own carbon footprint.
**Evaluation**

Our evaluation of the student’s performance will not only be based on the poster presentation but will be assessed throughout the week. The overall grade for the week will be broken up evenly into three sections: participation, worksheets, and poster. Each section will account for \( \frac{1}{3} \) of the student's overall grade for the week. First the participation throughout the week will be assessed using the participation rubric [see pg. 6] by both the teacher and the student himself/herself. Next there will be a worksheet/writing portfolio, which will consist of the short writing exercise on the cartoon from Monday, the Energy City worksheet from Wednesday, and the Global Maps worksheet from Thursday. Finally the poster presentation will be evaluated using both teacher and peer evaluation using the poster presentation rubric [see pg. 5].

Our objectives will be fulfilled throughout the week. Our first objective (Students will broaden their understandings of their own impact on the planet through carbon pollution) will be fulfilled during the first day specifically and during all five days on a whole because that is the point of this week. To see if this objective is met will be measured through all worksheets and the culminating project. Our second objective (Students will learn how to use library resources including librarians, encyclopedias, online sources, and will learn how to cite sources properly) will be fulfilled in day two when they will be using the library as a resource. To see if this objective is met will be measured through evaluation of the final poster. Our third objective (Students will learn what a carbon footprint is and how to calculate it) will be fulfilled throughout the week as well. Thus to see if this objective is met will be seen through the short writing exercise from Monday, the Energy City Worksheet, and the final presentation. Our fourth objective (Students will compare the effects of carbon emissions on a global scale, seeing the
disparity between who emits carbon and who is affected by it) will be fulfilled on Thursday. In order to see if this goal is met the Global Maps worksheet will be evaluated to see the student’s understanding. Our final objective (Students will work together to develop a poster project that will be used in educating others on how to reduce their carbon footprint) will be fulfilled on day five, Friday through their poster presentations. In order to see if this goal is met, a rubric will be used by both the teacher and the student’s peers to evaluate the presentation.
Works Cited


References


Those who contribute the least greenhouse gases will be most impacted by climate change.