

Implementing Complex Climate Change Curriculum into US Schools

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Introduction

You have stolen my dreams and my childhood with your empty words. And yet I'm one of the lucky ones. People are suffering. People are dying. Entire ecosystems are collapsing. We are in the beginning of a mass extinction, and all you can talk about is money and fairy tales of eternal economic growth. How dare you!

On September 23, 2019, sixteen-year-old climate activist Greta Thunberg addressed the UN climate summit, where she accosted world leaders for their role in the growing climate crisis (Rosenblatt). For the past two years, she had been skipping school in her home country every Friday to protest Sweden's lack of action against pollution and carbon emissions. She decided that if adults were not going to do anything about it, she would. Her strike may have started small, but at only sixteen years old, her strikes have led to millions of students all over the globe skipping school to protest growing carbon emissions (Irfan). Her young voice has led to millions more speaking out about climate change. She has proved that minors can promote major change if their adult counterparts refuse to participate.

The media has only begun to cover climate change in the last twenty years, but it is something that humans have been increasingly exacerbating in the last 150 years. It is caused by the release of greenhouse gasses such as carbon dioxide and methane into the air ("The causes"). These gasses trap the heat that is supposed to escape into space. As heat is trapped it causes global warming, which affects every facet of life on earth. The increase in human-made carbon emissions started in earnest with the Industrial Revolution and has steadily increased since then. Many people still refuse to believe that humans are the cause of it; soon, however, it may be impossible to ignore.

Climate change is the biggest threat to humanity. It is more destructive than the Great Death in Europe, which killed nearly a third of the population ("The Black Death"). It is more dangerous than the threat of nuclear catastrophe during the Cold War. It is a bigger humanitarian crisis than Syria, Darfur, and the Ebola epidemic combined. The U.N predicts that there will be two hundred million climate refugees by 2050 ("Refugees"). These are people that will be forced to leave their homes due to famine, flooding, rise in temperature, and other climate related problems. This is partly because of the predicted global temperature rise of 4.2 degrees Fahrenheit by 2100. Seven million people already die from pollution every year (Wallace-Wells). This is not a problem that people in the distant future are going to have to tackle. Instead, it is something that millions of people are already having to grapple with.

Humans are the Cause of Climate Change

Since 1960, the annual carbon emissions have increased from 9.45 billion tons to 36.5 billion tons (Ritchie). This 400% increase is due in large part to the massive population growth around the world. As humans reproduce exponentially, their need for resources is robbing the planet. There are currently 7.7 billion people on earth ("Current World"); fifty years ago that number was 3 billion ("Population Explosion"). That means that there is more than twice the number of people who need food, water, transportation, and housing. This creates a strain on our environment because the earth was not designed to withstand the carbon emissions of 7.7 billion people ("The Causes").

With almost eight billion people on earth, there are roughly eight billion mouths that need to be fed. Many people find that to be an impossible task, and eleven percent of the world's population are chronically malnourished, although that is not because there is not enough food in

the world (World Hungry). One-third of the food that is produced in the world gets thrown away (“One-Third”). This is very important to our environment because an estimated 33% of our carbon emissions come from the production of food. This means that if we just stopped producing unused food, we could get rid of one-ninth of our carbon emissions. This could be done without changing anything else about our food reduction. We would not have to reduce the cattle industry, which is responsible for 65% of CO₂ emissions (“Key facts and findings”). If all we do is commit to stop throwing away food, it would make a huge impact.

Food is not our only wasted resource. Water is one of our most valuable natural resources, and also one of our most wasted (“Statistics”). Americans use an average of eighty-eight gallons of water per day. Most of our water gets wasted through the overuse of sprinkler systems and old technology in our bathrooms and kitchens. The average American could cut down on the amount of water they use by an estimated 20% if they installed water-saving technology in their homes. When we waste water, we are depleting our natural streams, rivers, and lakes, which means resorting to aquifers in order to obtain fresh water (WWF). Not only is this an unsustainable practice, but it is also bad for natural ecosystems. Furthermore, by diverting rivers and building dams, we are often leaving communities open to dangerous flooding by not building structurally sound systems to prevent these places from flooding. We need to stop the overuse of water, and a big help would be cutting down on the overproduction of grains and other agricultural products. Agriculture and industry take up ninety percent of our global water every year (“Water”).

With the increase in the population and the advancement of technology, there are many more people traveling for work, school, and recreational activities every day. In America, 45% of

people commute to work and the average is about twenty-five minutes (Ingram). This same trend can be seen around the world as more people move to working outside of the home. In the last thirty years; there has been a shift from working in rural areas to working in urban areas. As of 2019, 55% of the world's population lives in urban areas, with about 45% living in rural areas (Ritchie, Hannah). These numbers were reversed thirty years ago. In 2017, the transportation sector was responsible for 29% of greenhouse gas emissions. This is due to the use of gasoline to fuel our vehicles. Since 1990, the amount of CO₂ emitted by the transportation sector has more than doubled (Ritchie).

A total of 37 billion tons of carbon dioxide were released into the world last year (Canadell). That carbon dioxide is releasing havoc on our environment and raising the global temperature. There is not a single problem causing climate change, or a single solution to solve it, but humans have to take ownership of this problem. This is not something that is occurring naturally, and it is not something that our grandparents and great-grandparents are responsible for. This is a problem that everyone is contributing to every day, and if we do not do something about it now, our children and grand-children will see disastrous consequences.

Harmful Effects of Climate Change

When thinking of global warming, it is easy to simply think of the added heat that it will cause, but that is only the tip of the iceberg. When the global temperature rises it melts the polar ice caps causing a rise in sea level, and by 2100, we could see as much as a three foot rise in sea level ("Climate"). This would cause mass destruction along the coastlines of the United States. Half of Florida could be underwater. For half a degree of warming, there is estimated to be a ten to twenty percent increase in the likelihood of armed conflict (Wallace-Wells). By 2050, the U.S.

is predicted to lose as much as 2.51% of GDP (Frank). There will be millions of more people in the United States who are food insecure because of the destruction of arable land. Water scarcity will become a major problem because of an increase in hurricanes and flooding that will pollute our freshwater sources. In short, if nothing is done to help slow the effects of climate, Americans will have less access to food, water, and shelter: the main components needed to survive.

The main issue with climate change is not only the disastrous effects that it is having on our environment, but also on the conditions that are going to get exponentially worse if we do not do something about it. That does not mean getting people to recycle more or cut off the lights in their house; we need comprehensive reform in the top carbon-emitting countries. This means they need to commit to replacing their entire electrical grids with renewable energy and cutting their beef and dairy intake by half. If we do not do that by 2050 certain parts of our world will be uninhabitable by 2100 (Wallace-Wells).

The Role our Leaders Play

Some may argue that replacing our electrical grid with renewable energy or getting rid of gasoline-powered cars is financially unfeasible, but that is simply untrue. Renewable energy sources are much more cost-effective than coal-powered plants, and it would not be very difficult to install clean energy plants all across the country (Ellsmoor). The issue is not that America does not have the resources to make the changes to be a more environmentally friendly nation. The issue is that too many of our leaders do not care. Oil companies and coal plants are big business in America, so politicians are not going to sacrifice millions of dollars of funding they receive from these companies for a better future (Goldenberg). It is human nature to protect yourself and your family, and that is what these politicians are doing.

Although the fault of pollution and climate change may seem to fall on our leaders, the American public is also to blame. America is a democracy, which means that we elect our leaders. If we truly wish to save our world, there are plenty of people we can elect to help do that. However, people have to vote, which means people have to care. The problem is that not enough people care, but not for the same reasons politicians do not care. The average American citizen is not profiting off of oil companies or coal factories. Coal mining and the pollution it creates from factories actually kills about thirteen thousand Americans a year (End Coal). Furthermore, switching to renewable energy would be a much safer and cost-effective option for Americans.

Unfortunately, many Americans do not know that as they are not educated about climate change. They might hear about some polar bears being endangered in the Arctic or some homeless birds in the Amazon rainforest. But they do not know about how far reaching climate change really is. They do not know that it is going to one day affect every facet of their lives, if it doesn't already. It is not personal for them, and people vote for what they feel will affect their lives the most. That is why healthcare is repeatedly number one on the list of priorities for voters (Clear Politics). They care about the health of themselves and their children. Climate change will affect people's health, their jobs, and their homes. Every issue that Americans hold dear will be invaded by climate change. We just have to convince people of that, and it starts with our children.

Environmental Studies Must be Implemented into the Curriculum

It is not easy to change an entire generation's perspective of the world, and that is not what I am proposing. Instead, I propose that we change the hearts and minds of a generation that

is still developing. Change happens when a group of young people stands up for what they believe in and work to change the world around them. A sixteen-year-old from Sweden started a massive movement for our environment that has led to millions of young people protesting against the harsh sustainable practices our governments support. Greta Thunberg is a great example of how much power one young person can have, which is why we have to raise a generation of students that care about the environment. If we implement environmental studies into our core curriculum that tackles the complex issues of climate change, we could create a generation of leaders that actively work together to save our world from human-made destruction. These students would be taught from an early age how the climate affects them and what they can do to help heal what their ancestors ruined.

The curriculum that we implement can not be simple or display climate change as a “theory.” Our educators have to teach students that climate change is a global issue caused by humans releasing an inordinate amount of CO₂ into the atmosphere. In the state of South Carolina, our standards are tremendously vague when it comes to climate change. In the fifth grade, children briefly discuss pollution and its possible effects on the earth (SC standards). In Earth Science—which is not a required class in South Carolina—the standards state that students need to be able to analyze arguments that support human impact on the environment. That is the only mention of climate change in the entire set of standards, and it does not even support that climate change is happening, only that some people believe that it is happening. Students need to be taught that their actions have consequences for the environment, either good or bad, and what is happening to their earth is going to have a significant effect in their lifetimes. The National Science Teaching Association has complex standards that include the human

causes of climate change, the science behind it, and possible solutions (NGSS). South Carolina is one of ten states that have not adopted these standards or standards like them (Ines Kagubare). This has to change if we want to raise a generation of protectors of the earth instead of destroyers.

The effects of our vague standards can be seen at my school. I recently gave an anonymous survey to all of the high school students that are currently taking a science class and all of the middle school students about climate change (appendix). I could not ask every high school student at my school, so I felt that the students in science would be a good representation since every student at my school has to take three sciences. The results were not surprising, but they were upsetting. When asked if students believed in climate change, 50.6% of students responded “yes”. The rest responded with “no”, “I don’t know”, or “somewhat”. That is 49.4% percent of my school that does not fully believe in a scientific fact. When asked why they believed or not believed in human-impacted climate change, the answers got even more varied. Many students mentioned how climate change was a “theory.” One tenth grade student responded, “I know there have been theories that pull towards both sides (yes or no) so they make good points on each.” This student was trying to be fair-minded because they had been taught that climate change was a political issue. This trend seemed to follow throughout the surveys. Many of the students who circled “no” or “somewhat” made references to President Trump, “fake news,” or political media. These students did not know that climate change is supported by scientific data from every reputable scientific agency in the world. They were taught that a specific political party used climate change, or more often the term “global warming,” as a tool of fear to accomplish their own political agenda. The overload of political

propaganda that we are being confronted with everyday needs to be combated with education. Students need to be given the tools to discern fact from opinion, and “alternative facts,” from misinformation.

While some students saw climate change as a political issue, others did not know anything at all. When asked if they believed in climate change, 10.4% of students replied: “I don’t know.” Almost all of those students replied that they did not know much or anything at all about climate change. This was especially evident in the middle school, with 12.6% of middle schoolers replying that they did not know if they believed in climate change. That number does not include the countless somewhats and yeses that I received that made no sense. One seventh-grader wrote, “I believe in climate change because the earth is spinning around the sun every year changing as it turns around it.” Another replied, “Because in winter it can be warm at school. But also last year it was in like April it started to snow.” Both these students had not been exposed to information about climate change and yet when asked if they were taught about it in school the latter student replied yes. It is easy to say that this lack of information is due to the age of the students, and that gets corrected as they get older. But only 51.4% percent of high school students responded that they believed in human-impacted climate change. That is only a 1.4% increase from middle school to high school for students that believe in climate change. Even as students are exposed to more information, resources, and education, they still remain ignorant of the truth.

While these statistics may make it seem as though the students at my school care nothing about the environment or the world they are living in, that is simply not true. When asked whether or not they cared about their possible negative impact on the environment, 78.2% of

students replied yes. These students want to have a healthy earth, it is just that many of them think that is separate from the “political issue” of climate change. That actually gives me hope because I believe that if these students are educated about climate change and how it is impacting their earth, they will want to do everything they can to help the environment. This, however, means that this curriculum has to be implemented into our schools and students have to be taught not only about what is causing climate change but also how we can help fight against it. When asked what students considered the most impactful things someone could do to help the environment, almost every student put down something to do with recycling or trash. There was almost no mention of carbon emissions and only an unclear mention of pollution. If we expect these students to go into adulthood as stewards of the environment, we have to teach them how they can accomplish this.

Students need to be taught that climate change is irreversible; however, we do have the power to slow the effects if we implement green initiatives into our country and around the world. The lack of information about climate change is not only evident at my school. In a recent NPR poll, 55% percent of teachers report not discussing climate change in their classrooms (Anya Kamenetz). Additionally, 65% of them reported that this was due to it not aligning with their subject area. Climate change is going to affect every facet of human life and it should be included in every subject area. Science classes can go into the science behind climate change, and social studies classes can go into the importance of collaboration and global agreements. They have to be taught the importance of collaboration and critical thinking. Climate change is not going to be something one person solves. If we ever do reach a point where we have an environmentally friendly world, it will be because of a generation of people that came together to

save their planet. The reason our current leaders have not worked harder to get rid of the practices that are ruining our earth is because in our current American school system we are trained to care about the individual; Not the collective.

If we are going to implement climate change into the curriculum educators have to accept that the climate is happening and that we have to do something about it. A majority of teachers care about climate change, with 74% of them believing that climate change should be taught in school (Anya Kamenetz). But that is obviously not happening at my school, or schools across the country. If we are going to change the classrooms it will start with the standards. We need to require teachers to not only teach about the climate, but also for schools to show students what it means to live sustainably. Students should practice sustainable agriculture, complex recycling, and water conservation in their schools. If we teach students that this is the right way to live, then they will then use these green practices in their adult life.

What I am proposing would not be something that hasn't been done before in other states. In 2016, Oregon passed a resolution mandating that climate change and climate justice be taught in schools (Alan Singer). In New York, students are required to watch videos and lessons pertaining to climate change (Andrew Urivig). In states that do not have a complex curriculum, teachers have taken upon themselves to use interactive lessons and websites created by other teachers to educate their students about climate change. A social studies teacher in Oregon has created a complex book of programs, projects, and games that students can participate in to learn about climate change and how to fight for justice. Teachers all across that country have used this book to teach about climate change and climate justice. So, what we need to do is being done in some schools across the country. But the movement to educate students on the perils of climate

change needs to grow. Not only for the good of our environment or the good of students, but also, for the good of our economy.

Climate change is not only an American issue, it is something that will take global focus, however, I am confident that if the United States takes the proper measures, the rest of the world will follow. If the world does not come together to truly tackle the environmental issues that we are facing, we are going to see a drastic drop in global GDP and national GDP in America (Freedman). Climate change will cause billions of dollars worth of damage to communities on the coast, and will severely disrupt agriculture because of the rising temperatures (Fourth National Climate Assessment). All in all, if the world continues the way that it is, the United States could lose an estimated ten percentage points of GDP. This could cripple our economy and we could see conditions in America that haven't been seen since the Great Depression.

The good news is that the world has already come together to create a plan on what each country can do to limit their negative contributions to climate change. The Paris agreement was negotiated and signed in 2015 by 195 countries ("The Paris"). This was a complex agreement to attempt to limit warming to two degrees in the next hundred years. To accomplish this task each country agreed to commit to limit its carbon and methane emissions. The issue with the Paris agreement is that the commitments that each country made are guidelines instead of rules that they must follow, and all of the major carbon producers are not following those guidelines (Erikson). The top carbon producers: India, China, and the United States, are all still on a dangerous path to four degrees warming by 2100. The United States is actually doing less to try and cut back on their emissions than both India and China, and President Trump went so far as to pull the United States out of the climate accord. This was a clear message to the world that the

United States does not care about tackling climate change. Especially not at the expense of our oil and coal monopolies (McCarthy). In fact, in 2017, twenty-two Senators wrote a letter urging President Trump to pull out of the Paris Agreement. All together these Senators received ten million dollars from oil, gas, and coal companies. This is a clear demonstration of the control that the coal and oil companies have over America. And that influence extends to South Carolina and our students. One of those twenty-two Senators was Tim Scott, one of the two Republican Senators that represent South Carolina. He received roughly half a million dollars from coal, oil, and gas companies in the past three election cycles. The problem is in our own backyards, and we have to fix it.

If every country did honor the commitments that they made in the Paris accords, we would see far less destruction than what we are facing now. But for that to happen, America and the other world powers have to start setting a good example, instead of a bad one. And to do this, we must commit the next generation of Americans to help the climate instead of hurting it. My plan will cost money. I am proposing that we put solar panels in schools and water conservation technology in the bathrooms. I am proposing that students have the opportunity to grow sustainable gardens and go on field trips to local conservation areas. This will require schools and the government to invest a good sum of money into our school system. But what I am proposing will end up saving us a lot more money than what four degrees of warming could cost us.

Conclusion

If nothing is done in the next fifty years to combat climate change, the world as we know it will be drastically different. Global GDP could fall as much as seven percentage points by

2100 (Freedman). Hundreds of millions of people will experience more storms, droughts, and wildfires (The Effects). Homes will be destroyed, the unemployment rate will increase, and parts of the world could be completely underwater a hundred years from now (Bendix). To quote my personal hero, Greta Thunberg, “this is not a drill.” We have to do something and to do that we have to convince the public that this is an issue worth fighting for.

In America, fifty million students are enrolled in public schools (The NCES). That is fifty million students that are going to school every day, learning the information that the government deems necessary. Imagine if that information included comprehensive information about climate change. The problems created by climate change are not going to fix themselves, but many of them can be solved by a generation of young Americans who care about the environment and have the tools to come up with creative solutions on how to help it.

The climate change curriculum I am proposing can not include simply teaching about climate change, but it has to include programs that let students practice sustainability. When I was in art class as a child, my teacher did not simply teach me about artistic techniques and the history of famous painters, she gave me a paintbrush and encouraged me to be creative. In history class, my teachers not only taught me about the civil war, but brought me to a famous battleground in the state. School has taught me that it is important to go beyond the classroom and encourage students to take charge of their own interests. Some of the best learning experiences I have ever had have been done through experimentation and field trips. Art and history, science and mathematics, they are all very important. But it is not going to matter if we do not do something about climate change now. I do not want my great-grandchildren going on a field trip with their history class to the beach that used to be Charleston, South Carolina. I do not

want our generation to go down in history as the villains who destroyed planet earth. I want us to be the heroes that saved it.

Action Plan

While I cannot control what goes on in schools across the country, I can impact what goes on in my small charter school in Rock Hill, South Carolina. My school practices hardly any recycling. We have no gardening despite our large spacious campus, and we pay thousands of dollars in energy bills every month. It is safe to say that our campus is not environmentally friendly, however, I think that there are some simple actions that we could take to remedy this.

The first thing we have to do is start a recycling program at York Prep. Recycling is definitely not going to save our planet, but I think that it is a good way to get students focused on the environment through something that is familiar to them. Plus, it just makes no sense that York Prep throws away so much paper every day when we could be recycling it. There should be a recycling bin in every classroom, and students should be encouraged to recycle by their teachers and by the administration.

York Prep is currently building a cafeteria where we can finally start to produce and sell our own food. Up until now, we have relied on food from the Rock Hill school system, so we have not had much control over what we are giving to our students, however, now we have the opportunity to provide healthy sustainable options. This starts with limiting the meat that we feed our students, especially beef, since cows are by far the biggest contributor to methane released by livestock. I also think we should try to source some of our produce from local farms in the area, and stick to organic fruits and vegetables. Our cafeteria also should focus extensively on

limiting the amount of food that we throw away and composting our leftover produce. That compost can then be used in the gardens that we will start.

Gardening is a great way to connect students to the earth and show them what sustainable agriculture looks like. I think that we should start a gardening club at school to get students interested in agriculture and it would be an easy way to teach young students about photosynthesis and plant life. Our gardening club could also lead to making our campus look better and could even lead to some produce for our cafeteria.

My last and biggest proposal is that we invest in some renewable energy and water conservation technology. This will require a rather large investment, however, I think that in the long run, it will not only help the environment but also save York Prep a lot of money. Currently, we spend tens of thousands of dollars on our energy bill every month, and a lot of that is due to the fact that a lot of our energy is being used at peak demand. This means that we are using energy when everyone else is using energy therefore resulting in a higher energy cost. If we could subsidize even part of the energy that we use with solar panels, I am quite confident that we could save a lot of money in the future. We could use this money to better York Prep and maybe spend some of it on future sustainability programs.

York Prep is in a unique position because of its location and title of a “public charter school.” This means that we have a little bit more freedom to pursue the programs that we want to pursue, and we have the land to do that. I am confident that if we put into place the programs that I mentioned above, we could become leaders in the climate change movement. The world is going to have to change if we are to have a healthy future. The question is will this school be pioneers? Or will it get left in the dust?

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Appendix

Student survey

1. What grade level are you in? (circle one)

6th 7th 8th 9th 10th 11th 12th

2. If in high school, what is the most recent level of science that you are in or have taken in the past? (Circle one)

Biology Physical Sci. Environmental Sci. Chemistry Anatomy AP Biology

3. Do you believe that the climate is changing due to human impact on the environment? (Circle one)

No Somewhat Yes I don't know

4. Why do you believe (or not) in climate change? Give a short response in the space below.

5. To what extent do you understand the science behind what scientists propose is causing the climate to change? Rate your understanding from one (being you don't understand it) to five (being you believe you have a full understanding of it.)

1 2 3 4 5

6. Do you recall being taught about climate change in school?

No Yes I don't know

7. If so, in which classes were you taught about climate change? (List them below)

8. Do you believe that you have been taught how you can help the environment?

No Yes I don't know

9. Do you care about your possible negative impact on the environment?

No Yes I don't know

10. What do you consider the three most impactful things someone can do to help the environment?

1. _____

2. _____

3. _____