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Climate Change: Empowering Deaf Students
to Think Critically and Take Action

A thesis submitted in partial satisfaction
of the requirements for the degree Master of Arts in

Teaching and Learning:
ASL-English Bilingual Education

by

Jennifer Wickman

Committee in Charge:

Gabrielle A. Jones, Chair
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Cheryl Forbes

2020

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This Thesis of Jennifer Wickman is approved, and it is acceptable in quality and form for publication on microfilm and electronically:

Chair

University of California San Diego

2020

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ABSTRACT OF THE THESIS

Climate Change: Empowering Deaf Students
to Think Critically and Take Action

by

Jennifer Wickman

Master of Arts in Teaching and Learning: Bilingual Education (ASL-English)

University of California San Diego, 2020

Professor Gabrielle A. Jones, Chair

Deaf students often lack access to STEAM resources, specifically climate change, due to no captioned videos or not being ASL-friendly. Deaf students have missed opportunities to enhance their creativity, gain knowledge in STEAM, experience hands-on activities, and learn how to be advocates for themselves and their communities. To address this problem, the

curriculum is designed to teach students about how humans impact the micro environment as a result of trash pollution and deforestation, and how the macro environment (i.e. global warming) harms the health and safety of humans, animals and environment.

The curriculum is designed for middle school students and consists of two units and four lessons each. The first unit focuses on identifying the actions we do to harm the Earth, the different signs of climate change, the extent of damage on divergent ecosystems (micro environment), and how we mitigate to minimize humans' impact on Earth. The second unit is focused on how the consequences of our actions and how the actions as a result have harmed us, our animals and our planet. Students will analyze evidence of climate change, summarize macro environment impacts on humans, argue political and social responses, and create a call to action plan.

The curriculum used five learning theories: Inquiry-Based Learning, Empowerment Theory, Collaborative Learning Theory, Metalinguistic Awareness Theory and Socially Mediated Theory. The learning theories are used to encourage a student-centered classroom, exploration in science, interaction between peers and empower students to take action towards an issue they see in their communities or the world. Deaf students need to have access to STEAM resources as it will empower them to think critically and to contribute to their society.

Students will learn and produce work in both ASL and English. The curriculum draws on students' funds of knowledge, encourages language transfer between ASL and English, and provides all aspects of practical, authentic STEAM instruction. The curriculum goals will have students to: 1) describe the phenomena of climate change in how we impact the Earth and in how these actions harm us in both ASL and English, 2) problem solve the issues within climate change by providing clear and detailed solutions and justifying their arguments in both ASL and

English, 3) enhance their research skills, and 4) increase climate change awareness in personal and community lives and develop a call to action plan.

Due to COVID-19, I was not able to implement my curriculum at my student teaching placement. I created an online platform using Google Site (link:

<https://sites.google.com/view/climate-change-curriculum/home?authuser=1>) to make the curriculum interactive for students to receive access to science in ASL and English at home during the pandemic.

Introduction/Overview

The current climate change is mainly caused by human activities, such as burning fossil fuels including coal, oil and gas to power factories, cars and buses, meeting their demand (NASA, 2020). This specific activity releases excessive greenhouse gases to the Earth's atmosphere making it trap more heat than usual inside the atmosphere. In result, this causes the Earth's average temperature to rise which is known as global warming. The effects of global warming include changes in rainfall patterns, extreme weather, arrival of seasons, and more. In addition, as the world's population continues to grow, so does the amount of trash that humans produce. On-the-go lifestyles require easily disposable products, such as soda cans, plastic bottles and straws, amounting to an excessive accumulation of pollution around the world. Decomposing plastic products requires that they be burned in landfills, which contributes to an increase in greenhouse gases and a rise in the Earth's temperature. The impact of a growing population on the environment takes two major forms: consumption of resources such as land, food, water, air, fossil fuels and mineral and waste products as a result of consumption such as air and water pollution, toxic materials and greenhouse gases (Australian Academy of Science, 2020). The ramifications of human overproduction of non-biodegradable products releasing gaseous toxins in the air are damaging air quality. In California, rapid wildfires in the Los Angeles areas, Ventura, San Bernardino, and Sonoma are due to the effects of hotter and drier climate exacerbating the risk of fire. Many homes, buildings, and lands are damaged. People and animals either died or have been injured from wildfire incidents. These are a few examples of how our ill-informed decisions and actions hurt our planet in the process. We are simply not taking care of mother nature. The domino effect of our actions toward our planet continues to unfold. Scientists, lawyers, and activists are actively seeking ways to educate our society.

Protests, speeches, and proposed bills to establish rules and laws are put into motion to inform our world of the dangers of climate change. Younger generations are taking action in this protest. A young renowned activist, Greta Thunberg, a fifteen year old Swedish young girl, warns us, “we are living in the beginning of a mass extinction because our climate is breaking down, species are going extinct, and most of the arctic ice, wild animals and soil are gone” (WWF International, 2019). Thunberg believes we can still fix this problem, together. She has taken the political stage by storm providing lectures on the climate crisis. Her speech addressed the need to stop burning fossil fuels and spend our money on natural based solutions, such as trees, mangroves, marshes. The more trees we have, the more they will absorb carbon dioxide (CO₂) from the atmosphere and release oxygen. She has inspired people to make collective lifestyle changes to protect, restore and invest in our nature. We need to talk about what is happening with our ecosystems and join movements that are fighting for environmental causes. We need to do it on a massive scale to end mass extinction on this planet. Her role model has sparked educators to involve young children in understanding the scientific and personal ramifications of climate change.

Throughout my first year of student teaching and having worked at an elementary school for deaf children, I noticed that STEAM has not been a central focus in education. So much focus is on English literacy and math that other subjects such as science are set aside. My main goal is to provide a meaningful context for our deaf children to access STEAM subjects in American Sign Language, a language that is known to them and in English where they get to develop research skills such as collecting evidence, analyzing data, evaluating and interpreting information to ultimately become advocates for their community. This curriculum is likely the first of its kind for Deaf youth in the United States. Given the tools and scientific knowledge, it is

my hope to train them to better advocate for themselves in their communities regarding climate change.

The purpose of this bilingual ASL/English science curriculum is to give students the opportunity to delve in STEAM when studying about climate change. Climate change is described as a change in the average conditions which includes rise in temperature and shortage in rainfall (NASA, 2020). Over the years, scientists have been able to show how humans damage the Earth and how the actions as a result are harming us through dangerous rising sea levels, shrinking mountain glaciers and severe weather. I categorized the themes within climate change in Unit 1 focusing on human activities impacting the immediate surroundings and its long-term effects (i.e. trash pollution, deforestation) and Unit 2 focusing on the overarching impacts from human activities (i.e. global warming, rising sea levels, severe weather). Students will explore the various subtopics, (ocean pollution, wildland fire, land management) and choose a subtopic of their interest. Students are to identify a problem, find ways to solve it, and present their idea/plan to their peers in different types of media (i.e. PowerPoint, animated video, board). Students perform a self-assessment and create a call to action plan.

This curriculum is an ASL-English bilingual curriculum where bilingual teaching strategies are utilized and both languages are valued equally. Students will learn and produce work in both ASL and English. Additionally, the curriculum draws on students' funds of knowledge, encourages language transfer between ASL and English, and provides all aspects of practical, authentic STEAM instruction.

There are four goals that I created for the curriculum. Students will be able to:

- 1) Describe the phenomena of climate change in how we impact the Earth and in how these actions harm us in both ASL and English

- 2) Identify the issues within climate change by providing clear and detailed solutions to the problems and explaining the cause and effect in both ASL and English
- 3) Enhance their research skills (i.e. knowing how to search cause and effects and finding correct sources/links, knowing who to contact based on the issue they choose)
- 4) Increase climate change awareness in personal and community lives and develop a call to action plan (i.e. flyer, letter, PSA, etc.)

The need for bilingual approaches to education

My approach to the education of deaf children is using a bilingual and multicultural teaching and learning framework. I believe this framework honors all of a child's language, identity, and cultural memberships and provides deaf children with a rich and comfortable learning environment. By adopting an ASL/English bilingual approach to educating Deaf children, it is important to address scholarly research, authentic pedagogy and socio-cultural practices within instructional practices.

Scholarly research shows that bilingual education provides benefits to the mind. Studies suggest that fluent bilinguals outperform non-fluent bilinguals on cognitive tasks (Diaz & Kingler, 1991). The cognitive benefits for bilingualism include: higher creativity and reorganization of information, higher metalinguistic ability, enhanced cognitive flexibility (Sun, Li, Ding, Wang & Li, 2019), heightened spatial and verbal reasoning (Stephens & Moxham, 2019), higher scores on nonverbal spatial, symbol manipulation, and reorganization tasks and higher ability and understanding on the differences between form and meaning (Bialystok, Craik & Luk, 2012). To conclude, bilingual education has been shown to be beneficial for children around the world, more specifically for Deaf children in school.

For deaf children, learning in American Sign Language fosters cognitive development (Humphries, 1997). The fact that sign language is guaranteed to be visually accessible and naturally acquired within the signing community, deaf students can express themselves easily in sign. This natural ability to verbally sign receptively and expressively enables deaf students to build Basic Interpersonal Communicative Skills (BICS) and academic language (Cognitive Academic Language Proficiency) learned and used in the classroom. Cummins (1996) suggested that without having a strong foundation with BICS, students have a harder time developing CALP. This means the use of academic language in ASL is crucial in building knowledge.

Traditionally, deaf children must learn English, but they do not have access to spoken English making their language acquisition weak or non-existent, and challenging to read and comprehend English textbooks. Their arrival at a deaf school or a signing environment allows them to pick up ASL on a social level and ultimately develop abstract thinking in ASL mastering CALP to deal with English as a second language. Humphries (1997) claims, “Deaf children need a strong foundation and fluency in ASL to develop their academic language”. Studies on Deaf children have shown ASL development correlates with reading development (Padden & Ramsey, 1998; Hoffmeister, et al., 1998). Having ASL as a foundation to English is critical to academic achievement.

As for bilingual pedagogy, “chaining” and sandwiching methods are used in the deaf classroom as a code-switching approach between languages. According to Humphries and MacDougall (1999/2000), the approach of “chaining” helps students connect English print to ASL. It also helps introduce new vocabulary words. A teacher points to the word, “dog”, fingerspells it “D-O-G,” and then signs “DOG.” Sandwiching is another bilingual code-switching technique for using a student's native language to use a second language in the

classroom. When introducing a new concept or word, teachers scaffold using ASL students' own language to guide them into learning the printed English. This approach makes children feel more comfortable and gain self-esteem in using both languages.

According to Krashen and Terrell (1983), children must be able to listen and comprehend ASL before they will be able to access the English language. This refers to "comprehension precedes production." It is really important for educators to know that children understand more than they actually produce. Cummins' empowerment theory (1996) strongly encourages teachers to embrace students' cultures and practice an "additive" philosophy. His theory states that teachers should empower their students to succeed in school and excel by embracing their cultures and practicing an "additive" philosophy rather than a "subtractive" philosophy. It is important for teachers to approach bilingual education classrooms with an "additive" philosophy by embracing their culture and language as Deaf individuals.

As for socio-cultural practices, my approach to the education of Deaf children is through bilingual-multicultural education. Our classrooms are filled with students that come from many different diverse cultural backgrounds. It is important for educators to recognize and value their backgrounds and find ways to have them contribute to our classrooms. With that being said, this approach is more fitting for Deaf children rather than using a bilingual-bicultural approach, which is also known as the "Bi-Bi" philosophy. In the book, "Bilingual Education in the 21st Century: A Global Perspective," García (2009) emphasized the importance of not only valuing students' languages, but also welcoming their cultures in the classrooms. García (2009) used the Banyan tree as a metaphor to describe the linguistic fluidity of the twenty-first century is multi-rooted and polydirectional. The author stated that education is constantly evolving and growing that roots knowledge into all who interface with it. Therefore, additive bilingual education is

important to both the language and cognitive developments. A bilingual-multicultural approach will value and treat two or more languages as equal as well as embrace not only Deaf culture, but students' other cultural backgrounds.

I believe that my curriculum will fill the need for more support of bilingual teaching strategies for Deaf students.

Assessment of need

Although there has been an increased interest in climate change education, this concept is not addressed within school curricula nationwide. Climate change is the most critical environmental issue of our time and it connects across all systems and disciplines. Such a prevalent concept will need to be understood and addressed throughout our lifetime, yet it is currently not included in most education curriculums (Climate Generation, 2019). We need our youth to be climate literate, to make informed and responsible decisions with their actions about climate change. Climate literacy is an understanding of one's impact on climate and how the effects of climate impact our society. Furthermore, our educational systems often do not provide a thinking curriculum and it is essentially important for children's problem solving, critical thinking and social skills. According to Bresser and Fargason (2013), the authors stated, "Providing a thinking curriculum is especially important for those children in diverse classrooms who have been underserved by our educational system" (pg. 1).

STEAM is lacking from Deaf children's education. Based on my observation in student teaching and long-term sub experience, I noticed that STEAM is not the school or DHH program's priority. Their central focus is to develop Deaf children's literacy and math skills. STEAM is the last subject of importance. Additionally, I noticed that students in general

education receive STEAM curriculum and supplies long before deaf students receive theirs. The small number of Deaf students may be a factor, but by law, they have a right to equal access to education as compared to the general population. The district will be more willing to pay a large amount of money to those who are large in number and provide training for teachers to use the curriculum and supplies properly. STEAM resources are not accessible to Deaf students because they often lack captions. Many Deaf students are missing opportunities to practice their critical thinking skills, increase interest in STEAM, and develop hands-on experience as well as creativity. It is, therefore, my intention to remedy this challenge by providing this tailored curriculum in deaf students' native sign language and to empower Deaf students to think critically and take action on critical issues of ecology.

To address climate change to my students, it is necessary to investigate what curricula is available for the general population, what research related to STEAM subjects has been done for deaf students and how I could make this STEAM curriculum accessible to my students.

Review of existing materials and curricula

Following are examples of curricula currently being used that focus on climate change: 1) Stanford University on Climate Change: Middle School curriculum and Climate Generation on Next Generation Climate for Grades 6-8 and the following materials: 2) PBS/NASA: Global Climate Change and Project Learning Tree.

Stanford University on Climate Change: Middle School Curriculum

When looking over the Stanford University on Climate Change: Middle School curriculum and its objectives, the goal is for students to identify the relevance of studying climate change and differentiate between elements of weather and climate. It is designed to

address the following topics; Earth's energy balance, greenhouse gases and energy balance, impact, adaptation, and mitigation of climate change, science consensus and the climate change debate and mitigation strategies. I conclude that this curriculum provided helpful ideas in designing my own. One introduction to climate change lesson to last for two days started out with a "Student Hook Article" to encourage students to think about what is happening in their surroundings and to challenge them to create questions about the topic. I liked how it emphasized vocabulary, hands-on activities and videos to guide students through the lessons. However, the one disadvantage of this curriculum was that their videos did not include captions and are heavily focused on English. Access is hindered and therefore it is crucial for me to provide ASL friendly materials. The content is rich with scientific explanations which I will read through and incorporate in some of my signing videos for instruction. This curriculum does not promote cooperative learning, research skills and a call to action plan.

Climate Generation on Next Generation Climate for Grades 6-8

In the second curriculum, I looked at Climate Generation: Next Generation Climate for Grades 6-8 and its objectives seem to be student friendly. They are to investigate the cause of the global temperature change, research the major repercussions of climate change, and find out how they can monitor and minimize those repercussions. It is designed as a six lesson, interdisciplinary, middle school climate change curriculum. Students are to work with graphs and data and practice the skills of argumentation and engineering design. The curriculum uses the Next Generation Science Standards (NGSS) as a framework as well as is aligned to Climate and Energy Literacy standards. This curriculum encourages hands on learning, creative thinking, problem solving skills, effective communication, and making connections across all domains of science and other disciplines. Much of these skills will be introduced in the curriculum such as

interpreting data, doing hands-on learning and problem solving. The language of the instruction however is in ASL and will be specifically used to scaffold students' experiences. Many of the students lack the vocabulary to investigate and discuss science topics. I will extend those language rich content to fit the needs of deaf students. I've added an activist element which is to take action for the damage caused by human beings.

PBS/NASA on Global Climate Change

I found additional existing materials from PBS/NASA on Global Climate Change and videos from Project Learning Tree. It is designed as free, self-paced modules to guide middle school teachers to teach global climate change (GCC). It has STEM resources which are believed to increase teachers' knowledge of climate change concepts and can be used directly with students. Global climate change modules include the following units: Introduction to Earth's Dynamically Changing Climate, Impacts of a Warming Arctic, and Coastal Consequences of Sea Level Rise. The objectives within the first module include: analyzing diverse kinds of data around the world that document a warming planet, interpreting graphical representations and scientific visualizations of data exhibiting climate change and considering strategies to engage students in data analysis. This existing material is similar to the second curriculum as mentioned above, Climate Generation because they both focus a lot on data analysis. The different interactive activities, galleries and apps to show students how Earth has evolved over time are very visually rich resources which would be great for my students who are visual learners. These resources are useful for my curriculum.

Project Learning Tree

The Project Learning Tree is designed to help students understand climate change. Twelve videos include from climate change to carbon cycles to what teachers and students do to

help. It stated that it is important for us to better understand the science behind the rise in global temperatures in order to help us talk about our changing climate and take action (Project Learning Tree, 2019). I conclude that it is a great resource to use in my curriculum since all videos have captions and are very visually stimulating. The videos are easy to understand and can relate to students' real-life situations. I feel that they are meaningful, challenging and promote students' engagement, critical thinking and problem solving with regard to issues of climate change. I will incorporate some of these videos as instructional materials to strengthen my students' understanding of the topic in the additional resources tab on the online platform.

After reviewing the literature and existing curricula and materials, I have plenty of resources to refer to and use when necessary. I anticipate the development of an ASL/English curriculum will greatly benefit the deaf communities in grasping the issues of climate change.

Relevant research

Research has shown many benefits of climate change education for the youth. Dittmer and Riemer (2012) mainly focus on the participation of community psychology, specifically in issues of global climate change. The researchers described an education project that includes youth and how they engaged in a community-based environmental organization. The project was motivated by the idea that engaged and critically aware youth would become change agents for social movements in regard to our environment. The youth would be influenced by their community to rethink their environmental habits as well. Additionally, the project was influenced by five community psychology concepts, such as stakeholder participation, ecological and systems thinking, social justice, praxis, and empirical grounding. The study was measured based on these concepts and its influences on youth's thinking and action through an evaluative

study. As a result, the study suggested the contributions of community psychology had greatly impacted the quality of the project and the outcomes experienced by the youth, specifically increasing their critical, systems, empathic, and reflective thinking skills. The participants felt intrinsically motivated to contribute to the environmental issues.

Bofferding and Kloser (2014) state policy-makers and scientists “...emphasize the importance of education for influencing environmental behavior and minimizing the effects of climate change on biological and physical systems” (pp. 275). The researchers believe that students should receive climate change education because it can potentially impact students’ system knowledge (i.e. their understanding of the factors that affect the climate system) and action knowledge (i.e. their understanding of behaviors that can impact the system). The researchers mentioned that studies on climate change education have focused on system and action knowledge rather than adaptive responses in the system. Bofferding and Kloser (2014) conduct a study that used a pre/post-test format to recognize middle and high school students’ climate system and action knowledge in terms of mitigation and adaptation for climate change. As a result, the study shows that middle and high school students combine both climate change mitigation strategies and unrelated environmental problems in surveys. In addition, students exhibited a lack of understanding of adaptive responses to climate change. The researchers claim that students have increased their system and action knowledge after being taught a unit about climate change. However, the study shows students had misconceptions about mitigation and adaptation in climate change.

Monroe et al. (2017) recognize that there is an increased interest in climate change education along with challenges to address this issue in this type of education. The researchers perform a systematic review of the research to identify effective climate change education

strategies. They find 959 citation records that address climate change education and 49 sources of those focused on assessment of climate change education interventions. The researchers analyze different factors that include intervention purpose, assessment methodology, and identified strategies that might contribute to effective interventions. They identify two common themes in environmental education which is "...focusing on personally relevant and meaningful information and ...using active and engaging teaching methods" (Monroe et al., 2017, pp. 791). Additionally, they identify four themes specifically for issues related to climate change: engaging in deliberative discussions, interacting with scientists, addressing misconceptions and implementing school or community projects.

Johnson (2011) explores current practices in K-12 climate change education which includes teacher preparation, professional development, and understanding of climate change. In addition, the article discusses teachers' reflections on their use of resources, hardships they face when teaching about this subject, and student and teacher misconceptions. Teachers are experiencing pressures which were said to cause them to negatively deliver climate change education to their students. Due to a survey, teachers who teach climate change report a little over 60% in high school, about 35% in middle school, 15% in elementary school and less than 5% in preschool. This shows that students learn about preserving their environment very late in school. This confirms what Climate Generation (2019) said about climate change education, that it is not being included in most education curriculum. Another survey reflects how comfortable teachers feel covering topics in climate change. The result in this survey shows more than 50% of teachers feel they are comfortable teaching the topics and at about 20% teachers feel uncomfortable. Another survey reflects the challenges that teachers face in teaching about climate change. As a result, about 38% of teachers felt it was hard to address students'

misconceptions about climate change and more than 25% of teachers report that students, parents, administrators and community members have argued with them that climate change is not a result of human activities, or climate change is not happening. Johnson (2011) recommended that our community should provide climate change educational resources that are evidence-based, and data driven to provide multiple opportunities for students to work with actual data, question the data, and dig deeper. Johnson 2011) state “science education is all about asking questions, and answering them with the scientific knowledge, process skills, and analytical toolkit they develop in their studies” (pp. 13).

Inquiry-based instruction is a student-centered approach and a great way to get students engaged in science. Witt and Ulmer (2010) claim that inquiry-based learning contrasts with traditional education. The researchers mention that teachers are required to follow the *No Child Left Behind* act and are pressured by state testing which makes them responsible for students’ academic achievement. Student’s academic achievement is assessed based on their growth on in-class assessments. The researchers conduct this study to identify the impact of using inquiry-based, or constructivist, curriculum on student academic achievement in a middle school classroom. The researchers refer to constructivism as a teaching method that builds on students’ prior knowledge and allows them to construct their own understanding. They also want to determine if either constructivism or traditionalism was effective in increasing student academic achievement. As a result, the study suggested that using inquiry-based, or constructivist, curriculum in middle school has positively impacted student academic achievement. In addition, the result showed constructivism is more effective in increasing student academic achievement as opposed to traditionalism. The article includes eight pedagogical principles of constructivism and inquiry pedagogy: “...1) learning is enhanced by the use of authentic or real-world

problems, 2) socialization should be included, 3) the problems should be related to students' needs and goals, 4) the problems must lie within a student's past/present experience, 5) students should be assessed formatively, 6) students should be encouraged to become self-regulatory, self-mediated, and self-aware, 7) teachers should act as guide/facilitator, not conveyor of knowledge, and 8) teacher should encourage the student to examine a problem from multiple perspectives" (Witt & Ulmer, 2010, pp. 270).

More specifically, Wang (2011) focuses on inquiry-based science instruction and performance literacy for deaf and hard of hearing students. The author mentions that deaf and hard of hearing students who have difficulties accessing and using information in print will struggle learning in science instruction that particularly relies on lectures and textbooks. The author provides an overview of inquiry-based science instruction reform, examines the empirical research on science education specifically for deaf and hard of hearing students, and introduces a conceptual framework that combines both inquiry-based instruction and performance literacy. Wang (2011) suggests teachers of deaf and hard of hearing students should reconceptualize and broaden science literacy in the classroom by providing them "...opportunities to gain and think about complex information through a captured (i.e., preserved, saved, or documented) mode other than print..." (pp. 240). It can be done in a signing literacy mode. It is suggested that teachers should avoid giving out traditional test-based science instruction and instead, they can use a signed rendition of the "...same information but with more explanations and simpler language" (Wang, 2011, pp. 248). Additionally, a DVD can be created that includes the discussion between the teacher and students during the inquiry process, so they can take the DVD home and students can watch it over and over. In conclusion, Wang (2011) suggests

inquiry-based science instruction for deaf and hard of hearing students can enhance their learning experience in science and performance literacy.

A review of the literature reveals that climate change education is heavily emphasized in higher grades (i.e. high school) and education (i.e. college) in contrast to younger populations (Johnson, 2011). Most articles explain different aspects of climate change and how it affects our environment rather than how students can learn to identify a problem and find solutions and become self-advocates to the issues within climate change. Moreover, there is a lack of empirical research on science education for deaf and hard of hearing students, as Wang (2011) mentioned in her article on inquiry-based science instruction. Wang (2011) discovered only 12 empirical studies on teaching science to deaf and hard of hearing students in the last 40 years. According to Wang (2011), this is the same case for other populations of students with disabilities, such as significant cognitive disabilities. Although there has been an increase in interest in climate change education, this novice type of education is yet to be mastered and teachers are paving their way into this path of fostering critical thinking and problem-solving skills in their students.

Key Learning Theories

This curriculum is designed with five key learning theories that I believed best matched my goals. The learning theories are as follows: Inquiry-Based Learning, Empowerment Theory, Collaborative Learning Theory, Metalinguistic Awareness Theory and Socially Mediated Theory.

The first learning theory is the *Inquiry-Based Learning*, which is not solely asking students what they want to know, but rather about promoting curiosity. This particular learning theory does not focus on students' memorization of information in STEAM. According to

Dewey (1997), he argued that science should be taught in a way that fosters development of young scientific thinkers. In addition, he said that science should be taught as a process and way of thinking rather than memorizing all facts. My plan is to incorporate Inquiry-Based Learning into my instruction: I will have my students select a topic and develop a problem statement that requires them to finalize it with a well-constructed solution, further inquiry, and citation. They will research their chosen topic using time in class, take notes in both English/ASL and have them present what they have learned from their research. Upon completion of the assignment, they will be asked to reflect on what worked and did not work about the process. Meanwhile, I will guide them and model different types of methods of researching reliably and presenting appropriately. I strongly feel that incorporating Inquiry-Based Learning will boost my student's engagement as well as pique their curiosity in STEAM activities within the classroom.

Moreover, in the book, "Becoming Scientists: Inquiry-Based Teaching in Diverse Classrooms, Grade 3-5", the authors believed inquiry science is all about active, student-centered learning (Bresser & Fargason, 2013). The classroom should begin with a question when we engage in inquiry. Questions could vary from students responding to a topic to teachers posing a question at the beginning of a science unit. Afterwards, students will do experiments, and these include collecting data, making discoveries, and drawing conclusions about our question. In the end, students and teachers can either have their question answered or create a new one. Bresser and Fargason (2013) mentioned that "children learn about concepts by being involved in the science processes" in inquiry science (pg. 2). In my project, one of my main goals is for students to be able to observe and describe objects/topics, make predictions, ask questions, acquire knowledge, and communicate their ideas to their peers. They get to do exactly what scientists do.

The second learning theory is what Cummins (1996) refers to as the *Empowerment Theory* suggesting that students learn more effectively when teachers allow their students to take a proactive role in their own learning process. Throughout my curriculum, students learn about various topics related to climate change, choose a topic of their interest, research ways to solve the issue within their topic and create a presentation to show what they have learned from their research. Students create a call to action plan for themselves and their peers to follow in solving the issue of their chosen topic. By allowing students to take active responsibility in being proactive about climate change issues within their own communities, they are empowered to take pride in their work as well as to recognize their own strengths and areas of growth as writers, readers, and users of ASL and English. In addition, Cummins (1996) strongly encourages teachers to embrace students' cultures and practice an "additive" philosophy. His theory states that teachers should empower their students to succeed in school and excel by embracing their cultures and practicing an "additive" philosophy rather than a "subtractive" philosophy. As a teacher, I plan to approach my bilingual education classroom with an "additive" philosophy by embracing their culture and language as Deaf individuals.

The third theory is the *collaborative learning theory*. Vygotsky (1962) claims that students learn through interactions and communications with their peers, teachers, and other experts. As a teacher, it is important for me to create a learning environment that maximizes my students' abilities to interact with their peers through discussion, collaboration, and feedback. In this curriculum, students conduct their own research of their chosen topic, but I will also encourage them to ask their peers to see what they already know and do not know about their topic. Students learn that if they do not collaborate, they do not effectively share correct information with each other. Students learn that the exchange of information is important in the

scientific world leads to political activism, where measures are taken to better our lifestyles which in turn will positively safeguard and protect the Earth.

The fourth theory is the *metalinguistic awareness theory*. This theory can refer to the ability to think about language, comment, and manipulate using a language's different structures (McAllister, 1989). This ability is critical for bilingual students when they code-switch between two languages. For my curriculum, this theory applies in multiple ways. Students will be required to think about their sign choice when reading the English versions of their research about their chosen topic and try to distinguish how they can sign the English versions in ASL. Their presentations will encourage them to create English statements as well as present the information they have learned in ASL.

The fifth and final theory is the *socially mediated theory*. Vygotsky (1962) suggests that students learn through social interactions within the classroom. This theory strongly encourages students to participate and interact with their peers in order to learn new skills, knowledge and behaviors. Through the curriculum, students will be required to participate in discussions about their chosen topics with their peers. They will explain why they chose their topic, how they create a call to action plan and ask them for feedback. Most importantly, students will be encouraged to exchange information about different topics of climate change and how we can become self-advocates for our communities to better our Earth.

Design and Description of the Curriculum

This description of the curriculum, "Climate Change: Empowering Deaf Students to Think Critically and Take Action," should be taken as a frame of reference for teachers intending to use this curriculum. There are four overarching goals for the curriculum; students will

- 1) Describe the phenomena of climate change in how we impact the Earth and in how these actions harm us in both ASL and English
- 2) Identify the issues within climate change by providing clear and detailed solutions to the problems and explaining the cause and effect in both ASL and English
- 3) Enhance their research skills (i.e. knowing how to search correct links, knowing who to contact based on the issue they choose)
- 4) Increase climate change awareness in personal and community lives and develop a call to action plan (i.e. flyer, letter, PSA, etc.)

Each unit has a theme and the lesson has specific learning and language objectives. All lessons and activities within the lessons are created to meet the content and language objectives and support the overarching curriculum goals. Teachers are to refer to the blue print (pg. 22) as a visual representation of the following information.

A list of lesson plans and its sequential format are included as a guide for teachers to help them prepare for lessons and activities. There are materials and assessment resources included to assist teachers in adapting lessons for their classrooms. The units are designed in a way to encourage gradual release of responsibility that will eventually lead to independence. These lessons include modifications and resources for students who require different levels of support. Hands-on practice, wait time, visual support, signing English print in ASL and open-ended questions to expand on their thoughts are provided for struggling students and challenging texts and writing prompts are suggested for advanced students. Assignments can be adjusted to meet the levels of the students.

Unit One: How we harm the Earth?

This unit is focused on students researching how we harm the Earth. Students will identify different signs of climate change, explain human impacts, describe the damage on divergent ecosystems, and propose a mitigation strategy to minimize humans' impact on Earth. Students will participate in a pre-test where they will be filmed answering the questions: "What do you know about climate change? What do you think we should do about it?" in ASL. The goal of this pre-test is to see how much students gain knowledge about climate change from the beginning of curriculum and to the end of curriculum. To initiate this overall theme, students will participate in a gallery walk with six pictures (trash, deforestation, melting cap, bushfires, global warming and protest) that represents an aspect of climate change. Additionally, students will be introduced to community meetings and science journals in this unit. In community meetings, it is a great way to create a sense of community within the classroom. It is a way for students to share their feelings and ideas with their classmates. For science journals, students will have either pictures, texts, questions and free writing. Science journals are a way for students to practice their writing. Their writing will not be criticized. Students will participate in a micro environment research project where they will research, collect data, summarize, problem solve and present to their classmates. They will learn about the difference between facts and opinions and credible sources as well as participate in a Greenhouse Effect experiment.

Unit Two: How our consequences harm us?

This unit is focused on how our consequences harm us, animals and our planet. Students will analyze evidence of climate change, summarize impacts on humans, argue political and social responses and create a call to action plans. They will still participate in community

meetings and science journals in this unit. Students will experience Climate Change ASL In-Text using blogs, newspapers, websites and short texts. This means that students will receive access to English text through ASL that will be provided by the teacher. Students will participate in a melting glaciers science experiment and research project where they will focus on macro impact on nature (drought, tropical storms, forest fires, sea level rising, and glacier melting). Students will work in groups with their classmates to find what causes the phenomena and how it impacts us, animals and our planet. They will also collect and interpret data as well as create a summary of results, solutions in preventing the damage and call for action creative pieces. At the end of the curriculum, students will do a post test answering the questions: “What do you know about climate change? What do you think we should do about it?” in ASL.

The Blue Print of the Curriculum

Unit #1: How we harm the Earth?

- Lesson 1: Identifying the Signs of Climate Change
- Lesson 2: Explaining Human Impacts
- Lesson 3: Describing the Human Damage on Divergent Ecosystems
- Lesson 4: Proposing Mitigation

Core Ideas

- Climate change
- Irresponsible humans
- Greenhouse Effect
- Trash pollution
- Deforestation

Enduring Understandings

- Climate is the average weather condition in a place over many years.

- Weather and climate are not the same thing.
- Human activities play a major role in causing a rise in global temperature.
- Humans have the power to control the environment.
- Humans depend on the Earth for different resources.

Essential Questions

- What is the difference between weather and climate?
- What is climate change?
- What is responsible for climate change and how do we know?
- How can we minimize our impact on climate change?

Unit #2: How our consequences harm us?

- Lesson 5: Analyzing Evidence of Climate Change
- Lesson 6: Summarizing Impacts on Human
- Lesson 7: Arguing Political and Social Responses
- Lesson 8: Creating Call to Action Plan

Core Ideas

- Predictability and unpredictability of natural disasters
- Rise in global temperatures
- Endangered habitats
- Extinct ecosystems
- Human consumption

Enduring Understanding

- The consequence of human activities has a negative impact on temperature, agriculture products, animals, and natural disasters.
- There are consequences from human activities that will harm humans as a result.
- Human activities affect the Earth's system.
- We can make a change to climate change, but it begins within ourselves.

Essential Questions

- What evidence is there of climate change?
- Why does climate change matter?
- In what ways does climate change impact our lives?
- What can we do to prevent these consequences from happening on our Earth?

Estimated teaching time to complete this curriculum is 6-8 weeks. Some lessons can be a few days while others are a week and half. It depends on how long students are able to complete each step in research projects. Extended time will be given to those who struggle to finish on time.

The following Next Generation Science Standards, Common Core State Standards and ASL Standards have been drawn as a foundation for this curriculum.

NGSS for Unit 1

MS-ESS3-2: Analyze and interpret data on natural hazards to forecast catastrophic events and inform the development of technologies to mitigate their effects

MS-ESS3-4: Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems

ELA Standards

CCSS.ELA-LITERACY.W.6.10: Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

ASL Standards

Viewing Standards: Students will be able to determine central ideas or themes of a text and analyze their development

Discourse and Presentation: Students will be able to prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively

NGSS for Unit 2

MS-ESS3-2: Analyze and interpret data on natural hazards to forecast catastrophic events and inform the development of technologies to mitigate their effects

MS-ESS3-3: Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment

MS-ESS3-4: Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems

ELA Standards

CCSS.ELA-LITERACY.W.6.10: Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

ASL Standards

Viewing Standards: Students will be able to determine central ideas or themes of a text and analyze their development

Discourse and Presentation: Students will be able to prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively

Evaluation Plan

In order to ensure that my curriculum and thesis goals are accomplished, I plan to collect several types of data; observational field notes (daily), student artifacts and work samples, rubric and checklists, and authentic performance tasks. These methods of data will be collected to show students' academic progress over time and to provide evidence that the curriculum goals are being met. This is done to support the understanding that students should be assessed overtime used by different types of data in order to provide more accurate evidence.

During my full-time student teaching, I will keep detailed observational notes in a notebook of students' academic progress. Their descriptions will be in ASL and in English through their presentations, their discussions in groups, in pairs and their written science journal. I will use color coded sticky notes with their names to keep track of students' comments (i.e. blue for describing the climate change, green for providing solutions and explaining cause and effect, yellow for showing research skills and pink for displaying climate change awareness and developing a call to action plan). Students will take turns being a notetaker during community meetings, which is another way of summarizing information in English for the class book with all the notes. I can go back to the class book and take notes on what I may have missed. Student interactions with peers and teachers especially in community meetings and group projects will be recorded when relevant to curriculum goals from this curriculum.

These written and signed summaries will meet the first curriculum goal which is to 1) *Describe the phenomena of climate change in how we impact the Earth and in how these actions harm us in both ASL and English* and 2) *Identify the issues within climate change by providing clear and detailed solutions to the problems and explaining the cause and effects in both ASL and English* and 4) *Increase climate change awareness in personal and community lives (KWL activity & post survey) and develop a call to action plan (i.e. flyer, letter, PSA, etc.)*

The second form of data collection that I chose is student artifacts and work samples. Students will write and/or draw in their science journals at the beginning of each class with exception of presentation days. They will either do free writing, answer questions, text or pictures about various topics related to climate change. Additionally, they will write lectures and community meeting summaries. Students will keep their science journals at their desk and after each day, I will scan or print students' completed work from the science journals and analyze the progress each student makes from the beginning of the curriculum to the end. Interpretations about their academic, description of climate change, problem solve and research skills, climate change awareness and content knowledge progress were used to make some final conclusions about the success of the curriculum. All work samples added or adjusted will be explained and evaluated. This will provide me a clear picture of their progress as well as supporting my curriculum goals.

The third form of data collection is rubrics and checklists for various activities and projects. Students will have rubrics for their science journals and research presentations. Students will also have checklists for their research projects. Every activity and project that the students will be given will have an attached rubric or checklist to help them guide their work. This will allow students to see the expectations for the activities and projects before starting them. This

kind of data will be combined with the other data to provide evidence of the curriculum's success.

The final method of data collection I will use is authentic performance tasks. Students will participate in two research projects; a micro environment research project focusing on micro-environment impact (Unit 1) and a research project focusing on macro-environment impact (Unit 2). This is designed to demonstrate students' understanding of the content and research skills. Given a topic, this performance task will have students work in groups and research information, create survey interview questions, collect data, cite proper sources and present to their classmates. Another performance task that students will do is debate. Students will be given a statement (e.g. We need to recycle plastic products) and they can choose to either disagree or agree with the statement. They will be required to explain and demonstrate the content and skills learned across the units of the curriculum.

The third curriculum goal which is to 3) *Enhance their research skills (i.e. knowing how to search correct links, knowing who to contact based on the issue they choose)* will be evidenced by their research work and research reports, their final performance and presentations will be in both ASL and in English. They will display statistics, record an interview for the survey and summarize the findings. The accumulation of the second and third data will answer this curriculum goal. Along with collecting data from students, notes, work samples, rubrics and authentic performance tasks, I will keep track of the progress that their teacher and classroom aide notice and add their observations to my observational notes. This data will be collected on a daily basis along with my observational notes. I will use the rubrics and checklists to assess the student's research projects and science journals on a weekly basis. The authentic performance will be monitored daily with notes and checklists and assessed toward the end of the curriculum.

Implementation

Due to the unfortunate situation of COVID-19 taking place starting in March 2020, all schools were closed and shifted to distant learning overnight. Administrators allowed teachers to cancel any other responsibilities other than preparing for online teaching. As a result of this outcome, I was not able to attend my student teacher placement and see my work in curriculum put into practice. I was deeply saddened by the fact that I could not experience teaching middle school students at a Deaf school in a subject I am passionate about. I hoped to attain this experience to strengthen my skills as a science teacher. I missed a great opportunity to network with faculty at my placement and learn new skills from my cooperating teacher. I was looking forward to strengthening my lesson plans and assessments and to receiving feedback from my cooperating teacher and students. I wanted to see what worked and did not work in my curriculum.

Because of COVID-19 and the prospect of distant learning for future classes, I had to accommodate the implementation of transforming my curriculum by creating an online platform accessible to teachers and students (link: <https://sites.google.com/view/climate-change-curriculum/home?authuser=1>). I was able to step outside the box and get creative with my curriculum as well as brush up my technology skills which include Google Site, Google Document, Google Excel, Google Slides, and iMovie.

I enjoyed creating an online platform. It forced me to think about how to implement ASL in science and climate change content and to organize my assessment plan and lesson plans in a way that was interactive and meaningful. It encouraged me to strengthen my lesson planning with ASL videos, worksheets, KWL charts, PowerPoint slides, and a tutorial. Most of them I did

not think I needed before, but while creating an online platform, I realized that I needed to create things to enhance students' learning experience.

Some reflections on the production side of online instruction. I learned that filming and editing are not simple and easy (hats off to creators who do that on a daily basis). It takes a person with lots of experience and training in filming and editing to provide great quality videos. I learned that some software is expensive and complicated to use. I used iMovie as it is already included in my MacBook Pro laptop and I had basic knowledge on how to use it. However, I learned that iMovie is limited with editing as opposed to Movavi, such as putting an additional picture within a picture to the screen and inflexibility in moving texts on screen for visibility. It was important to think about visual access to videos, pictures and text to incorporate bilingual chaining techniques. A good movie software is crucial in manipulating those essential concept building ideas. Extra funds for equipment will be required to become an outstanding distant learner educator.

For filming, since deaf individuals are visually inclined, viewing is important so therefore the background needs to be easy on the eye. I did not have proper equipment like lighting, green screen, and camera holder. I had to go a cheaper route by using my two floor lamps, neon green posters from Walmart, a dresser, laptop and chair without arms to film myself inside my home. I filmed inside my home because it was convenient due to weather conditions but found it to be difficult due to poor lighting. I did not have natural lighting in my room and even though I used two floor lamps, the video quality was still a little dark and blurry. I used neon green posters from Walmart and had to find a blank wall in my home to put them up. I had to use duct tape to tape them on the wall, or they will fall off after a while. I used Zoom since it had a green screen feature on it. I learned that I had to wait a little longer for Zoom to be customized to my green

screen. Because if I did not, my face would be completely blank. I could have not used the neon green posters as my green screen and used a wallpaper on Zoom but found the edges of me to be blurry which can be distracting for the viewers. Additionally, I tried filming outside due to natural lighting and real backgrounds (as opposed to wallpapers). On the other hand, the weather conditions (i.e. rain, wind, sun) can hinder the filming process. For example, I had wind blow the leaves in front of my laptop and sun glare halfway through the filming and these can be distracting for my viewers. I learned that I can't use Zoom outside of my home due to poor internet connection, so I had to use a photo booth app to film myself. I found an excellent background drop called "ePhotoInc 5' x 7' Photo Collapsible CHROMAKEY Green Blue Background 2 in 1 Backdrop Panel T57BG" for 64 dollars and would definitely recommend this for all teachers. Easy to put away and to set it up.

Originally, I was asked to create five videos to accommodate the implementation part of the curriculum. After some thinking, I wanted to do more, so I decided to create an online platform using Google Site. It is free, automatically saves all of my work on drive, and easy to use. I was able to embed words with links on Google Site to YouTube (ASL videos), PowerPoint slides, a class survey on ocean pollution, Google documents and to redirect to different pages/tabs on the Google Site. Pictures and ASL videos were visible for my students to see which it allows to enhance students' learning experience. I used an image carousel for the gallery walk, buttons with text to redirect students to ASL videos and they are cool features to use on Google Site. On the other hand, Google Site only accepts documents that are from Google as opposed to pdf. Since Google Site only accepts Google documents and slides, I am worried about other teachers and students being able to edit it once it is released to the public. It also had other limitations, such as where to put the pictures and texts on the page. It is hard to crop the

pictures the way I want them to be. The pictures will expand (crop) themselves when I make them bigger when I want them to stay. Another limitation is once I choose a theme for the site, I use the same color and font for the rest of the site. I cannot change them at all.

Organization of tabs needed to be clear and concise to help students navigate through the entire website. I completed this task by breaking down information in the Home page, Overview, Assessment, Tips for research, Unit 1: How we harm the Earth?, Unit 2: How our consequences harm us?, ASL STEM dictionary and Additional resources tabs. The Home page shows the title of the curriculum and explains the purpose of the website, who the website serves and the four goals of the curriculum along with a short background of who I am. The Overview tab provides a short description of the curriculum including pre test, which is to be taken before the beginning of the curriculum, Unit 1 and Unit 2 along with four lessons each and post test, which is to be taken after the end of the curriculum.

The Assessment tab has four different kinds of assessments including, science journal, community meeting, pre and post test, and performance tasks: research projects. Each of the sub tabs, except performance tasks: research projects, includes an ASL video and short descriptions of the purpose, expectations, when they can be used and how they are assessed. The science journal sub tab also has a rubric, like pre and post test, and suggested writing prompts along with photos. The community meeting sub tab also includes topics for the meeting and explains what the class book is. Additionally, the performance tasks: research project sub tab has an ASL video, a short description of what a performance task means and what students are expected to do in three different research projects: Climate Change Project, Micro Environment Research Project, and Macro Environment Research Project. Each of these projects has a link to the guidelines which has a list of what students need to include along with a presentation rubric. It

also provides a short summary of what each project is for, how long it should take and when the project should be completed. For example, Climate Change Project is expected to be completed within a period of 2-3 days by the end of Lesson 1. The Micro Environment Research Project is expected to be completed in a week by the end of Unit 1. Lastly, the Macro Environment Research Project is expected to be completed in a week by the end of Unit 2.

The Tips for research tab have five different sub tabs which includes: How to Trust Information Sources Online, Data Collection, Survey Interview Questions, Cause & Effect and Excel Tutorial. These are great research skills for students to acquire, such as finding credible sources, creating survey interview questions and collecting data and are served as mini lessons. Each of the sub tabs have an ASL video, a student-friendly step by step of what to do in a lesson, links to worksheets (i.e. KWL chart, notes, guidelines), and PowerPoint slides for students to navigate through the website and its topic. Each topic also has a link at the bottom of the website of each sub tab to Google document on Mini Lesson Plan for teachers to access. The Excel Tutorial sub tab has an ASL video that shows me explaining the step by step of filling in the graph with data from a survey interview and creating 2-D pie charts on Excel.

The Unit 1 tab has four sub tabs for four lesson plans. All of the sub tabs are student-friendly and are easy for students to follow step by step. The sub tabs also have a link to Google document for lesson plans for teachers to use. Lesson 1: Identifying the Signs of Climate Change has an ASL video explaining the gallery walk activity and an image carousel of six pictures (e.g. melting ice cap, trash pollution, global warming, bushfires, deforestation and protest) representing an overview of climate change. It also includes gallery walk discussion along with questions and sentence frames to help students guide their thoughts, ASL videos describing background information on each picture in the gallery walk, a science journal question, an

introduction to Climate Change Project with a teacher model of the project including ASL video and PowerPoint slides and Climate Change Project discussion. Lesson 2: Explaining Human Damage has a science journal question, class activity: survey on ocean pollution, interview with Jennifer Reilly, a Deaf sea turtle biologist and ocean conservationist at Loggerhead Marinelife Center in Florida, ASL videos on Greenhouse Effect Experiment and an introduction to Micro Environment Research Project including a teacher model of the project. Lesson 3: Describing the Human Damage on Divergent Ecosystems has science journal questions, mini lessons on data collection and survey interview questions along with ASL videos, PowerPoint slides and worksheets. Lesson 4: Proposing Mitigation has a warm up discussion activity, a science journal question and Micro Environment Research Project presentation.

The ASL STEM dictionary tab has 30 vocabulary words. On the website, students and educators can click on the word to watch an ASL video. The ASL video will fingerspell the word, sign it and explain the word in content to help students understand the vocabulary. Lastly, the additional resources tab is to help students and educators to learn more about climate change with different resources out there. This will also help parents learn the STEM vocabulary along with their own children.

As a Deaf teacher and creating an online platform, I am new to making the curriculum interactive online as I would like it to be in person. I wanted to make sure my curriculum will provide a great and fun learning experience for the students. Since I am new to this, I found myself looking for tutorials on YouTube on how to create iMovies with different features, such as split screen and picture in picture. I was faced with challenges since a lot of resources out there do not provide captions. It was really frustrating to not be able to understand what the creator was saying. For example, I joined a group on Facebook called Bitmoji Craze for

Educators to learn how to make resources online interactive for the students. The educators in this group were creative and provided a lot of great resources, but it was frustrating for me because they were not accessible. Speaking of accessibility, I wanted to add subtitles to my ASL videos, so it can be beneficial to not only signers, but to non-signer viewers as well. At first, I added subtitles to my three experiment videos and realized it can be time-consuming. It took me about four hours to add subtitles to three videos with about 6-9 minutes each of me signing. I realized it would be easier for me to have an interpreter do a voiceover and I can add it to my videos on YouTube. YouTube can automatically transcribe videos even though it may not be perfect, I could make some adjustments rather than starting from scratch.

As for the Greenhouse Effect Experiment, it was very difficult to film the experiment due to lighting and weather conditions. I went through lots of trial and errors to make my videos clear and easy to see. I have a couple of materials for the experiment (i.e. 2 2-liter plastic bottles, thermometers, water, soil) that need to be visible in the video. I learned that when I film the experiment with my iPhone and the thermometers in direct sunlight (which it should be), the numbers on thermometers are non-visible on camera. I figured that having high volt flashlights (one flashlight for one thermometer) light directly to thermometers make the numbers visible on camera. However, when thermometers are in shade, the numbers on thermometers are visible on camera and flashlights are not needed. Since the experiment has to be in direct sunlight, you have to make sure whatever device (iPhone, camera, laptop) you use to film is blocked off by the sun, so your device won't overheat and stop filming in the middle of the experiment. I used an umbrella to provide shade for my iPhone. You have to make sure your device is fully charged as well. The experiment is more effective in hot weather (or in direct sunlight) because you will see change in temperature right away. You should expect changes in direct sunlight. There are times

where the sunlight will be beaming towards the plastic bottles and the sunlight will be covered by clouds. When this happens, you will see changes in the temperature. I did use a laptop to film the experiment, but the numbers on the thermometers were backward, so I preferred to use my iPhone. In addition, you should make sure the plastic bottles for Experiment #3 (air vs. vinegar with baking soda; CO₂) are taped to a flat surface (i.e. table) because they can be knocked down by the wind. I had the plastic bottle representing the air get knocked down, so I had to tape the bottom of the plastic bottle to the table. Not only that, if you decide to use a tablecloth, make sure these are taped to the table as well. In addition, I noticed that the temperature changes when I put the end of thermometers directly in the soil or touching the soil. You will receive effective results if you put the ends of the thermometers in the middle of water, not touching anything. Lastly, you should make sure that your pets are inside the house when you are filming so they can't distract you or go on the screen. It happened to me twice and you would see my dog's ears and tail on the screen in the experiments. While I was filming, I also was nervous because my dog walked close to the camera and I was worried he would hit the camera. Therefore, you should make sure your pets are inside so you could have a peace of mind with the filming process.

Recommendations

I have recommendations for teachers who want to use this curriculum or create an online platform and make it a successful and less time-consuming experience. I would highly recommend teachers to use Movavi instead of iMovie because it does not have limitations in putting texts and pictures on the screen like iMovie does. I would suggest finding a place in your home to film in case the weather conditions do not permit you to film to be more effective with

your time. I had to put off filming because of the rain or strong wind and it can be time-consuming. As for the green screen, it is very important to have for filming yourself because you can change the background to your preference and if your space has busy walls. You can purchase a green screen through Amazon for \$64, expensive and fancier. Although they may be expensive, I found a good quality green screen, “ePhotoInc 5’ x 7’ Photo Collapsible CHROMAKEY Green Blue Background 2 in 1 Backdrop Panel T57BG” for a reasonable price - \$69.99. I purchased this screen and found it to be big and heavy, but beneficial for filming videos. I also found it difficult to film myself with the green screen using Zoom and its virtual background screen. The software from Zoom is very picky and requires proper lighting (i.e. floor lamps) for the background to change. I had to use the OBS software and it worked perfectly. I also purchased neon green posters from Walmart for cheap and it works the same. The only downside is that I have to find a clear wall to tape the posters on the wall. As for lighting, it is very important to have good lighting so your videos can be clear and in high quality. ASL videos are especially critical for Deaf students because they can receive access to content in their primary language as opposed to reading them in English. In addition, it is important to have chairs without arms and back support because it will be clear for students to watch. Your hands and arms will be free from these and would not hinder your signing.

I have some filming tips for teachers who plan to film themselves and create ASL videos. I noticed that I can forget the lines and I will have to film again and again until it is perfect. This can be time-consuming as well. The quickest way to provide good quality ASL videos is to type out a transcript for each video, practice signing them, then do a mock film where you will read the transcript and film yourself signing at the same time (through Zoom). Next, I will film myself outside while watching the mock video using a photo booth app, import it to iMovie, edit it there,

and upload it to my own YouTube channel. It is easier to add subtitles for non-signers on YouTube than iMovie. Also, it is important to put down the video as unlisted when you upload the video if you do not want it to be seen publicly. Viewers have to have the link to be able to watch the YouTube videos. I will use the YouTube link and put it on Google Site where students can view it.

Can the four curriculum goals be completed via online versus in real life? The goals will be assessed a little bit differently online. Students will have to upload their work online. I will have the students type out their science journal entries, take pictures of their drawings and submit them on Google Classroom for the journals to be assessed using the Science Journal Entry Rubric. As for the community meetings, Zoom sessions will take place with my students to discuss in-depth issues on climate change and these sessions can be recorded for me to go back to them and record if students' comments and questions. Another way to record is to have the classroom aides to help assess students' responses during the meetings. Based on the theme of the community meeting, I will ask the aides to use the corresponding sticky notes blue for when they describe climate change, green for when they provide solutions and explain the cause and effect, yellow for when they show research skills and red sticky notes for when they display climate change awareness and/or develop a call to action plan. This means a software sticky note will be needed for note taking and recording students' comments.

The benefits of having recorded zoom meetings will come in handy when I ask students to discuss with their family members and friends about the issues on climate change, they can save their discussions and send them to the teacher via Google Classroom. I can also have students record a video interview about what was discussed between them.

As for pre and post tests, if class was face to face, I would film students in the classroom answering questions, 1) What do you know about climate change? and 2) What do you think we should do about it? With distant learning I can either plan an individual Zoom session with each student and record it as they respond to the questions, or they can film themselves answering the questions and submit it via Google Classroom. The videos will allow me to assess the content knowledge, quality of delivery and problem-solving strategies on the topic of climate change.

As for the research projects, these will greatly allow me to assess the curriculum goals because it requires them to describe climate change (all research projects), provide solutions (Micro, Macro Environment Research Projects), explain cause and effect (all research projects), show research skills (all research projects), and display climate change awareness (all research projects) and develop a call to action plan (Macro Environment Research Project). I plan to have students work in groups of 2-3 in the classroom and monitor them throughout their research projects. Groupings, via zoom meetings break out sessions, can be done but will require scheduled sessions so that the teacher can show up during their break out session. Students can have the option of working individually or in groups with additional time to complete the projects due to possible miscommunications, internet problems, and no access to technology at home. I plan to meet them via Zoom to make sure they stay on track with the research projects or address any questions and concerns that they have about research projects.

Chat conversations during the zoom meetings, how students help each other out with research skills can be monitored. With the asynchronous instructional videos, the students can look up Tips for Research tab in ASL explaining how to find credible sources online, collect data, create survey interview questions, Excel workbook, and the difference between cause and effect. All of these videos include practice worksheets, KWL charts, PowerPoint slides, and

guidelines that will require for students to complete them and submit to me via Google Classroom. This will allow me to assess if students did meet the goals or not.

Since students and I won't meet in the classroom face to face, it is important that I plan Zoom meetings and keep constant communication with their parent(s)/guardian(s) to see how they are doing. Students need to have Google Classroom and an access to a device, such as laptop or iPad to complete their assignments on time and receive announcements as well as reminders that will be sent out by me. Students need to send me an email for any questions and concerns that they have throughout the curriculum. Although the results may be different due to not meeting face to face in the classroom, it is still possible for students to achieve the curriculum goals.

Conclusion

Climate change needs to be a subject of study for all middle school students and deaf students can be given the same information in ASL. The dangers of overproduction and neglect can hurt human beings in the long run. We all have a responsibility to take care of our own planet. Understanding the effects of fossil fuels and the greenhouse effects will awaken individuals to minimize the use of toxic gases.

This curriculum includes worksheets, guidelines, posters and other paper products that require students to complete the assignments. Ironically, due to COVID-19, it made me think outside the box of how I will deliver the curriculum to the students and that is when the online platform came to mind. I had all worksheets and guidelines online and encouraged students to use Google Classroom to submit their assignments. All of this put students and I one step ahead to conserving our environment due to not using any paper products since everything is online. As

a teacher who teaches climate change and students to conserve our environment, it is important for me to think how I can be environmentally friendly not only outside, but also inside the classroom. This is what distance learning had made me realize because it made teachers to think how they can teach and also save trees at the same time by not using paper products. Although I did not get to experience teaching this curriculum to students in person, I also learned that it is important to follow through with what I teach inside the classroom, so students can practice conserving our environment in and out of the classroom.

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Appendix A

Assessments

The following is a menu of assessment options for evaluating student progress toward curriculum goals.

Pre & Post Test

- What is the purpose? The purpose of the pre and post tests is to tap on students' prior knowledge about climate change and evaluate whether they have learned new content knowledge over the course of the curriculum.
- What are the expectations? To complete the pre and post tests, students are to have access to a phone, iPad, or laptop to film themselves answering two questions in ASL: 1) What do you know about climate change? 2) What do you think we should do about it? The students are to send the video to their teacher.
- When can it be used? The Pre Test will be given at the beginning of the curriculum, before Unit 1. The Post Test is used at the end of the curriculum after completing Unit 2.
- How is Pre & Post Test assessed? They will be assessed based on Pre & Post Test Rubric including content, quality, problem solving and posture/eye contact (see below). Teachers are encouraged to take notes and compare both tests to see how much they have progressed throughout the curriculum.

Pre & Post Test Rubric

Pre and Post Test prompt:

- 1) What do you know about climate change?
- 2) What do you think we should do about it?

	Outstanding (3)	Good Work (2)	Need to Improve (1)
Content	Answers <u>all</u> parts of the prompt clearly. Content displays a rich understanding of the phenomena with accurate scientific facts, cause and effects of climate change. Use of relevant climate change vocabulary is highly appropriate for the subject	Answers <u>most</u> parts of the prompt. Shows some understanding of the issues of climate change, a few errors in facts and what the causes/effects are. Attempts to use climate change vocabulary is present but not always used appropriately	Answers <u>some or none</u> of the prompt. The answers are not relevant to the issues of climate change. Does not use any relevant vocabulary
Quality of delivery	Your answer is <u>very well</u> detailed and shows thoughtful effort into explaining the cause and effects of the phenomena. Your signing is <u>clear</u>	Your answer is <u>somewhat</u> detailed and shows that you are attempting to explain the cause and effects of the phenomena. Your signing may <u>not be clear</u>	Your answer <u>does not</u> address the cause and effects of the phenomena. Your signing is <u>not clear</u>
Problem Solving	Identifies the problems with climate change and provides excellent solutions to the problem. Solution addresses all parts of the problem. Suggests very reasonable solutions (mitigation)	Addresses either the problem or the solution to climate change but does not address both. Solutions (mitigation) are not scientifically grounded	Does not identify the problem nor give the solution to climate change
Presentation skills: Posture/Eye Contact	Excellent use of posture and eye contact	Good posture and eye contact however a few mishaps were evident due to a lack of practice	Poor posture and eye contact making the video difficult to watch

Community Meetings

- What is the purpose? The purpose of a community meeting is to share freely about thoughts, feelings, ideas, and concerns about climate change in general throughout the curriculum. It is a safe space where everyone can reflect on serious issues. Agreements and disagreements are acceptable provided that they justify the reasons.
- What are the expectations? Students are encouraged to create a list of group expectations/rules for their own community meeting together. Students are responsible for following the expectations/rules. Frequent reminders to respect the standards are encouraged. Questions that can help guide students in creating their own list: 1) What should we put on the list? 2) How can we make sure everyone has their turn? 3) How can we show respect when a person is signing? 4) What would you say/do when you agree or don't agree with what is said? 5) What would you say/do when you want to add on to a person's comment? All students must give their consent by giving thumbs-up. The poster will be visible for all students during community meetings.
- When can it be used? Community meetings are scheduled sessions of 20 to 30 minutes, once or twice a week. Community meetings are a place to raise relevant discussions to foster critical thinking and argument building. Students sit in a circle where everyone can see each other and are given a question topic of the day. Quick discussions and summaries/review of content are not counted towards community meetings unless they are used as a topic of debate.

Suggested Topics for Community Meetings are the following:	
1	Are humans responsible for climate change? If so, how and what can we do about it?
2	Mitigation vs. adaptation (Which one matters more?)
3	Geoengineering (Useful mitigation tool or just an excuse for business-as-usual?)
4	The rise of green capitalism (Can capitalism and the climate ever be friends?)
5	Offsetting and trading (Will planting a few trees save us?)
6	Air pollution
7	Carbon and Land Management
8	Do you think recent changes in climate and weather are more attributed to natural or human causes? Explain your reasons.
9	Have you noticed recent changes in the weather or unusual weather patterns where you live? If so, describe them.

- What is the class book? The class book is a compilation of students' thoughts, feelings, ideas, and concerns about climate change shared during community meetings. For each community meeting, a student volunteer will take notes of students' responses to put it in the class book. Students can go back and remember what was discussed in community meetings.

- How are community meetings assessed? Teachers keep a detailed observational/anecdotal notebook to record students' thoughtful reflections and knowledge, and to check in their progress throughout the curriculum. Teachers include classroom aides in taking notes of students' responses in community meetings. To categorize students' progress, responses are recorded in color coded sticky notes with their names. For example, teachers can use blue sticky notes for when students describe climate change, and this meets curriculum goal #1. Teachers can use green sticky notes for when the students problem solve and provide solutions and this meets curriculum goal #2. Teachers can use yellow sticky notes for when students show their research skills, and this meets curriculum goal #3. Teachers can use red sticky notes for when students display climate change awareness and develop a call to action plan in community meetings and this meets curriculum goal #4. The class book can also be used as reference.

Science Journals

- What is the purpose? The purpose of a science journal is to write and/or draw freely about different topics on climate change and practice writing skills. This can include students' thoughts, feelings, observations and knowledge. Teachers should avoid criticizing students' writing. Science journal is a great way for students to gain confidence in their writing skills and express themselves creatively!
- What are the expectations? Students should use a notebook and decorate it with tape, stickers, markers, magazines, etc. to their liking. They are encouraged to be creative with it. There are four different writing prompts: 1) *pictures/graphs*, 2) *questions*, 3) *statements*, and 4) *free writing*. Sometimes, students are asked to summarize lectures in their science journals. Students are expected to write down the prompt and date in every entry.
- When can it be used? Science journals will be placed every morning on students' desks first thing in class to help students warm up to ideas that will be addressed and express their background knowledge on that topic. They will be given 10 minutes to complete the prompt prior to class starting. Students can be asked to summarize lectures during class time.
- How are science journals assessed? They will be assessed based on Science Journal Entry Rubric (see below). Teachers are encouraged to take pictures of students' entries to keep track of their growth and collect data to provide evidence of their growth.

Science Journal Entry Rubric

	Outstanding (3)	Good Work (2)	Need to Improve (1)
Content	Answers <u>all</u> parts of the prompt clearly. Use of vocabulary is highly appropriate	Answers <u>most</u> parts of the prompt. Attempts to use vocabulary but not used appropriately	Answers <u>some or none</u> of the prompt. Does not use any relevant vocabulary
Quality	Your entry is <u>very well</u> detailed and show that you are putting thought and effort into writing about the phenomena	Your entry is <u>somewhat</u> detailed and show that you are attempting to explain the phenomena	Your entry is <u>does not</u> address the phenomena
Problem Solving	Identifies the problem and provides the solution to the problem. Solution addresses all parts of the problem	Addresses either the problem or the solution but does not address both	Does not identify the problem nor give the solution
Neatness	Your entry is <u>neat</u> , and your handwriting is <u>clear</u> . Includes the date	Your entry is <u>somewhat neat</u> , and your handwriting may <u>not be clear</u> . Includes the date	Your entry is <u>not neat nor clear</u> to read. Date not included

Suggested writing prompts for science journal:	
Lesson 1	Respond to the following three pictures (i.e. polar bear on melting cap, sea turtle with plastic wrapped around its neck, koalas in bushfires, deforestation, global warming, protest). What are your thoughts, questions, concerns?
	Summarize the Overview of Climate Change lecture in 3 sentences of what you have learned.
	Can we live without trees? Why or why not?
	Have you been in a protest? What did it feel like? If not, would you be interested in protesting? For which one?
	Free writing: You can write about what you have learned about your theme, your experience with researching, creating PowerPoint slides, and/or sharing information with your family and friends, your feelings/thoughts towards climate change.

Lesson 2	What are 3-5 things you or others may negatively impact the environment?
	Summarize the community meeting in 3 sentences what you have learned.
	How do you decide what information to trust?
	What is the difference between fact and opinion?
	Document the Greenhouse Effect Experiment.
	How does greenhouse gases relate to human activities? What effects does it have on humans, animals, and our planet?
	Respond to the following picture. What is the takeaway message? (see below for picture)
	Have you met a Deaf scientist before? If so, explain who it was and what this person does? If not, who would you like to meet?
Lesson 3	What are different ways you can collect data?
	Have you experienced interviewing people and/or been in one before? If so, describe the experience.
Lesson 4	How will you plan to minimize the impact you have on the environment?
	How was your experience of trying to minimize your impact so far? Has it been easy or hard to do?
	What are two things you learned from doing the micro environment research project and from your classmates' presentations? Will you change something? If so, what is it?
Lesson 5	Explain how our planet is changing based on our actions in two ways.
	What is one or two thing(s) you have learned or found interesting while researching about your topic?
	Have you noticed recent changes in the weather or unusual weather patterns where you live? If so, describe them.
	Respond to the following picture. What is the takeaway message? (see below for picture)
Lesson 6	How do you think your topic impacts us humans, animals and our planet?
	Respond to the following picture. What is the takeaway message? (see below for picture)
Lesson 7	What would be your next step in solving the issue that damages our planet, animals and us?
Lesson 8	What do you think call to action means?
	What do you know about climate change? What do you think we should do about it?
	How is your call for action creative piece going? Write down any questions and/or curiosity you have about your topic?

Lesson 1, Writing Prompt #1



<https://www.pinterest.com/pin/249175791864020720/>



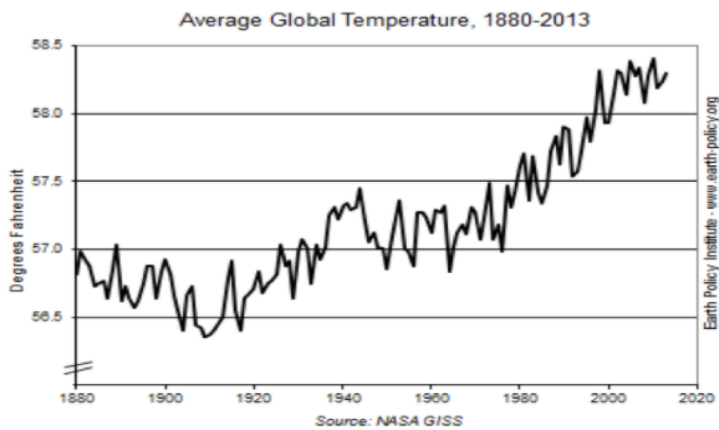
<https://www.shutterstock.com/search/sea+plastic+turtle>



<https://www.youtube.com/watch?v=x7NGY4MtpfY>



<https://scitechdaily.com/tipping-point-identified-for-deforestation-that-leads-to-rapid-forest-loss/>



<http://www.earth-policy.org/indicators/C51/>



<https://www.nbcnews.com/slideshow/photos-climate-change-protesters-take-streets-around-world-n1056846>

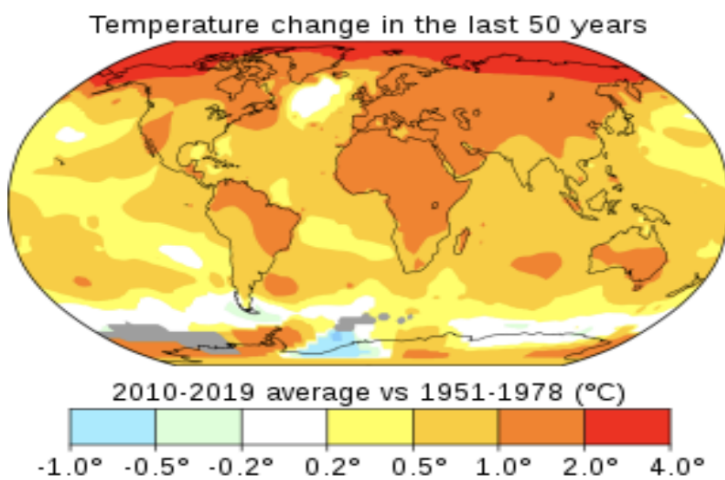
Lesson 2, Writing Prompt #7

Mild



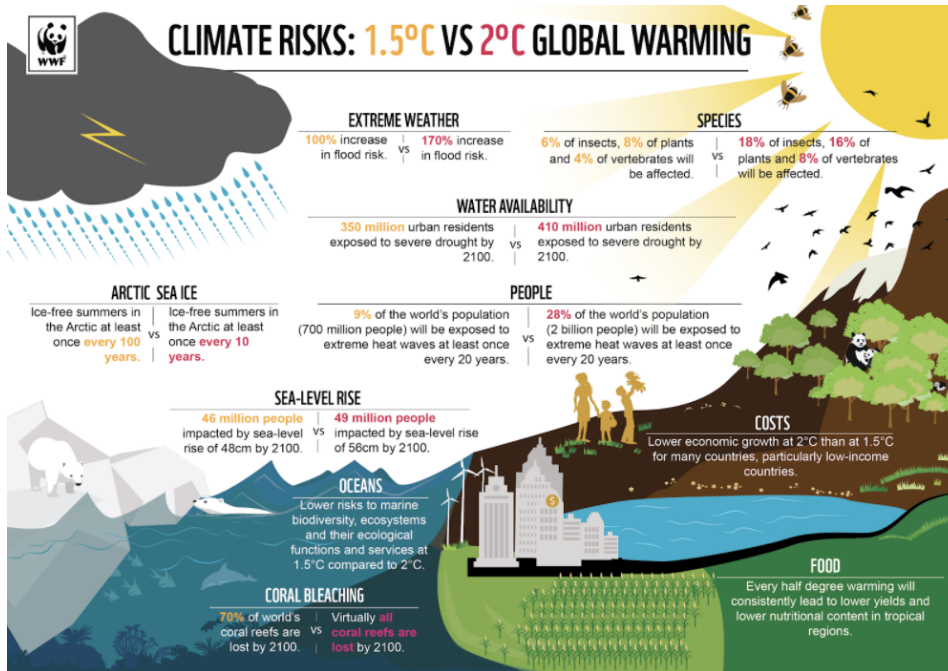
<https://www.vox.com/2014/10/22/18093054/global-warming-explained>

Medium



https://en.wikipedia.org/wiki/Global_warming

Spicy



<https://visme.co/blog/climate-change-facts/>

Lesson 5, Writing Prompt #4



<https://www.nasa.gov/content/climate-365-now-you-see-it-now-you-dont/#.Xs7ZtJNKifU>

Lesson 6, Writing Prompt #2



<https://www.ecmwf.int/en/about/media-centre/news/2019/herogram-illustrates-how-ecmwf-scientists-support-eu-flood-work>

Performance Tasks: Research Projects

A performance task is a learning activity that involves demonstrating their knowledge, using particular skills to complete a project, creating meaningful and purposeful products. In this curriculum, the performance tasks are three research projects. Students will pick a topic of their interest, research information through different types of media (i.e. websites, newspapers and books), create PowerPoint slides and present an argument on how to prevent damage. Guidelines are provided for each project for students to stay on track in completing them. Presentation rubrics are included in the guidelines.

1) Climate Change Project

- This research project focuses on the overview of climate change including melting cap, trash pollution, bushfire, deforestation, global warming and protest. Students will choose a topic and research its cause and effect and timeline showing the history of damages.
- This project is expected to be completed within a period of 2-3 days by the end of Lesson 1.

Climate Change Project Guidelines

Group #/Theme: _____

Group Members: _____

Climate change is real! You are given the task to become an activist, your job is to collect all the information about something that is harming our planet and share all the facts to the clueless policy makers. You and your group members are given a theme within climate change to research and find more information about it. Then, you and your group members will create a poster with all information about the theme in the next 2 days and present it to your classmates in the end. All group members are to split up parts, communicate effectively and work together equally. Use these guidelines to help you stay on track in completing this project.

1. Content

- ☐ Cause & effect (what is the cause of your theme and its effect on our environment?)
- ☐ Draw or cut out a visual picture about the timeline (find a picture that shows the history of damages from this theme)
- ☐ Find 3-5 pictures of your theme
- ☐ Provide a theme as title (clearly write the theme as your title)
- ☐ Cite sources (use credible sources that have .gov, .edu, .org. Examples may include: World Wildlife Fund & NASA)

2. Organization

- ☐ Is information clear and organized? Is it easy to read and big enough to see?

3. Preparedness

- ☐ Did you and your group members assign parts for the presentation?
- ☐ Did your group practice their parts? (Remember your part by heart, to stand up straight, make eye contact, and sign clearly)

4. Collaboration with Peers

☐ Write down each group member's name and what they were responsible for in this project below
(Examples may include: researching cause & effect, finding 3 pictures and facts, printing pictures, drawing on the poster)

Group Member	Responsibilities

5. Presentation Rubric

	Outstanding (3)	Good Work (2)	Need to Improve (1)
Content	Includes <u>ALL</u> parts: ☐ cause & effect ☐ timeline ☐ 3 pictures ☐ theme as title ☐ sources	Includes <u>3-5</u> parts: ☐ cause & effect ☐ timeline ☐ 3 pictures ☐ theme as title ☐ sources	Includes <u>1-3</u> parts: ☐ cause & effect ☐ timeline ☐ 3 pictures ☐ theme as title ☐ sources
Organization	Information is clearly detailed and organized.	Information is somewhat clearly detailed and organized.	Information is not clearly detailed and organized.
Preparedness	Student is completely prepared and has obviously rehearsed.	The student is somewhat prepared, but it is clear that rehearsal was lacking.	Student does not seem at all prepared to present.
Posture and Eye Contact	Stands up straight and signs clearly. Establishes eye contact with everyone in the room during the presentation.	Sometimes stands up straight and establishes eye contact. Signs may be unclear.	Slouches and/or does not look at people during the presentation. Signs are unclear.
Collaboration with Peers	Almost always listens to, shares with, and supports the efforts of others in the group. Tries to keep people working well together.	Often listens to, shares with, and supports the efforts of others in the group but sometimes is not a good team member.	Rarely listens to, shares with, and supports the efforts of others in the group. Often is not a good team member.

2) Micro Environment Research Project

- This research project focuses on how humans impact the immediate environment, such as trash pollution and deforestation. Students will choose a topic and research its human activity, cause and effect, create interview questions, collect data, include solutions and cite sources.
- This project is expected to be completed in a week by the end of Unit 1.

Micro Environment Research Project - Guidelines

Group #/Theme: _____

Group Members: _____

Climate Change is a major problem in our society. You and your group members are given the responsibility to investigate the immediate human damage we humans do to our planet. You will be selecting one problem and researching the cause and effects of that problem. Help us make a difference in this world.

You will be addressing the Climate change committee on _____ (date) so make sure your PowerPoint presentation is clear, filled with scientific information that will help us understand the Climate Change phenomena, (use your rubric here to include the relevant points you want your students to incorporate) Be sure to practice with your classmates prior to this Committee presentation.

It is imperative that each group member be assigned a task, no one should be left behind. You can decide which parts can be done collectively as a group. Make sure you communicate effectively and work together equally. The work will be done if each and every one of you is committed to getting the job done.

When collecting information, you can select images that describe the cause, the effect, the extent of damage and the history of the damage. You want your presentation to be compelling so pick your sources/pictures wisely.

Use these guidelines to help you stay on track in completing this project.

1. Content

☐ Describe the human damage Person responsible _____

☐ What caused the damage? Person responsible _____

☐ What was the extent of the damage on our divergent ecosystem? History of the damage?

- ☐ Create interview questions/collect data
- ☐ Include solutions in preventing the damage
- ☐ Cite sources

2. Organization

- ☐ Is the information clear and organized? Is it easy to read and big enough to see?

3. Presentation preparedness

- ☐ Did you and your group members assign parts for the presentation?
- ☐ Cite sources
- ☐ Did your group practice their parts? (Remember your part by heart, to stand up straight, make eye contact, and sign clearly)
- ☐ Create 2 questions/multiple choices for answers for Kahoot!

4. Collaboration with Peers

- ☐ Write down each group member's name and what they were responsible for in this project below
(Examples may include researching, creating PowerPoint slides, citing information)

Group Member	Responsibilities

5. Presentation Rubric

	Outstanding (3)	Good Work (2)	Need to Improve (1)
Content	Includes <u>ALL</u> parts: ☐ Describe the human activity ☐ What caused it? ☐ How does the damage impact our planet? Our divergent ecosystem? ☐ Create interview questions/collect data ☐ Solutions in preventing the damage ☐ Sources	Includes <u>3-5</u> parts: ☐ Describe the human activity ☐ What caused it? ☐ How does the damage impact our planet? Our divergent ecosystem? ☐ Create interview questions/collect data ☐ Solutions in preventing the damage ☐ Sources	Includes <u>1-3</u> parts: ☐ Describe the human activity ☐ What caused it? ☐ How does the damage impact our planet? Our divergent ecosystem? ☐ Create interview questions/collect data ☐ Solutions in preventing the damage ☐ Sources
Organization	Information is clearly detailed and organized.	Information is somewhat clearly detailed and organized.	Information is not clearly detailed and organized.
Preparedness	Student is completely prepared and has provided citations and questions and obviously rehearsed.	The student is somewhat prepared, but it is clear that rehearsal was lacking.	Student does not seem at all prepared to present.
Posture and Eye Contact	Stands up straight and signs clearly. Establishes eye contact with everyone in the room during the presentation.	Sometimes stands up straight and establishes eye contact. Signs may be unclear.	Slouches and/or does not look at people during the presentation. Signs are unclear.
Collaboration with Peers	Almost always listens to, shares with, and supports the efforts of others in the group. Tries to keep people working well together.	Often listens to, shares with, and supports the efforts of others in the group but sometimes is not a good team member.	Rarely listens to, shares with, and supports the efforts of others in the group. Often is not a good team member.

3) Macro Environment Research Project

- This research project focuses on how human activities harm us, animals and the planet as a result, such as melting caps, bushfires and global warming. Students will choose a topic and research its cause and effect, collect and interpret data, summarize results, provide solutions, cite sources and create a call to action plan.
- This project is expected to be completed in a week by the end of Unit 2.

Macro Environment Research Project - Guidelines

Group #/Theme: _____

Group Members: _____

Our Arctic ice is melting! Polar bears need ice to rest on and take care of their cubs! Our forest is being taken down from fires! Koalas are losing their homes and have no food to eat! We need your help in preventing the deterioration of our Earth. You are to select a topic from the list of macro environments (such as global warming, melting ice cap, bushfires) provided and become the expert scientist in the field. Your job is to research the topic, collect data, summarize the damage, and come up with a solution.

For all the steps, you will need to

1. Find one article about its macro environment phenomena and paraphrase in ASL (video recorded)
2. Find 2-3 different visual displays that explains the macro environment phenomena
3. Summarize the phenomena in English in one paragraph on a PowerPoint
4. Find data that represents the topic from the past and present

1. Content

- ☐ What causes the macro environment phenomena?
- ☐ How does it impact us humans and animals? What are the damaging consequences to our planet and to our health? Why should I care?
- ☐ Collecting and interpreting data
- ☐ Summary of results
- ☐ Solutions in preventing the damage
- ☐ Cite sources
- ☐ Call for action creative piece (PSA, art display, theatre, write a letter, brochure, flyer)

2. Organization

- ☐ Is information clear and organized? Is it easy to read and big enough to see?

3. Preparedness

☐ Did you and your group members assign parts for the presentation?

☐ Did your group practice their parts? (Remember your part by heart, to stand up straight, make eye contact, and sign clearly)

4. Collaboration with Peers

☐ Write down each group member's name and what they were responsible for in this project below
(Examples may include researching, creating PowerPoint slides, citing information)

Group Member	Responsibilities
_____	_____
_____	_____
_____	_____

5. Presentation Rubric

	Outstanding (3)	Good Work (2)	Need to Improve (1)
Content	Includes <u>ALL</u> parts: ☐ What causes the phenomena? ☐ How does it impact us humans, animals, and planet? ☐ Collecting and interpreting data ☐ Summary of results ☐ Solutions in preventing the damage ☐ Sources ☐ Call for action creative piece	Includes <u>3-5</u> parts: ☐ What causes the phenomena? ☐ How does it impact us humans, animals, and planet? ☐ Collecting and interpreting data ☐ Summary of results ☐ Solutions in preventing the damage ☐ Sources ☐ Call for action creative piece	Includes <u>1-3</u> parts: ☐ What causes the phenomena? ☐ How does it impact us humans, animals, and planet? ☐ Collecting and interpreting data ☐ Summary of results ☐ Solutions in preventing the damage ☐ Sources ☐ Call for action creative piece
Organization	Information is clearly detailed and organized.	Information is somewhat clearly detailed and organized.	Information is not clearly detailed and organized.

Preparedness	Student is completely prepared and has obviously rehearsed.	The student is somewhat prepared, but it is clear that rehearsal was lacking.	Student does not seem at all prepared to present.
Posture and Eye Contact	Stands up straight and signs clearly. Establishes eye contact with everyone in the room during the presentation.	Sometimes stands up straight and establishes eye contact. Signs may be unclear.	Slouches and/or does not look at people during the presentation. Signs are unclear.
Collaboration with Peers	Almost always listens to, shares with, and supports the efforts of others in the group. Tries to keep people working well together.	Often listens to, shares with, and supports the efforts of others in the group but sometimes is not a good team member.	Rarely listens to, shares with, and supports the efforts of others in the group. Often is not a good team member.

Appendix B

Climate Change Curriculum Design

Climate Change: Empowering Deaf Students to Think Critically and Take Action

Unit 1: How we harm the Earth?	Unit 2: How our consequences harm us?
Lesson 1: Identifying the signs of Climate Change	Lesson 5: Analyzing Evidence of Climate Change
Lesson 2: Explaining Human Damage	Lesson 6: Summarizing Impacts on Human
Lesson 3: Describing the Human Damage on Divergent Ecosystems	Lesson 7: Arguing Political and Social Responses
Lesson 4: Proposing Mitigation	Lesson 8: Creating Call to Action Plan

Unit 1: How we harm the Earth

Lesson 1: Identifying the Signs of Climate Change

The activities in the following plan are meant to be taught over the course of approximately one week.

Student: Jennifer Wickman Lesson: “Identifying the Signs of Climate Change” Course: EDS 240B Date Submitted: TBD Date for Implementation: TBD	Cooperating Teacher: Ms. Bronson Lesson Area: Science School Site: CSDF Grade Levels: Middle School Description of Group: Whole class
NGSS MS-ESS3-2: Analyze and interpret data on natural hazards to forecast catastrophic events and inform the development of technologies to mitigate their effects ELA Standards CCSS.ELA-LITERACY.W.6.2.B: Develop the topic with relevant facts, definitions, concrete details, quotations, or other information and examples CCSS.ELA-LITERACY.W.6.10: Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. ASL Standards Viewing Standards: Students will be able to determine central ideas or themes of a text and analyze their development Discourse and Presentation: Students will be able to prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others’ ideas and expressing their own clearly and persuasively	
Content Objective Through a gallery walk (six pictures of key themes-trash, deforestation; melting cap, bushfires, global warming; solution: protest) within climate change, students will identify, predict and assess signs of climate change and damage from human activities on the environment. Language Objective English objective – Given 6 pictures of key themes within climate change, the students will write or draw to explain their emotions, reactions and/or knowledge on sticky notes next to pictures during a gallery walk and science journal as measured by teacher observation.	

Sentence Frames: 1) I notice..., 2) I feel..., 3) I know..., 4) When I saw the photo of...I notice/feel/know...because..., 5) I think that humans are/are not responsible for this because..., 6) We can..., 7) I wonder..., 8) The cause(s) of (theme) is/are...The effect(s) of (theme) is/are..., 9) The history of damage for (theme) shows..., 10) The 3-5 facts include...

ASL objective – Given 6 pictures of key themes within climate change, the students will describe their emotions, reactions and knowledge regarding the issues in climate change through producing appropriate ASL structure and facial expression as measured by teacher observation.

Formative Assessment

Teacher observation, peer discussion through community meeting, use of ASL structures/facial expression and English sentences, pre-test (Q: What do you know about climate change? What do you think we should do about it?), journal, sticky notes during gallery walk

Summative Assessment

Teacher observation, group discussion, and use of ASL structures/facial expression, journal entry (What do I know about climate change? Share thoughts/feelings from the gallery walk)

Materials/preparation

- Camera/iphone/ipad (pre-test)
- 6 pictures (i.e. polar bear on a melting ice cap, sea turtle with a plastic piece around its neck, forest fires including koalas, deforestation, data on rise in temperature, and people protesting) for gallery walk
- Sticky notes for each student
- Climate Change Class book (notes from community meeting)
- ASL Videos (Overview of Climate Change)
- Print 6 pictures for each student and put in their journals
- Science Journals for each student
- Construction paper each group (6) for their mini project

The Lesson:

Prior to introducing the curriculum unit, the teacher will have completed videotaping the pretest for all students as a way to assess their prior knowledge and what they know about the topic of climate change.

Hook Activity: Gallery Walk (15-20 minutes)

- Have 6 pictures (overview of climate change; micro- and macro-environment, solution) on the wall in the classroom/or online
- Notice the pictures on the wall and refer to the experience of going to a museum. Why are pictures on the wall? Pictures often convey a message to the audience.

Messages can be statements of facts or an opinion. Sometimes pictures evoke an emotional response.

- Introduce the gallery walk and have them respond with emotions, thoughts, and knowledge about the topic on the sticky note and post it on the wall next to the picture. They can also write down the first thing that came up in their mind.
- Explain the rotating process. Split the students up groups of 2-3 students. Have them spend 2 minutes for each rotation and move on to the next picture. They must complete all pictures.
- After gallery walk, instruct students to gather together (sitting on floor or chair) for a class overview in a circle and ask them to think about what the underlying common factor in all of these pictures was.

Gallery Walk Community Meeting (20-30 minutes)

- discuss as a community about the gallery walk and share their responses on sticky notes
- Ask a student to volunteer to take notes of students' responses on Climate Change Class Book or Smart board
- Students take turns in sharing their feelings/thoughts of the pictures in the gallery walk. Ask "What did you notice when seeing this picture? How did that make you feel?"
- Group Discussion- Are we responsible for this? What actions have we done to cause this damage? They share their natural reactions for any of those pictures. (can go through one by one picture and see if students have something to say about it)
- Encourage them to refer to pictures and share their thoughts/feelings
- Ask students if they feel the same (agree or disagree?)
- Review students' responses on the SMART board (type the notes on the board) and identify common themes
- Have volunteer print it out and place it in the Climate Change class book
- Transition: Students will explore more in depth about the issues of Climate Change.

Mini Lecture: Identifying Signs of Climate Change (20-30 minutes)

(micro- environment: trash, deforestation; macro- environment: melting cap & bushfires global warming; solution: protest)

- These pictures from the gallery walk communicate a message that we humans harm the earth.
- Explain the difference between micro-environment (human impact on our immediate environment) and macro-environment (larger environment, the ecosystem)
- Exploring the human damage: Present the pictures (use the provided ASL videos below) from the gallery walk and discuss whether it is micro or macro environment.
 - Trash Pollution
<https://www.youtube.com/watch?v=DiWgtsgsyc4&feature=youtu.be>

- Deforestation
<https://www.youtube.com/watch?v=TINJbwAhjPc&feature=youtu.be>
- Melting Ice Cap
<https://www.youtube.com/watch?v=WKII2KRTIew&feature=youtu.be>
- Bushfires
<https://www.youtube.com/watch?v=LqwlBOP8KiI&feature=youtu.be>
- Global Warming
<https://www.youtube.com/watch?v=4oElU4k5Te4&feature=youtu.be>
- Protest
<https://www.youtube.com/watch?v=u7J8F77jwX0&feature=youtu.be>
- Have the students write down in their journals how humans have damaged the immediate environment
- In the end, have them ask questions and allow them to add information if they know about the topic.

Wrap up: Science Journal (5-10 minutes)

- In their journals, under the title “Are humans responsible for this? If so, how and what can we do about it?” students will write their thoughts.

Conclusion: Introduction to Climate Change Project (10 minutes)

- *We will be exploring this hot topic of Climate Change, why should we care, what does it have to do with me and why do we need to take action. My hope is to empower you all to think critically and analyze the human damage that has been made to this planet as a result of our actions and explain the choices we make that affect the immediate and larger environment and how we can stand up for the preservation of our planet.”*
- Explain that they will be involved in a research project and will share their findings at the science fair where the school and family members will get to see their final product. (provide them the guideline for Climate Change Project in Lesson 1; can be found under Assessments)
- Split students in groups of 2

Teacher Model Climate Change Project (10-20 minutes)

- Have students view the ASL video (https://www.youtube.com/watch?v=wj_8QeVQpHo&feature=youtu.be) and presentation to learn what the Climate Change Project presentation will look like (see below for presentation slides)

Application of lesson: Climate Change Project (30 minutes)

- Students will work on their research project following the guideline provided.
- Remind them to look at the rubric for content, organization, preparedness, posture and eye contact, collaboration with peers
- Opportunities to practice their presentation will be given. Students will assign who is responsible for what on presentation day

Modifications

- Pair shares; collaborative work
- Wait time
- Visual representations
- Modeling
- Frequently checking in with them
- Advanced students: can challenge them to write sentences in their journal and help write the guideline for the community meeting; can take notes of students' feelings/thoughts during the community meeting; can help their peers with signing guidelines, or writing
- Struggling students: pair work, visual support, model, encourage them to draw and sign their feelings/thoughts, ask open-ended questions to expand on their thoughts/feelings (prompting/wait time), signing English print in ASL

Weekly Schedule

Assessment	-Pre-test: film each student answering questions: "What do you know about climate change? What do you think we should do about it?"
Day 1	-Gallery Walk -Community Meeting
Day 2	-Direct Instruction on one topic as model for students (trash pollution)
Day 3-6	-Instruction about how to do the Climate Change Project -Review Climate Change Project guidelines and rubric -Work on Climate Change Project
Day 7	-Climate Change Project Presentation Day -Feedback

Gallery Walk (pictures)



<https://www.pinterest.com/pin/249175791864020720/>



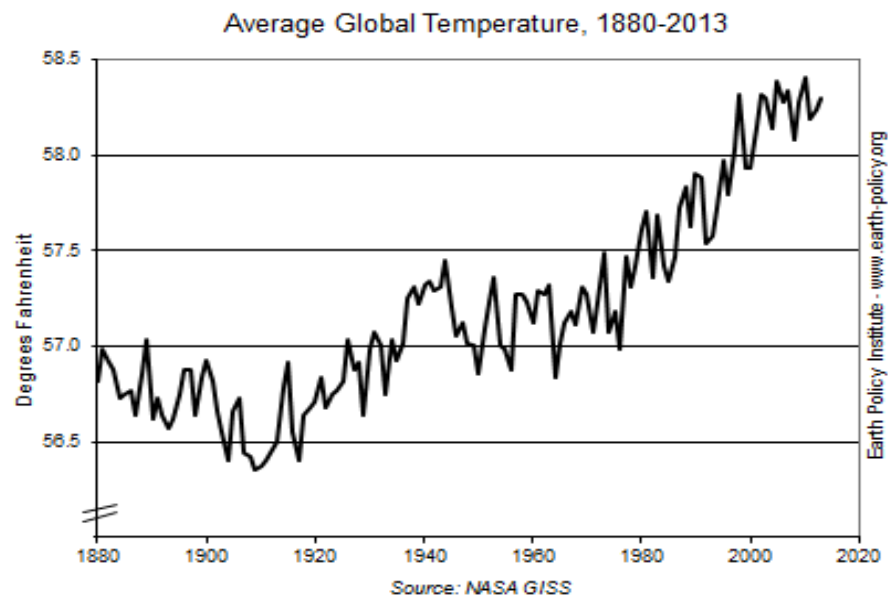
<https://www.shutterstock.com/search/sea+plastic+turtle>



<https://www.youtube.com/watch?v=x7NGY4MtpfY>



<https://scitechdaily.com/tipping-point-identified-for-deforestation-that-leads-to-rapid-forest-loss/>



<http://www.earth-policy.org/indicators/C51/>



<https://www.nbcnews.com/slideshow/photos-climate-change-protesters-take-streets-around-world-n1056846>



○ Causes of Trash Pollution

- The mismanagement of solid waste from:
 - Human and their activities
 - Waste collectors
 - Waste disposal contractors



○ Effects of Trash Pollution

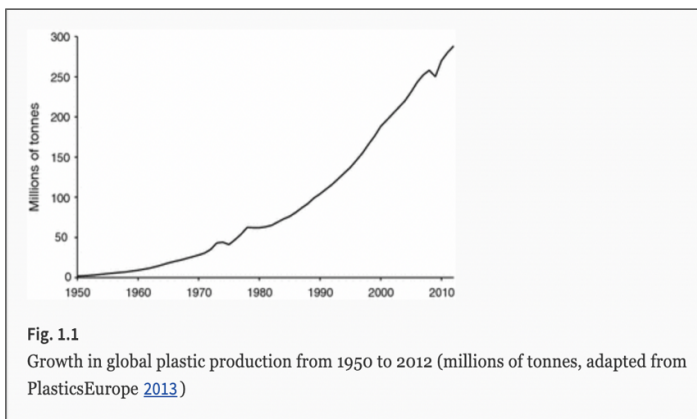
- Spread of harmful bacteria in the area
- Bad smell
- Air pollution
- Contaminated water
- Harms marine animals



<https://www.hrw.org/>



○ History of Damages

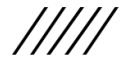


https://link.springer.com/chapter/10.1007/978-3-319-16510-3_1



○ Sources

- <https://waste4change.com/5-kinds-of-environmental-pollution-caused-by-waste/#:~:text=It%20is%20caused%20by%20the,end%20up%20as%20air%20pollution.>



Unit 1: How we harm the Earth

Lesson 2: Explaining Human Damage

The activities in the following plan are meant to be taught over the course of approximately four days.

Student: Jennifer Wickman Lesson: “Explaining Human Damage” Course: EDS 240B Date Submitted: TBD Date for Implementation: TBD	Cooperating Teacher: Ms. Bronson Lesson Area: Science School Site: CSDF Grade Levels: Middle School Description of Group: Whole class
NGSS MS-ESS3-2: Analyze and interpret data on natural hazards to forecast catastrophic events and inform the development of technologies to mitigate their effects MS-ESS3-3: Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment ELA Standards CCSS.ELA-LITERACY.W.6.10: Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. ASL Standards Viewing Standards: Students will be able to determine central ideas or themes of a text and analyze their development Discourse and Presentation: Students will be able to prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others’ ideas and expressing their own clearly and persuasively	
Content Objective The students will • identify and describe humans’ impacts on immediate environment (i.e. transportation and overproduction) and what happens to the air quality, water level and temperature when exposed to the sunlight. • explain the greenhouse effect on climate change. Language Objective English objective – The students will write a list of what they identified from human impacts on the immediate environment as measured by their science journals and teacher observation.	

ASL objective – The students will describe their experiment and the greenhouse effect using spatial ASL, appropriate cause and effect and contextualize it within climate change.
Formative Assessment Teacher observation, peer feedback through journal sharing, and written entries
Summative Assessment Teacher observation, group discussion, science journal students will predict, verify and record their observations through drawing and explanation in English
Materials/preparation • Science journals • Markers/craft supplies • Mini lesson: How to Trust Information Sources Online • Greenhouse gases Experiment: 2 thermometers, 2 two-liter plastic bottles, 2 zip locks, 2 rubber bands, 2 sun lamps (or sunlight), soil, water, utility knife/scissor, ruler, 20 ice cubes, permanent marker, vinegar, baking soda, 1 tablespoon, and ⅓ cup https://www.youtube.com/watch?v=Zst7B-B3P2E (video) https://sealevel.jpl.nasa.gov/files/archive/activities/ts1hiac1.pdf (descriptive) • List of micro impact (i.e. trash, greenhouse gas emissions, deforestation, livestock husbandry, air pollutants, overproduction) in a bowl (to assign pairs) • Google Classroom (students upload their PowerPoint presentation)
The Lesson <u>Warm up activity: Science Journal/Discussion (10-20 minutes)</u> • Science journal “What are 3-5 things you or others do to damage the earth or the environment? Feel free to draw.” in their science journals • Share with their partner what they did to damage the earth <u>Application to test the theory: Greenhouse Effect Experiment (50-70 minutes)</u> <u>Introduction</u> (ASL video: https://www.youtube.com/watch?v=M0LujC3_Yig&feature=youtu.be) <i>Today, we will learn about gases and greenhouse effect. First, what is a greenhouse? Have you ever seen what a greenhouse looks like? A greenhouse is a building with glass walls and a glass roof where plants grow, such as tomatoes and tropical flowers. If you know what a garden looks like, a greenhouse is an inside garden where temperatures are manipulated. Some plants need warmth, some plants need cold temperatures. A greenhouse makes it possible for gardeners to grow plants that need a particular temperature when the weather outside makes it difficult to grow. It can stay warm inside, even during the winter. In the daytime, sunlight goes through the greenhouse’s wall and roof and absorbs the warmth</i>

necessary to help the plants grow. The sunlight heat is trapped inside the greenhouse. People manipulate the air temperature for certain plants and keep it under control year-round for the survival of the plants. The greenhouse effect is an image of what happens to the Earth. Our earth's atmosphere is the glass wall that protects our earth. It is made mostly of nitrogen and oxygen, but also contains other gases. These include carbon dioxide (CO₂), methane, nitrous oxide, water vapor and ozone, which are known as greenhouse gases. These gases trap heat just like the glass roof of a greenhouse. During the day, the Sun goes through the atmosphere. Earth's surface warms up from the sunlight. At night, Earth's surface cools, releasing heat back into the air. But some of the heat is trapped by the greenhouse gases in the atmosphere. That is what keeps our Earth warm and gives the right temperature for plants, animals and humans to have a comfortable place to live. Now we have a problem with global warming, what does that mean? It means our earth's atmosphere is overheating. We are going to do an experiment to understand what that means. We will investigate the effects of heat under different circumstances in a closed and open context.

Experiment 1 - For testing the effect on water temperature

(ASL video: <https://www.youtube.com/watch?v=kWiuujmHLPo&feature=youtu.be>)

Experiment Question: What happens to the air temperature and water when it is exposed to sunlight in closed vs. open environments?

Materials

- 2 clear plastic 2-liter bottles (it is like the greenhouse)
- 1 plastic wrap or clear plastic bag to cover the "greenhouses"
- 1 string or rubber band to hold the plastic in place
- 2 thermometers (can use thermometers for fish tank, will need tape to tape inside the bottle)
- Soil
- 3 inches of water in each bottle
- plastic ruler or measuring cup (to measure soil/water)
- utility knife for cutting the plastic bottles
- clip-on light source with at least a 100-watt bulb (only if you are doing the activity indoors)

Activity

Before the experiment:

- Take out your science journal and write down a **prediction** (i.e. decrease in temperature, dry/damp soil), **procedure** and **sketch** of the experiment

- You will be given the Experiment 1 Worksheet (see below) to document your observations including the temperature for every 15 minutes. Write down your observations for “before” the experiment on the worksheet

During the experiment:

- Find a place where the bottles will remain in the direct sunlight for 60 minutes
- Cut the top part of plastic bottles off so we can put stuff inside the bottles
- Set up two clear plastic 2-liter bottles on a flat surface
- Make a hole in the middle for both clear plastic bags
- Add the same type and amount of soil in **both bottles**
- Add 3 inches of water in **both bottles**
- Cover only **one plastic bottle** with a clear plastic bag and a rubber band to hold it in place
- Put the thermometer in **both bottles** through the hole from the plastic bags and make sure the thermometer touches the water inside the bottle
- Leave both bottles in the direct sunlight for 60 minutes to see what happens to them
- Observe the bottles every 15 minutes and document the temperature and your observations for “during” the experiment on your worksheet

After the experiment:

- Check the bottles and document your observations in the “after” part on your worksheet
 - Go back to your prediction from the beginning and see your prediction was correct
 - Discuss with your family and/or friends about your observations during the experiment. Share what you have learned
-

Experiment 2 - For testing the effect on ice water

(ASL video: https://www.youtube.com/watch?v=zmDVD_EfDII&feature=youtu.be)

Experiment Question: What happens to the temperature and water level when it is exposed to sunlight in closed vs. open environments?

Materials

- 2 clear plastic 2-liter bottles (it is like the greenhouse)
- 1 plastic wrap or clear plastic bag to cover the "greenhouses"
- 1 string or rubber band to hold the plastic in place
- 2 thermometers (if use thermometers for fish tank, will need tape to tape inside the bottle)
- Soil

- 3 inches of water in each bottle
- Permanent marker (to mark the water level on the outside of each bottle)
- 10 ice cubes per bottle
- plastic ruler or measuring cup (to measure soil/water)
- utility knife for cutting the plastic bottles
- clip-on light source with at least a 100-watt bulb (only if you are doing the activity indoors)

Activity

Before the experiment:

- Take out your science journal and write down a **prediction** (i.e. decrease in temperature, dry/damp soil), **procedure** and **sketch** of the experiment
- You will be given the Experiment 2 Worksheet (see below) to document your observations including the temperature for every 15 minutes. Write down your observations for “before” the experiment on the worksheet
- In this experiment, it is important to observe both the change in the water level and the temperature difference

During the experiment:

- Find a place where the bottles will remain in the direct sunlight for 60 minutes
- Cut the top part of plastic bottles off so we can put stuff inside the bottles
- Set up two clear plastic 2-liter bottles on a flat surface
- Make a hole in the middle for both clear plastic bags
- Add the same type and amount of soil in **both bottles**
- Add 3 inches of water in **both bottles** and mark the water level on the outside of each bottle with a permanent marker
- Add 6-12 ice cubes to each bottle
- Cover only **one plastic bottle** with a clear plastic bag and a rubber band to hold it in place
- Put the thermometer in **both bottles** through the hole from the plastic bags and make sure the thermometer touches the water inside the bottle
- Leave both bottles in the direct sunlight for 60 minutes to see what happens to them. Continue the experiment until all the ice is melted
- Observe the bottles every 15 minutes and document the temperature and your observations for “during” the experiment on your worksheet

After the experiment:

- Check the bottles and document your observations in the “after” part on your worksheet

- Go back to your prediction from the beginning and see your prediction was correct
 - Discuss with your family and/or friends about your observations during the experiment. Share what you have learned
-

Experiment 3 - For testing the effect on air vs. vinegar/baking soda (CO₂)

(ASL video: <https://www.youtube.com/watch?v=hbxlhJE6L4w&feature=youtu.be>)

Experiment Question: What happens to the air quality and temperature when it is exposed to sunlight with additional gas emissions in closed environments?

Materials

- 2 clear plastic 2-liter bottles (it is like the greenhouse)
- 2 plastic wrap or clear plastic bags to cover the "greenhouses"
- 2 strings or rubber bands to hold the plastic bottle in place
- 2 thermometers (can use thermometers for fish tank, will need tape to tape inside the bottle)
- 1/3 cup of vinegar
- 2 tablespoons of baking soda (vinegar/baking soda is CO₂; gas emissions)
- utility knife for cutting the plastic bottles
- clip-on light source with at least a 100 watt bulb (only if you are doing the activity indoors)

Activity

Before the experiment:

- Take out your science journal and write down a **prediction** (i.e. decrease in temperature, dry/damp soil), **procedure** and **sketch** of the experiment
- You will be given the Experiment 3 Worksheet (see below) to document your observations including the temperature for every 15 minutes. Write down your observations for “before” the experiment on the worksheet

During the experiment:

- Find a place where the bottles will remain in the direct sunlight for 60 minutes
- Cut the top part of plastic bottles off so we can put stuff inside the bottles
- Set up two clear plastic 2-liter bottles on a flat surface
- Make a hole in the middle for both clear plastic bags

- Air: cover the **first bottle** with a clear plastic bag, put the thermometer through the hole, wrap the plastic bag around with a rubber band and leave it aside. This represents just regular air, the air we breathe, without gas emissions
- CO₂: put 2 tablespoons of baking soda and 1/3 cup of vinegar in the **second bottle**. The combination of baking soda and vinegar are equivalent to gas emissions from factories, cars, livestock, agriculture, etc. Quickly cover the bottle with a plastic bag and put the thermometer through the hole
- Leave both bottles in the direct sunlight for 60 minutes to see what happens to them
- Observe the bottles every 15 minutes and document the temperature and your observations for “during” the experiment on your worksheet

After the experiment:

- Check the bottles and document your observations in the “after” part on your worksheet
- Go back to your prediction from the beginning and see your prediction was correct
- Discuss with your family and/or friends about your observations during the experiment. Share what you have learned

Conclusion

(ASL video: <https://www.youtube.com/watch?v=5mLcPDmC7Fs&feature=youtu.be>)

We experimented what happens to the air quality, water level and the temperature in different contexts when exposed to sunlight. All three experiments showed different results.

For Experiment #1 we tested the air quality and temperature of water in a closed and open container. The results showed that the open bottle had a lower temperature (cool) as opposed to the closed bottle with a zip lock bag, which had a higher temperature. What does this mean for our environment? The plastic bottles acted as a greenhouse wall which absorbed the heat inside. The Earth’s atmosphere traps the heat making the air quality pure, warm and comfortable for humans and animals to live.

For Experiment #2 we tested the water level and temperature of water in a closed and open container but this time with ice. The results showed that the open bottle melted ice cubes the same as the closed bottle. However, the closed bottle had a hotter temperature than the open bottle. There was also an increase of water after the ice melted. With the closed bottle, the water melted faster than the open bottle. What does this mean for our environment? When heat is trapped, ice melts. The hotter the air the faster the ice melts. Ice helps cool the earth.

The less ice we have on earth, the less cold air exists to cool our planet. When glaciers in the North and South pole melt, this causes sea levels to rise causing dangerous floods.

For Experiment #3 we tested the air quality and temperature in closed bottles in sunlight with one context where gas emissions were added. One closed bottle had air while the other closed bottle had vinegar and baking soda. Vinegar and baking soda have CO₂ which is the same gas as what is emitted from cars and factories). The results showed that the closed bottle (air) had a lower (cool) temperature as opposed to the second bottle (vinegar with baking soda CO₂). What does this mean? It means that clean air remains cool for us to breathe comfortably. However, when we have CO₂, as seen in the mixture of both vinegar and baking soda, the temperature immediately increased. This implies that an overabundance of CO₂ can be harmful to us. The gas from carbon dioxide (CO₂) created by cars and factories, traps a lot of heat making it difficult to breathe and the air quality becomes dangerous and influences climate.

All of these results show we humans cause problems by our overproduction of gas emissions from cars and factories. The increase of heat because of CO₂ emissions is affecting our planet. Our actions are causing our planet to trap more heat leading to climate change and dangerous outcomes. We need to start taking accountability for our actions and encourage others to do the same. We need to start NOW.

Modifications

- Pair shares; collaborative work
- Wait time
- Visual representations
- Modeling
- Frequently checking in with them
- Advanced students: can challenge them to write sentences in their journal and help write the guideline for the community meeting
- Struggling students: pair work, visual support, model, encourage them to draw and sign their feelings/thoughts, ask open-ended questions to expand on their thoughts/feelings (prompting/wait time). Can sign the questions in ASL

Weekly Schedule

Day 1	-Mini Lesson: How to Trust Information Sources Online (can be found under Tips for Research) -Group Work
Day 2-4	-Warm-up activity: Science Journal & Discussion -Lesson: The Greenhouse Effect Experiments ● Experiment #1: For testing the effect on water temperature ● Experiment #2: For testing the effect on ice water ● Experiment #3: For testing the effect on air vs. vinegar/baking soda (CO₂)



How to Trust Information Sources Online

@healthsignsctr

Internet Fact-Checking

More credible websites

.gov

(Government)

.edu

(Education)

.org

(Organization)

Sometimes

.com

(Commercial)

Non credible sources

Individuals' blogs

Facebook posts

Online forums

Chat rooms

How do you evaluate internet resources?

1. Look at ownership and authors (*"About us"*)
2. Expert in this field?
3. Outdated?
4. Citations?
5. Ask for your personal information?

Fact vs Opinion

1. Fact: backed up by scientific research
2. Opinion: personal stories may be true, but not for everyone else too

Cross-check the information

1. Use multiple sources
2. Combine the information

*The more research that shows the same results, the more trustworthy the advice is.

Always be skeptical and keep researching!

Experiment 1**Water**

Open Bottle				Closed Bottle			
15 min	30 min	45 min	60 min	15 min	30 min	45 min	60 min
°F	°F	°F	°F	°F	°F	°F	°F

Record your observations before, during and after the experiment.

Before

During

After

Experiment 2

Water with Ice Cubes

Open Bottle				Closed Bottle			
15 min	30 min	45 min	60 min	15 min	30 min	45 min	60 min
°F	°F	°F	°F	°F	°F	°F	°F

Record your observations before, during and after the experiment.

Before

During

After

Experiment 3

Air vs. Vinegar with Baking Soda (CO₂)

Closed Bottle (Air)				Closed Bottle (CO ₂)			
15 min	30 min	45 min	60 min	15 min	30 min	45 min	60 min
°F	°F	°F	°F	°F	°F	°F	°F

Record your observations before, during and after the experiment.

Before

During

After

Unit 1: How we harm the Earth

Lesson 3: Describing the Human Damage on Divergent Ecosystems

Micro Environment Research Project

The activities in the following plan are meant to be taught over the course of approximately five days.

Student: Jennifer Wickman Lesson: “Describing the Human Damage on Divergent Ecosystems” Course: EDS 240B Date Submitted: TBD Date for Implementation: TBD	Cooperating Teacher: Ms. Bronson Lesson Area: Science School Site: CSDF Grade Levels: Middle School Description of Group: Whole class
NGSS MS-ESS3-2: Analyze and interpret data on natural hazards to forecast catastrophic events and inform the development of technologies to mitigate their effects MS-ESS3-3: Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment MS-ESS3-4: Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth’s systems ELA Standards CCSS.ELA-LITERACY.W.6.10: Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. ASL Standards Viewing Standards: Students will be able to determine central ideas or themes of a text and analyze their development Discourse and Presentation: Students will be able to prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others’ ideas and expressing their own clearly and persuasively	
Content Objective The students will ● research the extent and timeframe on the human damage on divergent ecosystems based on their micro-environment (i.e. trash, deforestation, livestock husbandry, air pollutants, overproduction) as measured by micro environment research project rubric. ● collect data, create a graph and interpret the findings as measured by teacher observation, group discussion, and rubric on micro environment research project and presentation.	

Language Objective

English objective – The students will write 5 survey interview questions to send to peers and interpret their findings in English as measured by teacher observation and micro environment research project rubric.

ASL objective – The students will record their interview in ASL.

Formative Assessment

Teacher observation, peer discussion through community meeting, use of ASL structures/facial expression and English sentences, micro environment research project guidelines, science journals, their participation in the micro environment research project

Summative Assessment

Teacher observation, group discussion, and use of ASL structures/facial expression, presentation rubric, science journal rubric

Materials/preparation

- Prepare FT/Skye/Zoom with Jennifer Reilly (link to the interview: <https://www.youtube.com/watch?v=naWirBUX3qQ&t=360s>)
- Class survey on ocean pollution
- Science Journals
- Markers/craft supplies (journals)
- Mini Lesson: Data Collection
- Mini Lesson: Survey Interview Questions
- Excel (data collection); print greenhouse effect Excel
- Google Classroom (students upload their PowerPoint Presentation)

The Lesson**Science Journals (5-10 minutes)**

- Share with peers the experiment drawings and write a positive comment about their work

Class Activity: Ocean Pollution (30-40 minutes)

- Scientists are always in the business of exploring the world and solving problems. We have the opportunity to meet a Deaf scientist who is actively involved in ocean pollution
- Have students do a class survey on ocean pollution (https://docs.google.com/forms/d/e/1FAIpQLSdZ2YeSKyQWPhfw6uJrkV23mRZoea3_AJR0QVqmyPQypIqHiA/viewform). Questions include: "What do you know about ocean pollution? How important do you think ocean pollution is (from five - most, one - least), How would you stop ocean pollution? How much pollution is in the ocean do you think? How many animals are killed by ocean pollution every year do you think?"

- After the survey, ask students: “Have you met a Deaf scientist before? If so, explain who it was and what this person does? If not, who would you like to meet?”
- Take a few minutes to think about any questions you may have to ask Jennifer Reilly
- FT/Skype/Zoom with Jennifer Reilly, a Deaf sea turtle biologist and ocean conservationist at Loggerhead Marinelife Center in Florida. Have her tell a little bit about herself and what she does in her work. Present on concerns on trash pollution and sea turtles. Share her research.
- Students are encouraged to ask questions or make comments

Introduction to Group Micro Environment Research Project 30-40 minutes)

- The purpose of this Research Project is to delve in further to the immediate damage we humans have done on Earth. We will focus on micro-environment (i.e. trash pollution, deforestation). Students will be given a topic to research and create PowerPoint presentation to share with the class
- Review the guidelines (can be found in the Assessment section) to include requirements in their presentations
- Use the teacher made “Trash” Model the Micro Environment Research Project

Micro Environment Research Project: Check In (20-30 minutes)

- Students are to work together as a team of 2-3 and research a topic (pollution, deforestation, husbandry). Have 2-3 students share their thoughts about their project and what they have found or learned
- “How do you think each of your theme (micro impact) impact our planet? Ecosystem?” Have them share the problem (what causes it?) and figure out how it will cause our environment. The goal of this is to stimulate their thoughts and ideas about their theme
- Have students answer the question: “How does it impact our planet? Our divergent ecosystem?” through their research today
- Have students search possible effect on our planet and ecosystem from their theme
- Have them finalize their slides

Science Journals (5-10 minutes)

- Print and place the question, “What are different ways you can collect data?” in their science journals

Mini Lesson: Data Collection & Survey Interview Questions (50-60 minutes)

Data Collection

- "What is data? How do we collect data? Why should we collect data?"
- Scientists need reliable information to make statements about the world. One way is to “collect” evidence of information to understand facts. The larger the data the more reliable the information is, especially if the data is repeated. Is trash a problem? If so, how much trash do we get per day? Per person? If we add up all the trash, how much space will it take? Can we solve the problem of trash by reusing materials?
- “Eight million tonnes of plastic are dumped in our ocean every year” (WWF, 2020) This fact is measured data. Ask: "Have you seen or heard of primary and secondary data? Do you know what each of these means?" Primary data is information drawn

directly from interviews, compiling inventories and tallying points. Secondary data is using someone else's data.

- There are different ways of gathering data, from a variety of sources. There is no best method of data collection. It depends on the researcher's goal of the research plan and design.
- Most commonly used methods are: published sources, survey (email and mail), interviews (telephone, face-to-face or focus group), observations, documents and records and experiments. Data collection is an important aspect in any level of research work. If data is inaccurately collected, it will impact the findings of the study.

Survey Interview Questions

- “Guess which method we will be doing for our micro environment research project?” Answer is we will be doing a combination of survey and interview.
- There are 6 steps for the students to follow in data collection and finding results.
- Model Survey Interview Questions through PowerPoint presentation (can be found under the Tips for Research)
- Step 1: Have the groups discuss the problems and/or solutions of their theme, write them down on paper and a few students can share with the class
 - Have them decide on how many and who they will ask, so it would not be a repeated participant
 - They can ask their family members, houseparents, faculty and assign this for their homework. They should have interviewed all 20 participants by the next day. They should do tally marks for each question, so they know how many people answered and what they answered on a scale of 4 to 0
- Step 2: Interview 20 participants in ASL (school, family, friends) Have students share their experience interviewing people and what they have learned
- Step 3: count all the participants' responses together for each question and create 2-D pie charts from Excel the following day.
- Step Four: Have their tally marks out and count how many responded with 4 (very often), 3 (quite often), 2 (occasionally), 1 (very rarely), and 0 (never). Write down the total number for each scale for each question
- Step Five: Show Excel on the screen and use my data collection from greenhouse effect to put in the graph. Explain that the first column, you put in the scale (4-0) and the next column, you put in the total number of participants' responses in and at the top put Q_: (a short title for your question). Have them do it on their laptop after I modeled how to do it
- Step Six: Ask them if they have any experience with Excel and creating pie charts before. After they finish putting in their data for 5 questions, show how to create a 2-D pie chart for each question and add percentages. Discuss what is greater and least. Have students share what they found
- Check in to make sure they stay on track
- Have them finalize their slides

Modifications

- Pair shares; collaborative work
- Wait time

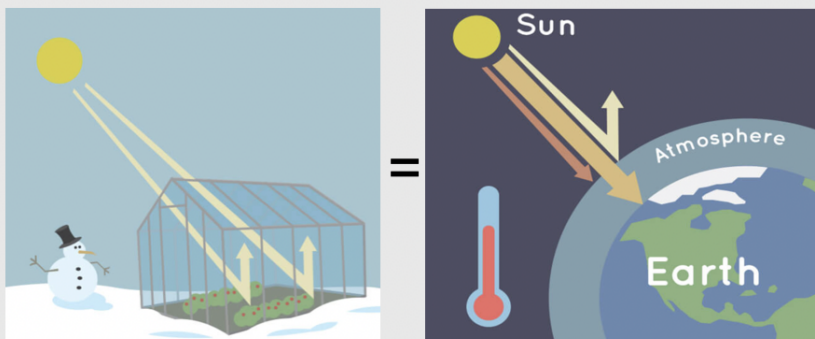
- Visual representations
- Modeling
- Frequently checking in with them
- Advanced students: can challenge them to write sentences in their journal and help write the guideline for the community meeting
- Struggling students: pair work, visual support, model, encourage them to draw and sign their feelings/thoughts, ask open-ended questions to expand on their thoughts/feelings (prompting/wait time). Sign English print in ASL.

Weekly Schedule

Day 1	-Science Journal -Individual Survey about trash -Interview with Reilly about trash/pollution in ocean
Day 2-3	-Science Journal -Introduction to Micro Environment Research Project -Teacher Model Micro Environment Research Project -Work on Research Project: Micro (1: Describe the human damage, 2: What caused the damage? 3: How does it impact our planet? Our divergent ecosystems?)
Day 4	-Science Journal -Mini Lesson: Data Collection -Mini Lesson: Survey Interview Questions (Step 1-3) -Work on Research Project: Micro (4: Create survey interview questions & interview participants)
Day 5	-Science Journal -Mini Lesson: Survey Interview Questions (Step 4-6) -Work on Micro Environment Research Project (5: Collect data & create 2-D pie charts)



Describe the human activity



Credit: NASA/JPL-Caltech

What causes it?

Greenhouse Gases					
Water vapor	Carbon dioxide	Methane	Ozone	Nitrous oxide	Chlorofluorocarbons
H ₂ O	CO ₂	CH ₄	O ₃	N ₂ O	CFCs
- Water in gas form - Clouds/rains - Causes a cooling effect	- All around us naturally - Decaying & living organisms - Volcanoes	Normal gas released from wetlands, growing rice, raising cattle, using natural gas, and mining coal	- In the atmosphere where the planes fly - Blocks the sun's radiation	- Natural part of the nitrogen cycle - Bacteria in soil and ocean make it	- Not created in nature - Damages the protective ozone layer - Powerful greenhouse gases
Blocks heat from escaping	Burning fossil fuels like coal and oil	- Traps a lot of heat - Causes global warming	Burning gas in cars and factories	- Factories, power plants, and plant fertilizer - Damages the ozone layer	Air-conditioning, refrigeration, blowing agents in foams, insulations and packing materials, propellants in aerosol cans

How does it impact our planet? Our divergent ecosystem?

- Ocean acidification
- Coral bleaching
- Damage the ozone layer
- Extreme weather (flood, heat waves)
- Melting Arctic sea ice
- Sea-level rise
- Unavailability in water (severe drought)
- Higher risks to marine biodiversity, ecosystem
- Lower nutritional content in food
- Lower economic growth
- Extinction

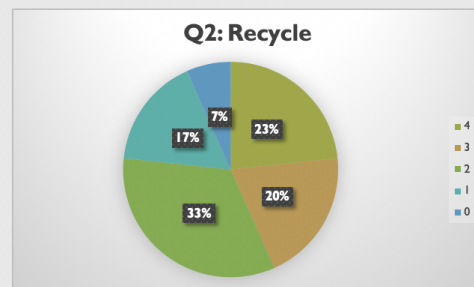


Credit: NOAA

Survey Interview Questions

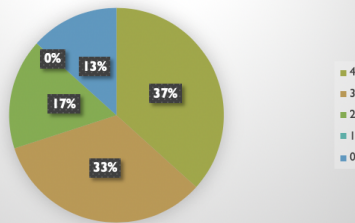
	Very often 4	Quite often 3	Occasionally 2	Very rarely 1	Never 0
Questions	4	3	2	1	0
1. Do you buy products with minimal packaging?					
2. Do you recycle plastic products?					
3. Do you use heat and air conditioning?					
4. Do you replace your regular light bulbs with compact florescent light (CFL) bulbs?					
5. Do you walk, bike, and/or carpool to work or school?					
6. Do you buy energy-efficient products?					
7. Do you use hot water?					
8. Do you turn off lights when you leave a room?					
9. Do you turn off the water when you are not using it?					
10. Do you encourage others to conserve?					

Data collection (30 participants)

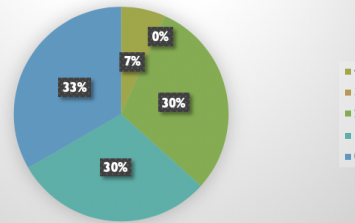


Data Collection (30 participants)

Q3: Heat & AC

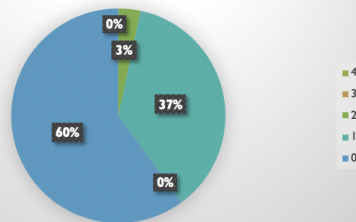


Q4: Light bulbs



Data Collection (30 participants)

Q5: Walk, bike and/or carpool



Solutions

1. Reduce, Reuse, Recycle
2. Use Less Heat and Air Conditioning
3. Replace your Light Bulbs
4. Drive Less and Drive Smart
5. Buy Energy-Efficient Products
6. Use Less Hot Water
7. Use the "Off" Switch
8. Plant a Tree
9. Get a Report Card from your Utility Company
10. Encourage Others to Conserve



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

Sources

- <https://climatekids.nasa.gov/greenhouse-effect/>
- <https://climatekids.nasa.gov/greenhouse-cards/>
- http://www.eastgwillimbury.ca/services/Environment/Ten_ways_to_Reduce_Greenhouse_Gases.htm?PageMode=Print



What is Data Collection?

- A systematic method of collecting and measuring data gathered from different sources of information in order to provide answers to relevant questions
- Accurate evaluation of collected data can help researchers predict future phenomenon and trends
- Classified into two: primary data vs secondary data

Methods of Data Collection

Literature sources	Surveys	Interviews	Observations	Documents and records	Experiments
Secondary (inexpensive/not time consuming)	Primary (easy to analyze)	Primary (in-depth responses)	Primary (monitor behaviors)	Secondary (examine documents)	Primary (examine 2 variables)
- Textbooks - Government or private companies' reports - Newspapers - Magazines - Online published papers and articles	- Web-based questionnaire - Paper-based questionnaire - Individual or group experiences	- Formal - Informal - Face-to-face meeting - telephone	- Controlled - Natural - Participant	- Call logs - Email logs - Databases - Minutes of meetings - Staff reports - Information logs	- Cause & effect - Variables: manipulated or measured - Dependent and independent variables

Survey Interview Questions

Step One

- Identify the problem(s)
- Identify the solution(s)

What causes it?

Greenhouse Gases					
Water vapor	Carbon dioxide	Methane	Ozone	Nitrous oxide	Chlorofluorocarbons
H ₂ O	CO ₂	CH ₄	O ₃	N ₂ O	CFCs
- Water in gas form - Clouds/rains - Causes a cooling effect	- All around us naturally - Decaying & living organisms - Volcanoes	Normal gas released from <u>wetlands, rice, rice-raising cattle, and mining coal</u>	- In the atmosphere where the planes fly - Blocks the sun's radiation	- Natural part of the nitrogen cycle - Bacteria in soil and ocean make it	- Not created in nature - Damages the protective ozone layer - Powerful greenhouse gases
Blocks heat from escaping	Burning fossil fuels like <u>coal and oil</u>	- Traps a lot of heat - Causes global warming	Burning gas in <u>cars and factories</u>	<u>Factories, power plants, and plants</u> - Damages the ozone layer	<u>Air-conditioning, refrigeration, blowing agents in foams, insulations, and packing materials, propellants in aerosol cans</u>

Step Two

- Create 5 questions

Survey Interview Questions

	Very often 4	Quite often 3	Occasionally 2	Very rarely 1	Never 0
Questions	4	3	2	1	0
1. Do you buy products with minimal packaging?					
2. Do you recycle plastic products?					
3. Do you use heat and air conditioning?					
4. Do you replace your regular light bulbs with compact florescent light (CFL) bulbs?					
5. Do you walk, bike, and/or carpool to work or school?					
6. Do you buy energy-efficient products?					
7. Do you use hot water?					
8. Do you turn off lights when you leave a room?					
9. Do you turn off the water when you are not using it?					
10. Do you encourage others to conserve?					

Step Three

- Interview 20 participants
 - Be respectful
 - May I have some of your time to ask questions for my mini research project?
 - Thank you for your time. I appreciate it.
 - Explain the purpose
 - I am collecting data because...



https://www.pngitem.com/middle/hmhRxRh_interview-icon-hd-png-download/

Step Four

- For each question, count how many responded with:
 - 4 (very often)
 - 3 (quite often)
 - 2 (occasionally)
 - 1 (very rarely)
 - 0 (never)

Step Five

- On Excel, put down your total numbers for each question

AutoSave OFF

GH Data Collection

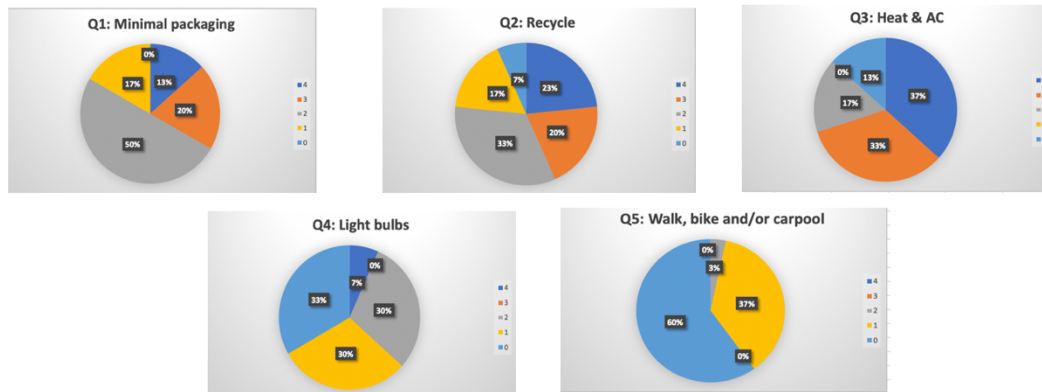
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Step Six

- On Excel, create a 2-D pie chart for each question



Sources

- <https://medium.com/@callygood/6-methods-of-data-collection-e946e993b930>

Unit 1: How we harm the Earth

Lesson 4: Proposing Mitigation (Solution)

The activities in the following plan are meant to be taught over the course of approximately four days.

Student: Jennifer Wickman Lesson: “Proposing Mitigation” Course: EDS 240B Date Submitted: TBD Date for Implementation: TBD	Cooperating Teacher: Ms. Bronson Lesson Area: Science School Site: CSDF Grade Levels: Middle School Description of Group: Whole class
NGSS MS-ESS3-2: Analyze and interpret data on natural hazards to forecast catastrophic events and inform the development of technologies to mitigate their effects MS-ESS3-3: Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment ELA Standards CCSS.ELA-LITERACY.W.6.10: Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. ASL Standards Viewing Standards: Students will be able to determine central ideas or themes of a text and analyze their development Discourse and Presentation: Students will be able to prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others’ ideas and expressing their own clearly and persuasively	
Content Objective Given their topic, the students will identify a mitigation strategy to limit their impact on climate change as measured by teacher observation, science journal, and micro environment research project presentation rubric. Language Objective English objective – Given questions for science journals, the students will write their plan to minimize the negative impact they have on the environment and what they learned from their classmates’ presentations as measured by science journal rubric.	

ASL objective – Given questions for community meeting, the students will identify ideas of what they will do to minimize the negative impact on the environment through producing appropriate ASL structure and facial expression as measured by teacher observation.
Formative Assessment Teacher observation, peer discussion through community meeting, community meeting, Kahoot questions, Micro Environment Research Project guidelines, science journals, their participation in the micro environment research project
Summative Assessment Teacher observation, group discussion, and use of ASL structures/facial expression, presentation and science journal rubric
Materials/preparation • Community meeting guideline poster • Science journals • Markers/craft supplies (journals) • Google Classroom (students submit their presentations) • Kahoot • iPads/laptops (Kahoot)
The Lesson <u>Micro Environment Research Project: Check In (5-15 minutes)</u> • If students did not finish putting data in Excel and creating 2-D pie charts, they can finish it up today • Have them start creating slides for the solutions in preventing the impact • Have them finalize the slides • Check in with them for questions and make sure they add sources to their slides <u>Class Warm Up Discussion in Pairs (10-20 minutes)</u> • <i>Today we are going to talk about Mitigation: Who knows what this sophisticated word means? Mitigation means the action of reducing the severity of problems. Problems are frustrating and we are given a mind, an intellect and therefore we can problem solve. If we can solve these damages, we wouldn't be facing global warming and climate change. Let's see if you can use your mind to minimize the negative impact of climate change on the environment. Let's use the example of trash</i> • "How can we minimize trash production?" What are the solutions to minimizing their micro impact on the environment? Where do we put the trash?" Think about 5 ways we can eliminate the trash problem • Have students share their ideas with the class • Go back to their research groups and come up with 5 solutions to the problem <u>Micro Environment Research Project (30-40 minutes)</u>

- Have students work on solutions to the problem on their PowerPoint slides. Add sources for the information they used in their slides. Have them add pictures
- Remind them to check rubric/guidelines to make sure they included everything
- Regroup in their research teams and discuss solutions to the problem. Have them discuss what needs to be done to solve these problems
- When they've agreed on solutions, have them practice signing in ASL (rough draft) and upload on PowerPoint slides. Share with the whole class the solutions
- Ask them to practice their parts at home as well for clarity

Homework: Kahoot Activity (15-30 minutes)

- The questions and multiple-choice answers are based on students' micro environment research project presentations. The activity will assess students' recollection of the presentations
- Come up with 2 questions with multiple choices answers (A, B, C, D). Explain that we will play Kahoot with the questions given to make sure if students remember their presentations. Questions have to be approved by me
- Have students submit presentations to Google Classroom

Science Journal: Wrap up activity (5-10 minutes)

- "How was your experience of trying to minimize your impact so far? Is it easy or hard?"

Modifications

- Pair shares; collaborative work
- Wait time
- Visual representations
- Modeling
- Frequently checking in with them
- Advanced students: can challenge them to write sentences in their journal and help write the guideline for the community meeting
- Struggling students: pair work, visual support, model, encourage them to draw and sign their feelings/thoughts, ask open-ended questions to expand on their thoughts/feelings (prompting/wait time). Sign English print in ASL

Weekly Schedule

Day 1-2	-Class Warm Up Discussion in Pairs -Work on Research Project: Micro (6: Solutions in preventing the impact)
Day 3	-Presentation Day -2 questions with multiple choices per group for Kahoot are due
Day 4	-Science Journal -Kahoot -Community Meeting

Unit 2: How our consequences harm us?

Lesson 5: Analyzing Evidence of Climate Change

The activities in the following plan are meant to be taught over the course of approximately three days.

Student: Jennifer Wickman Lesson: “Analyzing Evidence of Climate Change” Course: EDS 240B Date Submitted: TBD Date for Implementation: TBD	Cooperating Teacher: Ms. Bronson Lesson Area: Science School Site: CSDF Grade Levels: Middle School Description of Group: Whole class
NGSS MS-ESS3-2: Analyze and interpret data on natural hazards to forecast catastrophic events and inform the development of technologies to mitigate their effects MS-ESS3-2: Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment MS-ESS3-4: Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth’s systems ELA Standards CCSS.ELA-LITERACY.W.6.10: Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. ASL Standards Viewing Standards: Students will be able to determine central ideas or themes of a text and analyze their development Discourse and Presentation: Students will be able to prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others’ ideas and expressing their own clearly and persuasively	
Content Objective Given their chosen topic (drought, tropical storms, forest fires, sea level rising, glacier melting), the students will identify and describe major issues within climate change and how it is affecting our environment as measured by teacher observation, science journal, community meeting and macro environment research project presentation rubric. Language Objective English objective – After predicting the topic and issue in ASL, the students will read more data and statistics in English to be explained in ASL what they understand about the effects of	

human activities. Students will document their observation during glacier melting science experiment in written English as measured by science journal rubric.

ASL objective – Using the P-V-R method, the students will identify and describe major issues within climate change from reading English text and how it is affecting our planet in ASL as measured by teacher observation.

Formative Assessment

Teacher observation, peer discussion through community meeting, Macro Environment Research Project guidelines, science journals, their participation in the macro environment research project, observation notes for Glacier Melting Science Experiment

Summative Assessment

Teacher observation, group discussion, and use of ASL structures/facial expression, presentation and science journal rubric

Materials/preparation

- Community meeting guideline poster
- Class book (community meeting notes)
- Science journals
- Markers/craft supplies (journals)
- Google Classroom (students submit their presentations)
- iPads/laptops
- Climate Change ASL In-Text (blogs, newspapers, websites and short texts)
- Macro Environment Research Project Guidelines
- Melting Glaciers Science Experiment Supplies: 2 mid-size containers, water (colored blue with dye), 2 balls of clay, push pins, ice cubes

The Lesson

Science Journals (5-10 minutes)

- “Explain how our planet is changing based on our actions in 2 ways. Feel free to draw as well.”

Review of Unit 1

- Review how we harm the Earth through our immediate actions, such as deforestation and trash pollution, how toxic gases influence the quality of the air and raise heat temperatures. Transition to how heat increases dryness and flooding in nature and the fluctuating weather climate. Toxic gases cause long term damage to the health of humans and animals on our planet.
- How bad is the damage? We talked about cause and effect in Unit 1 and it is time that we evaluate the extent of the damage overtime. We will explore the differences from what happened in the past to now and consider what can be done to convince our communities to take action.

Instructional session: Global Warming Model (60 minutes)

- Watch this video and describe the causes and effects of global warming
 - https://www.youtube.com/watch?v=G4H1N_yXBiA
 - <https://youtu.be/sKDDWW9WIPSc>
 - Identify the causes and effects- humans harm the earth
 - Identify the solutions- how humans solve the problem
- Let's explore the effects of global warming on the environment and how it impacts humans:
 - <https://www.youtube.com/watch?v=4Uy9b87cYRs>
 - Have students create a visual map with arrows showing the cause and effect relationship of how we harm the Earth vs how our consequences harm us?
Students can help with drawing and writing as well
- Students will summarize the outcomes of global warming on humans. What should we do to stop global warming?
- Brainstorm 5 different ways to eliminate global warming.

Global Warming Science Experiment - Glacier Melting (60 minutes)

- One of the effects of global warming is glacier melting in the North and South poles and the result of glacier melting can be dangerous for humans. Let's explore why it can get dangerous
- Do the Glacier Melting science experiment
(<https://www.youtube.com/watch?v=1DZWwCafn-c>)
- "Which ice do you think will melt faster, land ice or sea ice?"
- There will be a change in sea level in land ice as opposed to sea ice which causes flooding
- Encourage students to document their observation during the experiment in written English (i.e. after 5 minutes, 10 minutes, 15 minutes) What do they see? What is happening?
- In the end, ask: "Which ice causes more problems? How does that affect us humans, animals and our planet?"
- Have the students find pictures that represent a glacier location but from two different time periods to demonstrate the extent of the damage.
- Research where flooding occurs as a result of the melting glacier and how it impacted humans.

Transition to Introduction to Macro Environment Research Project (20-30 minutes)

- "What are some things that are affecting our planet, animals and us?"
- Introduce macro-environment research: There are several macro environmental problems (drought, tropical storms, forest fires, sea level rising, glacier melting)
- Assign groups and give them a topic of macro impact on humans. Students will investigate the impact on nature overtime, research interesting facts such as extent of damage, collect data about the damage overtime, summarize information, create solutions and call to action.
- Assign responsibilities within the group members
- Review the Macro Environment Research Project Guidelines with them

- Pass out the guidelines checklist for them to keep track of their research
- Encourage them to do a little research for homework to get an idea of what it will include and write the ideas down for them to share with their classmates the next day

Macro Environment Climate Change ASL In-Text (40-60 minutes)

- Use Preview-View-Review strategy by having students discuss in ASL first what their topic of research should be about, then use blogs, newspapers, websites, and short texts to provide students access to information in English on main topics of macro impact (drought, tropical storms, forest fires, sea level rising, glacier melting)
- Then review their text in English in ASL, share their findings and incorporate fact vs opinion, data analysis, credible sources and increase awareness in climate change (human impacts vs impacts on nature)
- Ask each other questions to promote their critical thinking in those areas

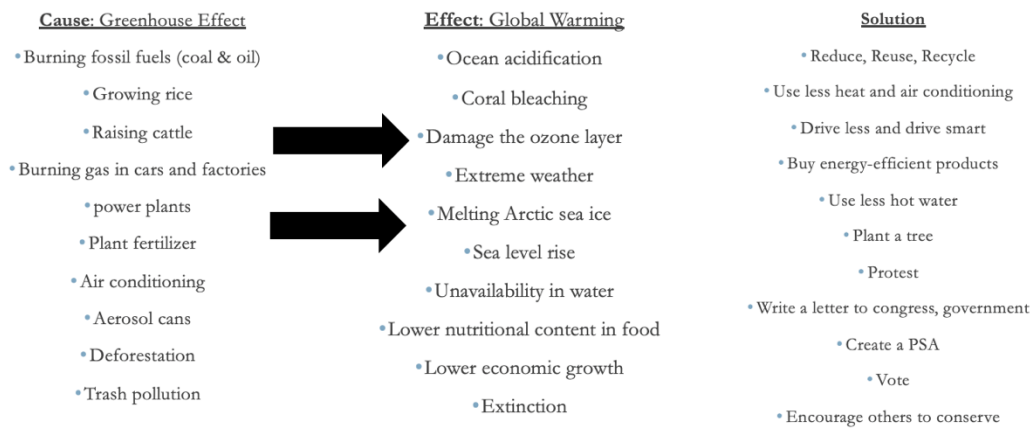
Macro Environment Research Project: Application in PPT (30-60 minutes)

- “What causes the phenomena?”
- Have them 1) find one article about its phenomena and paraphrase in ASL, 2) find 2-3 different visual displays that explains the phenomena, 3) summarize the phenomena in English in one paragraph on a PowerPoint, and 4) find data that represents the topic from the past and present
- Show pictures that reflect the past and present of the topic
- Have the students start working on the research project. Remind them to add sources for the information they used in their slides. Have them add pictures
- Regularly check in to see how they are doing

Modifications

- Pair shares; collaborative work
- Wait time
- Visual representations
- Modeling
- Frequently checking in with them
- Advanced students: can challenge them to write sentences in their journal and help write the guideline for the community meeting
- Struggling students: pair work, visual support, model, encourage them to draw and sign their feelings/thoughts, ask open-ended questions to expand on their thoughts/feelings (prompting/wait time). Sign English print in ASL

Visual Map



***This visual map can be used to help students understand the relationship between cause and effect by our actions and what we can do to solve the issue of climate change. This is a great visual representation that can be put on the wall in the classroom and students can feel free to add to it.

Weekly Schedule

Day 1	-Community Meeting -Science Journal -Introduction to Macro Environment Research Project -Teacher model of Macro Environment Research Project
Day 2	-Climate Change ASL In-Text -Work on Research Project: Macro (1: What causes the phenomena?)
Day 3	-Science Journal -Melting Glacier Science Experiment -Continue work on Research Project: Macro (1: What causes the phenomena?)

Unit 2: How our consequences harm us?

Lesson 6: Summarizing Impacts on Humans

The activities in the following plan are meant to be taught over the course of approximately three days.

Student: Jennifer Wickman Lesson: “Summarizing Impacts on Humans” Course: EDS 240B Date Submitted: TBD Date for Implementation: TBD	Cooperating Teacher: Ms. Bronson Lesson Area: Science School Site: CSDF Grade Levels: Middle School Description of Group: Whole class
NGSS MS-ESS3-2: Analyze and interpret data on natural hazards to forecast catastrophic events and inform the development of technologies to mitigate their effects MS-ESS3-2: Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment MS-ESS3-4: Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth’s systems ELA Standards CCSS.ELA-LITERACY.W.6.10: Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. ASL Standards Viewing Standards: Students will be able to determine central ideas or themes of a text and analyze their development Discourse and Presentation: Students will be able to prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others’ ideas and expressing their own clearly and persuasively	
Content Objective Given their topic (drought, tropical storms, forest fires, sea level rising, glacier melting), the students will identify and describe how climate change is impacting humans, animals and our planet as measured by teacher observation, science journal, and macro environment research project presentation rubric. Language Objective English objective – Given questions for science journals, the students will write how their chosen topic impacts humans, animals and our planet as measured by science journal rubric.	

ASL objective – Given questions for community meetings, the students will identify and describe ideas of how their topic impacts humans, animals and our planet through producing appropriate ASL structure and facial expression as measured by teacher observation.

Formative Assessment

Teacher observation, peer discussion through community meeting, Macro Environment Research Project guidelines, science journals, their participation in the research project

Summative Assessment

Teacher observation, group discussion, and use of ASL structures/facial expression, presentation and science journal rubric, community meeting discussion

Materials/preparation

- Community meeting guideline poster
- Class book (community meeting notes)
- Science journals/questions/pictures
- Markers/craft supplies (journals)
- Google Classroom (students submit their presentations)
- iPads/laptops
- Macro Environment Research Project Guidelines

The Lesson

Science Journals (5-10 minutes)

- Print and place the question, “How do you think your topic impacts us humans, animals and our planet? Feel free to draw as well.” In their science journals

Instructional session: Trash and Air Pollution Model (60 minutes)

- Watch this video and describe what has been done to help the earth
 - <https://www.youtube.com/watch?v=iPz5bJa9eOI>
 - Identify the causes and effects- humans harm the earth
 - Identify the solutions- how humans solve the problem
- Let’s explore the effects of pollution on air and how it impacts humans:
 - https://www.youtube.com/watch?time_continue=94&v=P-65ik9UKew&feature=emb_logo
 - Have students create a visual map with arrows showing the cause and effect relationship of how we harm the Earth vs how our consequences harm us? Students can help with drawing and writing as well
- Students will summarize the outcomes of trash and air pollution on humans. What should we do to stop the air pollution getting worse?
- Brainstorm 5 different ways to eliminate air pollution.

Macro Environment Research Project (30-50 minutes)

- Have students work in groups and focus on the second part: “How does it impact us humans, animals, and our planet?”
- Remind them to follow the Macro Environment Research Project Guidelines (find an article, 2-3 visual displays and data and summarize the information)
- Encourage them to split up work in researching for information regarding their topic
- Have them make PowerPoint slides and sign the information in ASL
- Check in with them for questions and make sure they add sources to their slides
- Encourage them to ask their family members or friends how they think climate change impact them
- Have them work on the third part: “Collecting and interpreting data”
- Have them show data they saw on websites and discuss how we can interpret it (did it increase? Or decrease?)
- When they complete them, have them work on the fourth part: “Summary of results” on data analysis (main point or issue of the result in data analysis)
- Have the students continue to work on their PowerPoint slides. Make sure they add sources for the information they used in their slides. Have them add pictures
- Remind them to check rubric/guidelines to make sure they included everything
- Encourage them to split up the work (summarize the information in a paragraph and sign in ASL)

Review in ASL of what they found in their research groups (15-30 minutes)

- Have the students share 1 or 2 things that their macro environment causes problems to the climate and how it affects humans in ASL. They can share experiences of how it may personally affect them or their family members

Modifications

- Pair shares; collaborative work
- Wait time
- Visual representations
- Modeling
- Frequently checking in with them
- Advanced students: can challenge them to write sentences in their journal and help write the guideline for the community meeting
- Struggling students: pair work, visual support, model, encourage them to draw and sign their feelings/thoughts, ask open-ended questions to expand on their thoughts/feelings (prompting/wait time). Sign English print in ASL

Weekly Schedule

Day 1	-Science Journal -Community Meeting --Work on Research Project: Macro (2: How does it impact us humans, animals and the planet?)
Day 2	-Science Journal -Macro Environment Research Project: Check-In -Work on Research Project: Macro (3: Collecting and interpreting data)
Day 3	-Science Journals -Macro Environment Research Project: Check-In -Community Meeting -Work on Research Project: Macro (4: Summary of results)

Unit 2: How our consequences harm us?

Lesson 7: Arguing Political and Social Responses

The activities in the following plan are meant to be taught over the course of approximately two days.

Student: Jennifer Wickman Lesson: “Arguing Political and Social Responses” Course: EDS 240B Date Submitted: TBD Date for Implementation: TBD	Cooperating Teacher: Ms. Bronson Lesson Area: Science School Site: CSDF Grade Levels: Middle School Description of Group: Whole class
NGSS MS-ESS3-2: Analyze and interpret data on natural hazards to forecast catastrophic events and inform the development of technologies to mitigate their effects MS-ESS3-2: Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment MS-ESS3-4: Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth’s systems ELA Standards CCSS.ELA-LITERACY.W.6.10: Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. ASL Standards Viewing Standards: Students will be able to determine central ideas or themes of a text and analyze their development Discourse and Presentation: Students will be able to prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others’ ideas and expressing their own clearly and persuasively	
Content Objective Given their topic, the students will explain what young activists can do to help fight climate change and identify solutions in preventing the damage on our planet as measured by teacher observation, science journal, and macro environment research project presentation rubric. Language Objective English objective – The students will write their next steps of activism in solving the issue that damages our planet as measured by science journal rubric.	

ASL objective – During community meetings, the students will explain their feelings when seeing different examples of young activists help fight climate change and come up with one or two arguments to use when protesting in ASL as measured by teacher observation.
Formative Assessment Teacher observation, peer discussion through community meeting, Macro Environment Research Project guidelines, science journals, their participation in the research project
Summative Assessment Teacher observation, group discussion, and use of ASL structures/facial expression, presentation and science journal rubric
Materials/preparation • Community meeting guideline poster • Class book (community meeting notes) • Science journals/questions • Markers/craft supplies (journals) • Google Classroom (students submit their presentations) • iPads/laptops • Youth activists fighting for climate action (https://www.cnn.com/2019/09/28/world/youth-environment-activists-greta-thunberg-trnd/index.html) • Ten ways you can help fight climate change (https://davidsuzuki.org/what-you-can-do/top-10-ways-can-stop-climate-change/) • Macro Environment Research Project Guidelines
The Lesson <u>Science Journals (5-10 minutes)</u> • “What would be your next step in solving the issue that damages our planet, animals and us? Feel free to draw as well.” <u>Community Meeting: Meeting Young Activists for Climate Change (20-30 minutes)</u> • Show “Greta Thunberg isn’t alone. Meet some other young activists who are leading the environmentalist fight” from CNN: video and pictures; sign the text in ASL (https://www.cnn.com/2019/09/28/world/youth-environment-activists-greta-thunberg-trnd/index.html) • “Are you familiar with any of these young activists?” Most of the young activists are close to your age. This means you can do the same when you see something you don’t like. They can share how they felt when seeing the pictures and the video • Discuss how we can become activists. How will we argue for a particular issue? What should be done to solve the issue? • (https://davidsuzuki.org/what-you-can-do/top-10-ways-can-stop-climate-change/) According to David Suzuki Foundation, there are 10 ways you can help fight climate

change, 1) unite for bold climate action (sign petition), 2) use energy wisely, 3) renewable energy transition, 4) climate-friendly diet, 5) start a climate conversation, 6) green your commute, 7) consume less, waste less, enjoy life more, 8) invest in renewables and divest from fossil fuels, 9) support or join youth-led movements, and 10) get politically active and vote

Macro Environment Research Project: Solutions (60 minutes)

- Check in with them to see how they are doing, what they are struggling with and what was the easiest part
- Students work on the fifth part: “Solutions in preventing the damage”
- Work on their PowerPoint slides, add sources and pictures to the slides
- Remind them to check rubric/guidelines to make sure they included everything
- Have students split up the work within their research group (summarize the information in a paragraph and sign in ASL)

Science Journals (5-10 minutes)

- Summarize the community meeting in 2-4 sentences. Write down what you will do to help fight climate change

Modifications

- Pair shares; collaborative work
- Wait time
- Visual representations
- Modeling
- Frequently checking in with them
- Advanced students: can challenge them to write sentences in their journal and help write the guideline for the community meeting
- Struggling students: pair work, visual support, model, encourage them to draw and sign their feelings/thoughts, ask open-ended questions to expand on their thoughts/feelings (prompting/wait time). Sign English print in ASL

Weekly Schedule

Day 1-2

-Science Journal
-Community Meeting
-Macro Environment Research Project: Solutions (5: Solutions in preventing the damage)

BUILDING AN ARGUMENT

MAIN IDEA
Here's what I think...

Evidence to back up my reasons

Here are my REASONS!

1. _____

2. _____

3. _____

PRO **CON**
When you weigh all the evidence, you conclude that...

Strong Finish!

COUNTER ARGUMENTS

You **COULD** argue that...

...but here's the **WEAKNESS...**

Unit 2: How our consequences harm us?

Lesson 8: Creating a Call to Action Plan

The activities in the following plan are meant to be taught over the course of approximately five days.

Student: Jennifer Wickman Lesson: “Creating Call to Action Plan” Course: EDS 240B Date Submitted: TBD Date for Implementation: TBD	Cooperating Teacher: Ms. Bronson Lesson Area: Science School Site: CSDF Grade Levels: Middle School Description of Group: Whole class
NGSS MS-ESS3-2: Analyze and interpret data on natural hazards to forecast catastrophic events and inform the development of technologies to mitigate their effects MS-ESS3-2: Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment MS-ESS3-4: Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth’s systems ELA Standards CCSS.ELA-LITERACY.W.6.10: Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. ASL Standards Viewing Standards: Students will be able to determine central ideas or themes of a text and analyze their development Discourse and Presentation: Students will be able to prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others’ ideas and expressing their own clearly and persuasively	
Content Objective Given their topic, the students will identify an adaptation strategy (i.e. call to action plan: PSA, art display, theatre, write a letter, brochure, flyer) to the climate change impact on humans, animals and our planet as measured by teacher observation, science journal, and macro environment research project presentation rubric.	
Language Objective	

English objective – Given questions for science journals, the students will write what call to action is, their progress with their call to action creative piece and their knowledge on climate change as measured by science journal rubric.

ASL objective – Given questions for community meeting and post test, the students will describe what they know about climate change and what they think we should do about it through producing appropriate ASL structure and facial expression as measured by teacher observation.

Formative Assessment

Teacher observation, peer discussion through community meeting, use of ASL structures/facial expression and English sentences, community meeting, Macro Environment Research Project guidelines, science journals, their participation in the research project

Summative Assessment

Teacher observation, group discussion, and use of ASL structures/facial expression, presentation and science journal rubric

Materials/preparation

- Community meeting guideline poster
- Science journals/questions
- Markers/craft supplies (journals)
- Google Classroom (students submit their presentations)
- iPads/laptops
- Macro Environment Research Project Guidelines
- Camera/iPhone/iPad (post test)

The Lesson

Science Journals (5-10 minutes)

- “What do you think call to action means? How can we do that for Climate Change? Feel free to draw as well.”

Community Meeting (20-30 minutes)

- We will now focus on making a call for action creative piece. “Have you heard or seen a call to action or know what it means? If not, what do you think it means?”
- Have them share ideas about call to action
- Students will do either public service announcement (PSA), art display, theatre, write a letter, brochure and flyer to show how their topic affects us, animals and our planet and what people should do about it (show different examples for students to get ideas). Students can be creative of how they want to carry the message about how us as the community can help fight climate change and make a world better and healthy place to live in for all of us
- Have them share ideas of what they want to do

Macro Environment Research Project: Call to Action Plan (30 minutes)

- Pick which call to action approach they want to do and create a plan
- Students make a list of what they need for their call for action creative piece
- Check in with them and have them work on it

Science Journals (5-10 minutes)

- Free writing (they can share their progress with their call for action creative piece)

Macro Environment Research Project (60 minutes)

- Students can continue to work on their call for action creative pieces, finalize their PowerPoint slides and split up parts for presentation
- Check in to make sure they stay on track and provide assistance on what they need to complete the project
- Have them practice together and at home
- When completed, students are to submit their presentation through Google Classroom

Presentation Day (60 minutes)

- Research groups can get together to finalize their parts for the presentation
- Remind them of the presentation rubric (i.e. content, organization, preparedness, posture and eye contact)
- Students have to be respectful when other students present. Everyone worked hard to make this happen, so be respectful
- Students get to present their slides to the class, and they can ask questions in the end

Videotaped Post test in ASL (15-30 minutes)

- Instruct them about the post-test. I want to see how much they know about climate change now as compared to the beginning of the unit
- Film each student answering questions, “What do you know about climate change? What do you think we should do about it?”

Community Meeting (20-30 minutes)

- Explain that they have worked really hard to learn about climate change and how we can help fight climate change to better our planet for us and for all
- “What made the most impact on you? What have you learned that you will keep for the rest of your life?”
- “What do you remember regarding skills that you will apply to your future?”
- “Name one thing you will do to better our planet?”

Modifications

- Pair shares; collaborative work
- Wait time
- Visual representations
- Modeling
- Frequently checking in with them

- Advanced students: can challenge them to write sentences in their journal and help write the guideline for the community meeting
- Struggling students: pair work, visual support, model, encourage them to draw and sign their feelings/thoughts, ask open-ended questions to expand on their thoughts/feelings (prompting/wait time). Sign English print in ASL

Weekly Schedule

Day 1	-Science Journal -Community Meeting: Call to Action
Day 2-3	-Science Journal -Macro Environment Research Project: (6: Call for action creative piece)
Day 4	-Continue work on Research Project (finalize slides and practice) -Presentation Day
Day 5	-Science Journal -Videotaped Post test -Community Meeting

Appendix C

Tips for Research (Mini Lessons)

How to Trust Information Sources Online

Duration: 30-45 minutes

ELA Standards

CCSS.ELA-LITERACY.W.6.2.B: Develop the topic with relevant facts, definitions, concrete details, quotations, or other information and examples

ASL Standards

Key Ideas: Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text

Integration of Knowledge and Ideas: Compare and contrast the experience of viewing a story, drama, or poem to viewing a video or live version of the text, including contrasting what they “see” when they view the text to what they perceive when they attend or watch

Text Types and Purposes: Sign informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content

-
- Pass out the provided KWL chart (see below) and have students fill out the first (What I Know) and second (What I Wonder) columns. Encourage students to put down questions as they watch the video
 - Explain that "With misinformation and bias is everywhere, how do we decide which source is trustworthy? Today we will learn how to look for credible sources and the difference between fact and opinion through my short presentation. Then, students will be split up in four groups (i.e. credible source, non-credible source, fact, opinion) and create a small poster of each group
 - Before providing a mini lesson on credible sources and the difference between fact and opinion (PowerPoint presentation), ask them, "How do you know whether the source is credible or not? Provide an example of each. What is the difference between fact and opinion?"
 - Present on How to Trust Information Sources Online PowerPoint (see below) and use the notes in the slides to help elaborate the information (15 minutes). Use the provided Quadrant Worksheet (see below) for students to practice finding credible/non-credible

sources and fact/opinion information online. They are to find five sources to fill in the quadrant

- After the presentation, have students complete the third (What I Learned) column. Split up students in 4 groups and have them create a small poster (i.e. credible source, non-credible source, fact, opinion) for the students to remember by while researching throughout the curriculum
- Additional resource: A Google document of Fact or Opinion Worksheet (see below) is provided for students to practice the concept of fact and opinion. The document also allows teachers to check the students' comprehension of the concept
- Additional resource: How to Trust Information Sources Online ASL video (<https://www.youtube.com/watch?v=NaOS1zciD3w&feature=youtu.be>)

KWL Chart

(<https://docs.google.com/document/d/1PVZqIV5TDV0VkFdiPaWiK1eHOvX40mJXqXzEN3p8u8k/edit>)

Name: _____

Date: _____

KWL Chart

Video Topic: How to Trust Information Sources Online

What I Know Before you watch the video, write what you think you know about the topic	What I Wonder Before or during watching the video, record questions about the topic	What I Learned After you finish watching, write what you learned about the topic

How to Trust Information Sources Online PowerPoint

(https://docs.google.com/presentation/d/1HjYP_9jFRuBKAX1mVdXLGaVhjmr5gfF8sdymMLEO5Jc/present?slide=id.p1)



Internet Fact-Checking

More credible websites

.gov

(Government)

.edu

(Education)

.org

(Organization)

Sometimes

.com

(Commercial)

Non credible sources

Individuals' blogs

Facebook posts

Online forums

Chat rooms

How do you evaluate internet resources?

1. Look at ownership and authors (*"About us"*)
 2. Expert in this field?
 3. Outdated?
 4. Citations?
 5. Ask for your personal information?
- 

Fact vs Opinion

1. Fact: backed up by scientific research
 2. Opinion: personal stories may be true, but not for everyone else too
- 

Cross-check the information

1. Use multiple sources
2. Combine the information

*The more research that shows the same results, the more trustworthy the advice is.

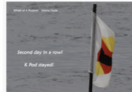


Always be skeptical and keep researching!



Quadrant Worksheet

(https://docs.google.com/document/d/1IJOTpC_OFHjYq17uE0pjhKcySud_97WvqePrZDaYwkM/edit?ts=5f0bd8e5)

	Credible	Non-Credible
Fact	The New York Times How Whales Became the Biggest Animals on the Planet 	BRITANNICA Blue whales are the largest animals to have ever lived on this planet. Including the dinosaurs!  One of the best things about whales surely is their sheer, inconceivable size, with which they suddenly emerge from the depths. The best whale considering that aspect. The blue whale. The blue whale is the biggest animal to ever have lived. Really. Biggest. One. Ever. Including the dinosaurs. With up to 100 tons, it weighs more than twice as much as the biggest dinosaurs. Let some calculating place that. 100 tons equal an empty Boeing 747, ten middle class cars, twenty elephants and 100 people - altogether. An average blue whale reaches a length of 30 meters, the largest even 33 meters. That equals three usually lined up school buses. Just as a comparison: Your standard whale watching boat usually has a length of 8 to 8 meters.
Opinion	WDC Author Whale and Dolphin Conservation The whale has been identified as a 3-year old that seems to be new to the Salish Sea area. While they were traveling with the other whale for at least a few days prior, it's unlikely it was a mom/calf pair as humpback calves leave their mom within their first year. https://www.cascadiaresearch.org/page/insights-humpback-whale-struck-ferry-6-july-2020 Like · Reply · 3d	Whale of a Paradise Blogspot.com 7-1-2020 K Pod - Two Matrilines Were Here Wednesday, July 2nd The K12s, Sequim's family unit of five, and the K13s, made up now of one brother, two sisters each with their male offspring, were present for a second day. They spent the day along the bottom half of the island. To keep it confusing and interesting they were coming up in the afternoon. Only a few made it as far as the lighthouse. They goofed around in front of the light and then turned and went back down island. 

Fact or Opinion Worksheet (https://docs.google.com/document/d/1gfw9UpUkgS5v70-bLFkhcUiUEXxg3w_gYPxpAep4P1Q/edit)

Fact or Opinion?

A **fact** is a statement which can be proven to be true.

Example: Blue whales are the largest animals on Earth.

An **opinion** is a personal view.

Example: The best flavor of ice cream is cookie dough.

Read each sentence below and decide if it states a fact or an opinion.

Circle your answer.

- | | | |
|---|-------------|----------------|
| 1. My favorite type of movie is comedy. | FACT | OPINION |
| 2. A snake is a reptile. | FACT | OPINION |
| 3. There are 26 letters in the English alphabet. | FACT | OPINION |
| 4. A rainbow is more beautiful than a sunset. | FACT | OPINION |
| 5. Rhode Island is the smallest state in America. | FACT | OPINION |
-

Write your own sentence that states a fact.

Write your own sentence that states an opinion.

Data Collection

Duration: 15-25 minutes

NGSS

MS-ESS3-2: Analyze and interpret data on natural hazards in forecast catastrophic events and inform the development of technologies to mitigate their effects

MS-ESS3-3: Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment

ELA Standards

CCSS.ELA-LITERACY.W.6.2.B: Develop the topic with relevant facts, definitions, concrete details, quotations, or other information and examples

ASL Standards

Key Ideas: Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text

Integration of Knowledge and Ideas: Compare and contrast the experience of viewing a story, drama, or poem to viewing a video or live version of the text, including contrasting what they “see” when they view the text to what they perceive when they attend or watch

Text Types and Purposes: Sign informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content

-
- *Slide 1*, Ask: "What is data collection? What is data? Why should we collect data?" Explain that data helps support a statement or an argument. An example would be using data for trash pollution: "Eight million tonnes of plastic are dumped in our ocean every year" (WWF, 2020) to show the irresponsibility in humans and severity of trash pollution.
 - Present on Data Collection PowerPoint (see below) and use the notes in the slides to help elaborate the information (15 minutes). A Google document of Methods of Data Collection Notes (see below) is provided for students to take notes and remember them by
 - *Slide 2*, Ask: “Have you seen or heard of primary and secondary data? Do you know what each of these means?” Have students share their guesses

- *Slide 3*, Explain there are different ways of gathering data, what we call “Methods of Data Collection.” Information gathering can be from a variety of sources. There is no best method of data collection. It depends on the researcher’s goal of the research plan and design. Data collection is an important aspect in any level of research work. If data are inaccurately collected, it will impact the findings of the study.
- *Slide 3*, Explain the most commonly used methods are: published sources, survey (email and mail), interviews (telephone, face-to-face or focus group), observations, documents and records and experiments.
- After presentation, quickly review the 6 methods of data collection using their notes and have students take turns describing what each of them do
- Additional resource: Data Collection ASL video
(<https://www.youtube.com/watch?v=dg3bec8MJ9U&feature=youtu.be>)

Data Collection PowerPoint

(<https://docs.google.com/presentation/d/11hX1uLtqjrrnzgWQqo8CorWFsrNVRr0a4dzYIm-kYTE/present?slide=id.p1>)



What is Data Collection?

- A systematic method of collecting and measuring data gathered from different sources of information in order to provide answers to relevant questions
- Accurate evaluation of collected data can help researchers predict future phenomenon and trends
- Classified into two: primary data vs secondary data

Methods of Data Collection

Observations	Literature sources	Surveys	Interviews	Documents and records	Experiments
Primary (monitor behaviors)	Secondary (inexpensive/not time consuming)	Primary (easy to analyze)	Primary (in-depth responses)	Secondary (examine documents)	Primary (examine 2 variables)
• Controlled • Natural • Participant	• Textbooks • Government or private companies' reports • Newspapers • Magazines • Online published papers and articles	• Web-based questionnaire • Paper-based questionnaire • Individual or group experiences	• Formal • Informal • Face-to-face meeting • telephone	• Call logs • Email logs • Databases • Minutes of meetings • Staff reports • Information logs	• Cause & effect • Variables: manipulated or measured • Dependent and independent variables

Sources

- <https://medium.com/@callygood/6-methods-of-data-collection-e946e993b930>

Methods of Data Collection Notes

(https://docs.google.com/document/d/16odhhUXAuUacJHmaQ8d_A8up9E4Vnnj2eTNegT1IoT4/edit?ts=5ee57cff)

Name: _____

Methods of Data Collection Notes

Information gathering can be drawn from a variety of sources. There is no best method to data collection. It depends on the researcher's goal of the research plan and design. The most commonly used methods are: finding literature sources, conducting surveys and/or interviews, recording observations, reading documents and records, and conducting experiments. Data collection is an important aspect to research work. If data is inaccurately collected, it will influence and skew the findings of the study. As you fill in the columns, circle whether the data came from a primary or secondary source. If you are not familiar with those terms, please watch the video on Data Collection.

Literature Sources	Surveys	Interviews	Observations	Documents and records	Experiments
Primary/Secondary	Primary/Secondary	Primary/Secondary	Primary/Secondary	Primary/Secondary	Primary/Secondary

Survey Interview Questions

Duration: 30-45 minutes

NGSS

MS-ESS3-2: Analyze and interpret data on natural hazards in forecast catastrophic events and inform the development of technologies to mitigate their effects

MS-ESS3-3: Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment

MS-ESS3-4: Construct an argument supported by evidence for how increases in human populations and per-capita consumption of natural resources impact Earth's systems

ELA Standards

CCSS.ELA-LITERACY.W.6.2.B: Develop the topic with relevant facts, definitions, concrete details, quotations, or other information and examples

ASL Standards

Key Ideas: Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text

Integration of Knowledge and Ideas: Compare and contrast the experience of viewing a story, drama, or poem to viewing a video or live version of the text, including contrasting what they "see" when they view the text to what they perceive when they attend or watch

Text Types and Purposes: Sign informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content

-
- Explain that we will be doing surveys and interviews as our methods of data collection for our research projects
 - Ask: "Have you experienced creating surveys or doing interviews before? If so, what was the experience like? If not, what do you think you should say when interviewing people?"
 - Present on Survey Interview Questions PowerPoint (see below) and use the notes in the slides to help elaborate the information (15 minutes)
 - After presentation, split up students in their research project groups and have them do the step-by-step. Teachers are to regularly check in to make sure they stay on track. A Google document of Survey Interview Questions Guidelines (see below) is provided

- Additional resource: Survey Interview Questions ASL video
(<https://www.youtube.com/watch?v=aTYIUEAeXws&feature=youtu.be>)

Survey Interview Questions PowerPoint

(https://docs.google.com/presentation/d/1KVi6MpmjezOQHbciJAJKVYHp_UrQA3SK9KRNwcxMcCI/present?slide=id.p4)



Survey Interview Questions

Step One

- Identify the problem(s)
- Identify the solution(s)

What causes it?					
Greenhouse Gases					
Water vapor	Carbon dioxide	Methane	Ozone	Nitrous oxide	Chlorofluorocarbons
H ₂ O	CO ₂	CH ₄	O ₃	N ₂ O	CFCs
• Water in gas form • Clouds/rains • Causes a cooling effect	• All around us naturally • Decaying & living organisms • Volcanoes	• Normal gas released from wetlands, growing rice, raising cattle, using natural gas, and mining coal	• In the atmosphere where the planes fly • Blocks the sun's radiation	• Natural part of the nitrogen cycle • Bacteria in soil and ocean make it	• Not created in nature • Damages the protective ozone layer • Powerful greenhouse gases
• Blocks heat from escaping	• Burning fossil fuels like coal and oil	• Traps a lot of heat • Causes global warming	• Burning gas in cars and factories	• Factories, power plants, and plant fertilizer • Damages the ozone layer	• Air-conditioning, refrigeration, blowing agents in foams, insulations and packing materials, propellants in aerosol cans

Step Two

- Create 5 questions

Survey Interview Questions					
	Very often 4	Quite often 3	Occasionally 2	Very rarely 1	Never 0
Questions	4	3	2	1	0
1. Do you buy products with minimal packaging?					
2. Do you recycle plastic products?					
3. Do you use heat and air conditioning?					
4. Do you replace your regular light bulbs with compact florescent light (CFL) bulbs?					
5. Do you walk, bike, and/or carpool to work or school?					
6. Do you buy energy-efficient products?					
7. Do you use hot water?					
8. Do you turn off lights when you leave a room?					
9. Do you turn off the water when you are not using it?					
10. Do you encourage others to conserve?					

Step Three

- Interview 20 participants
 - Be respectful
 - May I have some of your time to ask questions for my mini research project?
 - Thank you for your time. I appreciate it.
 - Explain the purpose
 - I am collecting data because...



https://www.pngitem.com/middle/hmhRxRh_interview-icon-hd-png-download/

Step Four

- For each question, count how many responded with:
 - 4 (very often)
 - 3 (quite often)
 - 2 (occasionally)
 - 1 (very rarely)
 - 0 (never)

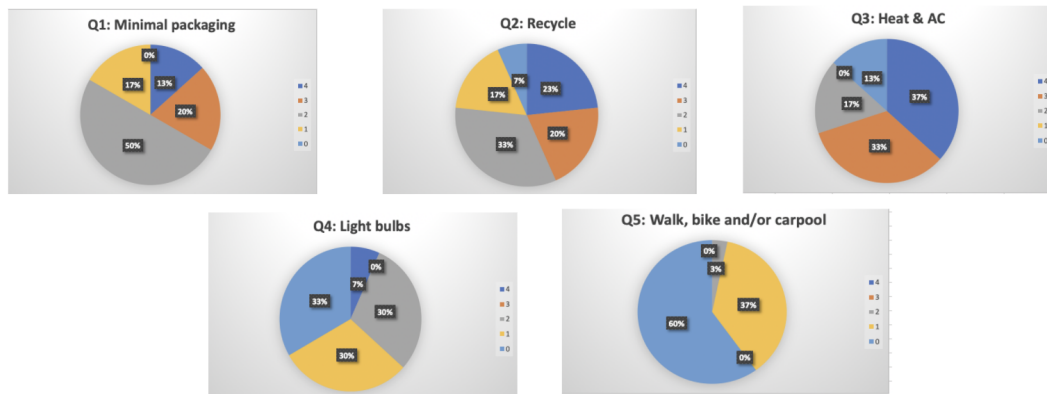
Step Five

- On Excel, put down your total numbers for each question

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1		Q1: Minimal packaging			Q2: Recycle			Q3: Heat & AC			Q4: Light bulbs			Q5: Walk, bike and/or carpool	
2		4	4		4	7		4	11		4	2	4	0	
3		3	6		3	6		3	10		3	0	3	0	
4		2	15		2	10		2	5		2	9	2	1	
5		1	5		1	5		1	0		1	9	1	11	
6		0	0		0	2		0	4		0	10	0	18	
7															

Step Six

- On Excel, create a 2-D pie chart for each question



Survey Interview Questions Guidelines (https://docs.google.com/document/d/1QKV-9Ttu1mXKsBivcY_iRZKhWEr70AlnB32u1LjCN2k/edit)

Micro Environment Research Project: Survey Interview Questions Guidelines

Group #/Topic: _____

Group Members: _____

Why do we need data? Data helps us to better understand the seriousness of the problem. We need to check our facts and opinions before making conclusions. Opinions do not matter unless we gather a large number of opinions. If a large number of opinions are connected, it can help us look for the source. So, let's put our suspicions into actions...It is time to interview your participants and collect data! This is the exciting part because you get to do what scientists do everyday! You and your group have chosen a problem related to climate change. After researching your topic, you should identify areas that need to be checked before coming up with a solution.

This will help you follow through the steps as shown below. Remember to be polite and show gratitude as you interview your participants!

Step One: Identify the problem(s) & solution(s)

Discuss with your group members and review your notes from research. Write down 5 causes and solutions. (Ex: recycling plastic products, encouraging others to conserve)

1. _____
2. _____
3. _____
4. _____
5. _____

Step Two: Create 5 questions

Then, you create questions based on the problem(s) and solution(s). Questions must be approved by your teacher before interviewing your participants. (Ex: Do you recycle plastic products? Do you encourage others to conserve?)

1. _____
2. _____

3. _____
4. _____
5. _____

Step Three: Interview 20 people

You are collecting data and it is important that you do not interfere with the data if you want the data to be reliable. Your job is to be a neutral investigator. You are to ask a few questions. Do not agree or disagree with the person sharing their thoughts /beliefs/ opinions. You are not to influence the interviewee in any way.

Discuss with your group members to decide who you will interview to avoid repetition/ redundancy. Be respectful towards your participants by asking them, “May I have some of your time to ask questions for my research project?”. You should also explain the purpose of your research by saying, “I am collecting data because...” and when you are done be sure to thank the person. Use the table below to fill in with tally marks.

Very often	Quite often	Occasionally	Very rarely	Never
4	3	2	1	0

Questions	4	3	2	1	0
1.					
2.					
3.					
4.					
5.					

Step Four: Count the tally marks

For each question, count how many participants responded with: 4 (very often), 3 (quite often), 2 (occasionally), 1 (very rarely), and 0 (never). Go through the tally marks all together with your group members and share your thoughts about the results. (Ex: I was/was not surprised to see...Question #___ had more/less than Question #___...) Use the table below to count all the tally marks.

Questions	4	3	2	1	0
1.					
2.					
3.					
4.					
5.					

Step Five: Put down total numbers on Excel

On Excel, put down 4, 3, 2, 1 and 0 on the left column and the total numbers on the right column. Put down each question at the top of both columns. For example, it should look like this:

	Q1: Minimal packaging
4	4
3	6
2	15
1	5
0	0



Step Six: Create 2-D pie charts

On Excel, click on the top corner of the left column and drag down to the right column. Make sure you get both columns and the question in grey. Find “Insert” and click on it. Then, find 2-D Pie and click on it to create a pie chart for each question. An example of a 2-D pie chart is shown below.



Cause and Effect

Duration: 30-45 minutes

NGSS

MS-ESS3-2: Analyze and interpret data on natural hazards in forecast catastrophic events and inform the development of technologies to mitigate their effects

Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment

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Text Types and Purposes: Sign informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content

-
- Pass out the provided KWL chart (see below) and have students fill out the first (What I Know) and second (What I Wonder) columns. Encourage students to put down questions as they watch the ASL video
 - Explain that "Cause and effect are important concepts in science as science seeks to create explanations. Scientists attempt to uncover and understand cause and effect relationships through well-designed experiments and investigations."
 - Present on Cause and Effect PowerPoint (see below) (15 minutes)
 - After the presentation, have students complete the third (What I Learned) column. Split up students in their research groups and have them identify the cause and effect of their topic. A Google document of Climate Change Project: Cause & Effect Worksheet (see below) is provided for research groups to identify the causes and effects within their topic

- Additional resource: A Google document of Cause & Effect Worksheet (see below) is provided for students to practice the concept of cause and effect. The document also allows teachers to check the students' comprehension of the concept
- Additional resource: Cause & Effect ASL video
(<https://www.youtube.com/watch?v=W8DNRgFEZGI&t=384s>)

KWL Chart

(https://docs.google.com/document/d/1iki_n1UeeznwxM_Bc1MDa7YbMLgTLeJKSIvKQL9LBkw/edit)

Name: _____

Date: _____

KWL Chart

Topic: Cause and Effect

What I Know Before you watch the video, write what you think you know about the topic	What I Wonder Before or during watching the video, record questions about the topic	What I Learned After you finish watching, write what you learned about the topic

Climate Change Project: Cause & Effect Worksheet

(https://docs.google.com/document/d/1SqO1BZLCDFN8EAYlGRvI_RIBW8EsmeEygTAKHNG7KHc/edit)

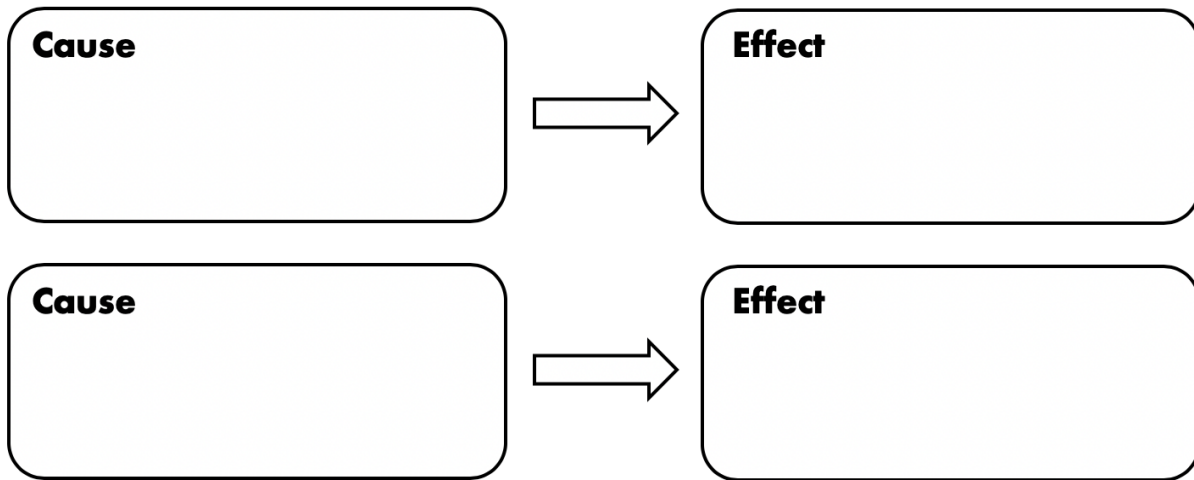
Climate Change Project: Cause & Effect Worksheet

Group #/Theme: _____

Group Members: _____

*It is time to become a real scientist and identify the causes and effects of your topic! Write the cause and effect for each row. Reminder: The cause is **WHY** something happened. The effect is **WHAT** happened.*

Cause People left trash on the beach.	→	Effect Birds ate trash and got choked by it.
Cause	→	Effect
Cause	→	Effect



Cause & Effect

(<https://docs.google.com/document/d/1nzEr2aaudTZfD47rvYbIPbOPlmxQEbE6qE1b8PCZc-c/edit>)

Name: _____

Cause & Effect

Write the cause and effect for each sentence.

1. Tim forgot his math book, so he was unable to complete his homework.

Cause: _____

Effect: _____

2. Keegan was hungry because he skipped lunch.

Cause: _____

Effect: _____

3. Erin's car had a flat tire, so she called a tow truck.

Cause: _____

Effect: _____

4. Gina couldn't find the cookies because Papa hid them in the cupboard.

Cause: _____

Effect: _____

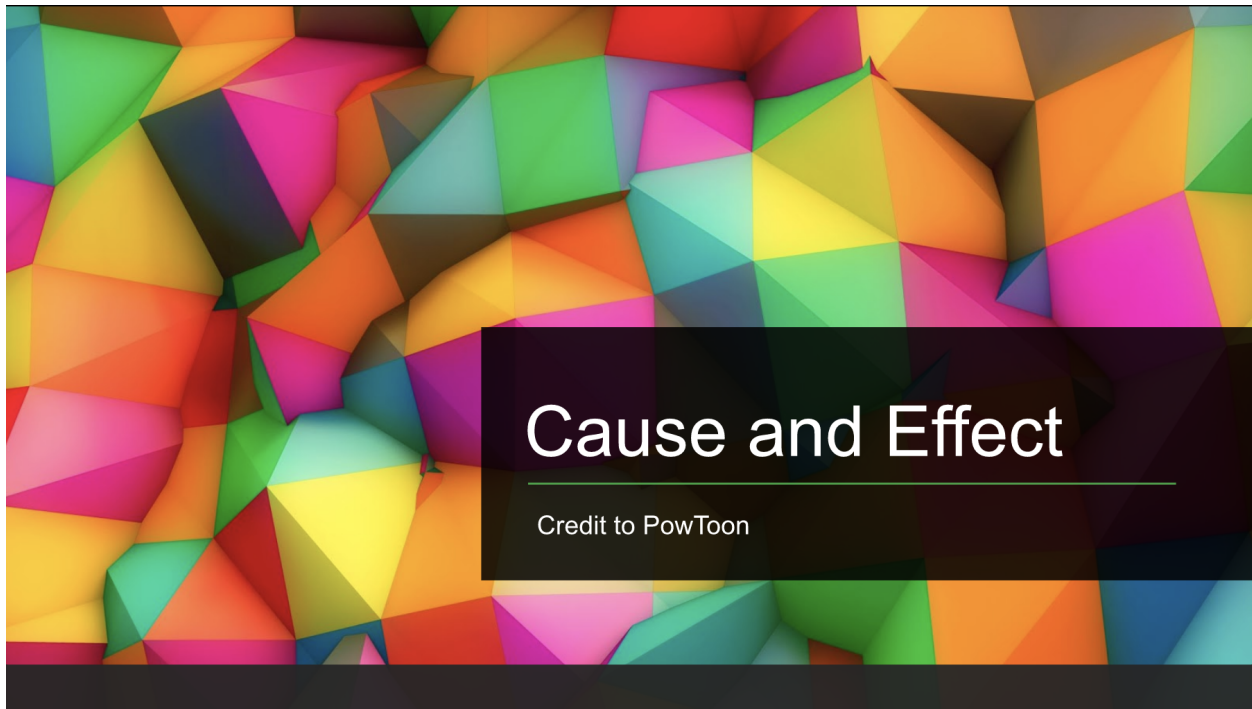
5. Kelly studied her spelling words and she got an A on the test.

Cause: _____

Effect: _____

Cause and Effect PowerPoint

(<https://docs.google.com/presentation/d/1zVTonPrJyoLaskHnbgQIQtZGq1PTmmfNWEj7t5RvES8/present?slide=id.p1>)



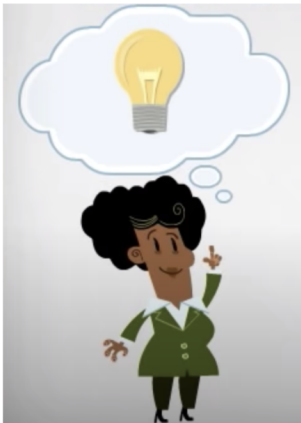
Cause

and

Effect



What is Cause and Effect?

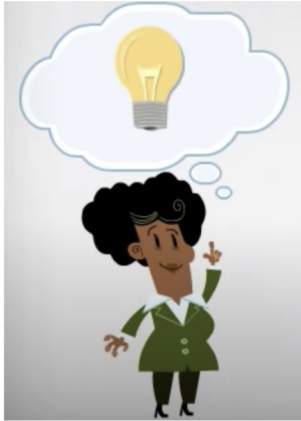


The Cause is **WHY** something happened.

The Effect is **WHAT** happened.

The Cause happens first but does not always come first in sentences and texts.

What is Cause and Effect?



Look for these keywords to help you find cause and effect in texts...

BECAUSE, SINCE, SO, IF, THEN, BEFORE, AFTER.

Example



Angela was happy **BECAUSE**...

She got to eat cake for dessert!

Angela was happy **BECAUSE** she got to eat cake for dessert.



The **CAUSE** was: Angela got to eat cake for dessert.

The **EFFECT** was: Angela was happy.

Here is another way to say it...

Angela got to eat cake for dessert
SO she was happy.



Now, the **CAUSE** (Angela got to eat cake for dessert) is before the **EFFECT** (Angela was happy) in the sentence but the **CAUSE** and **EFFECT** are still the same.

Let's try another...



Liam saw a UFO in the air and
THEN he started screaming.

CAUSE: Liam saw a UFO in the
air.

EFFECT: Liam started screaming.

Let's say it in another way...



Liam started screaming **SINCE** he
saw a UFO in the air.

CAUSE: Liam saw a UFO in the air.

EFFECT: Liam started screaming.

The **CAUSE** and **EFFECT** are the
same but come in a different order
in the sentence.



IF Steven takes out the trash, THEN he will get his allowance.



CAUSE

EFFECT

BEFORE Steven can get his allowance, he must take out the trash.



EFFECT

CAUSE

Things to Remember:



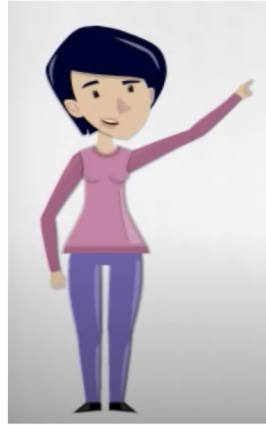
1. The cause is **WHY** something happened, and the effect is **WHAT** happened.

Things to Remember:



2. The **CAUSE** happens first but does not always come first in sentences and texts.

Things to Remember:



3. Look for the keywords **BECAUSE, SINCE, SO, IF, THEN, BEFORE, AFTER** to help identify causes and effects in sentences and texts.

Excel Tutorial

Students can watch the tutorial video to learn how to insert their 5 questions, data from survey questions, and create 2-D pie charts on Excel. They can copy and paste the 2-D pie charts from Excel for their research projects. ASL video

(https://www.youtube.com/watch?v=gQYp_8BHS7A)

