

CLIMATE CREW FORMATIVE EVALUATION

PERSONAL MEANING MAP RESULTS

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The Climate Crew, in the Kitty Andersen Youth Science Center, provides experiences for high school youth to learn about climate change issues and work in their community to address these issues. A formative evaluation was carried out in May 2010 to gain general feedback about the youths' Climate Crew experience, gauge how successful the program was in beginning to address the program outcomes, and provide the Climate Crew Manager with recommendations for program improvements. The formative evaluation consisted of one-on-one interviews with seven of the thirteen Crew members. Presented here are results of the evaluation that relate directly to the use of personal meaning maps.

Personal Meaning Map Results & Discussion

To measure knowledge about climate change, youth completed a Personal Meaning Map (PMM). The PMM method is sensitive to the experiences and knowledge that youth bring to a project. For a PMM, a word or phrase is written in the middle of a sheet of paper. Youth write words, ideas or images that they associate with the word or phrase. In the case of the Climate Crew, the phrase "climate change" was written in the middle of the paper. The evaluator gave the youth seven minutes to write words or draw images that came to mind when they thought of the term "climate change." After writing, the youth described what they wrote or drew and how it related to climate change.

Described below are summaries of the PMM discussions with each of the seven youth. For the purpose of readability and to ensure anonymity, all youth are referred to as females (she, her) in the write-ups. Appendix A also includes a table of what each of the youth wrote on their maps both during the formative evaluation and when they participated in entry interviews.

Youth exhibiting a broad understanding of climate change

Three of the youth (Youth 1, Youth 5, and Youth 9) exhibited a broad understanding of climate change. All three youth wrote terms and drew images on their maps related to climate change and were able to accurately describe how the terms and images connected to climate change. Both Youth 1 and Youth 5 appear to have increased their understanding of climate change from when they started their work in the Climate Crew. Youth 1 had the most developed understanding of climate change. She built on what she discussed in the entry interview to include more discussion of examples of what causes climate change and how people are working to address it. Youth 5 had an understanding of the environmental effects of climate change coming into the program as evident by the entry interview PMM discussion. This understanding was expanded through work on the Climate Crew to include the societal effects of climate change. Youth 9 did not have an entry interview so it is unclear whether she already had an understanding of climate change when starting on the Crew.

Youth 1

Youth 1 had the most detailed understanding of climate change. When thinking about Climate Change, many aspects of gardening came to mind. Youth 1 talked about various techniques they were using to grow food in their Climate Crew gardens. She talked about rain barrels, growing your own food, and organic farming. When asked to explain how the various aspects of gardening connect to climate change, Youth 1 talked about fossil fuels used to transport food and the pesticides used for gardening. *"If everybody just farmed in their backyard it'd be easier... So, that relates to climate change because you don't have to use fossil fuels and gas and waste all that to get it up here."* She also talked about how organic farming is something that doesn't contribute to climate change, however she didn't specify how it didn't contribute. She talked about the benefits of urban gardening, specifically how people can grow their own food, save money, avoid using pesticides, and help prevent the use of fossil fuels to transport food. She even recognized that you can motivate people to do something positive for climate

change by thinking about ways their changes in behaviors will benefit them personally. *“Even if you take away the climate change aspect of it, you can save money. And that will motivate people, in and of itself. Oh, I don't have to drive to the grocery store, I don't have to pay money to get fresh vegetables from the grocery store.”* Youth 1 also talked about increasing the community’s awareness of urban farming and creating sustainable communities where people *“can come together and then sell fruits and vegetables within the community and that also contributes to not having to buy stuff from Florida and bring all that up here. You don't have to use fossil fuels.”*

Youth 1 discussed organizations that are working to combat climate change. She mentioned an environmental organization at her school called Roots and Shoots. *“Roots and Shoots... do green stuff around the community that have to do with climate change. Make sure people recycle, make sure the school recycles, and all that.”* She said she previously wasn’t even aware of the group and realized it did things similar to what she was doing on the Climate Crew. She also talked about the NAACP and the Sierra Club working together for the same cause. She talked about the NAACP’s focus on *“justice for colored people”* and the Sierra Club’s focus on *“making sure people are doing what they should be doing to help climate change.”* She reflected on how climate change is going to affect everyone and that it is important to work together. *“And really, it, eventually, when climate change is done, it's gonna affect all of us, no matter how old we are, where we're from, what we look like, it's the world and the world doesn't really care, you know?”*

In addition to the work of volunteer organizations, Youth 1 talked about jobs in a green economy that address climate change issues. She discussed a variety of green jobs that have been created to help combat climate change, such as jobs to install solar panels and geothermal energy systems. Youth 1 also mentioned that a green economy will be beneficial because it will not only help combat climate change but create new jobs for a lot of people.

Youth 1 related climate change to environmental justice, going into a detailed description of what she learned about environmental justice from a guest speaker who visited the Climate Crew. She talked about how African-American kids are missing school because of asthma that is caused by pollution from factories that are in low-income neighborhoods. She said it is common to know people who have asthma and that she never thought about why. *“She (the guest speaker) kinda related it back to climate change and I think that's how we all kinda felt like personally affected by climate change...the things that are causing climate change are also affecting communities in ways that doesn't have anything to do with climate change, you know? Like asthma.”* Youth 1 talked about solutions to this problem. *“If we cut down the use, how much we rely on coal mines and cement plants and fossil fuels and all that, it'll cut down on where they put 'em because there's not gonna be that many, that much of them.”*

Finally, Youth 1 talked about the distinction between climate change and global warming, which she learned as part of the Climate Crew.

Instead of using the word ‘global warming’, we started using ‘climate change’ because global warming just means that places are getting hot, but really, like it snowed in Texas. When does it, that doesn't even sound right, so it's not all about things getting hot. It relates to the climate changing.

Youth 5

Youth 5 had an understanding of various societal and environmental effects of climate change. She wrote words related to the government and climate change. She felt that the government was secretive and *“doesn't really tell everybody necessarily how climate change is affecting us.”*

She said the future came to mind when thinking about climate change and that some people are *“oblivious. They think that there's nothing really going on, like, oh I don't believe in that.”* Youth 5 also talked about President Bush being secretive and how because of the *“state of war... they were thinking about pulling some soldiers out of Iraq to come help with Hurricane Katrina.”* In relation to Hurricane Katrina, Youth 5 did mention *“more severe weather”* and destruction from weather and hurricanes as relating to climate change. She also talked about the money that is and isn't being put into combating climate change.

Youth 5 discussed environmental justice and how it relates to climate change. She described climate change more in terms of local air pollution and how it affects public health, not in the larger picture of climate change. She discussed poverty, sickness, healthcare and less care for low and middle class, noting that *“climate change around poverty areas cause sickness because it's not in the wealthy areas that climate change is most affecting. Like in predominantly low-income communities, they have factories by them, so that causes asthma and sickness and all different types of stuff.”*

Youth 5 mentioned a variety of other words related to climate change. She talked about renewable resources such as corn and non-renewable resources such as oil. *“If we use the renewable resources instead of nonrenewable resources, we can actually get somewhere to help slow down the affects of climate change.”* Youth 5 also felt that some people are *“selfish”* because of *“how much oil they dig up.”* There were some words she said came to mind (ecosystem, economy, and nonchalant) but wasn't sure how to explain their connection to climate change.

Youth 9

Youth 9 exhibited an understanding of climate change based on how she described what she drew on her map (she drew images instead of writing terms). Youth 9 discussed a variety of the effects of climate change. She talked about how climate change affects bird migration. *“The climate change is usually getting hotter than it's supposed to be. The birds. I feel like it's, they need to come back.”* Youth 9 also mentioned how the change in temperature is affecting trees. *“The more hotter and the more cold and stuff, it's killing the trees.”* She described the effects of climate change on the oceans. *“The climate change affects the water from the pressure and making the levels rise. And it's killing the fish and I saw this picture on Google.”*

Youth 9 also talked about other terms related to climate change. She described the connection between climate change and carbon dioxide levels, *“since it has been getting hotter, the CO₂ level has been rising.”* She talked about factories and polluting, but didn't make the tie to the larger effects of climate change. *“The factories that produce coal mines and acid rains kill the plants that we use.”* Youth 9 mentioned combating climate change through *“renewable energy, which we probably need to end up doing, to stop climate change.”* She was also reminded of the “Change is needed” song the Climate Crew created.

Youth exhibiting a slight understanding of climate change

For two of the youth (Youth 6 and Youth 7), a number of words related to climate change came to mind, but they were only able to make a slight connection between a few terms and climate change. The data suggest that both youth may be starting to increase their understanding of climate change, but are still unable to accurately articulate a detailed understanding of the topic.

Youth 6

Youth 6 exhibited some understanding of the effects of climate change when talking about how plants aren't adapted to changes in the climate.

The weather, it affects the climate because climate and weather is together. The temperature and stuff, and that affects how things grow and that's what the garden comes from. The food. When the climate changes, the weather and the temperature and stuff in certain areas, it decreases, where it becomes hotter, or it's colder in some places, and then colder where it's hotter in places. And that stuff isn't adapted to that weather. Doesn't know how to grow...

A number of other words related to climate change came to mind, but she was unable to describe how they connect to climate change. She talked about people becoming more eco-friendly by *"keepin' the air more clean and safer for our community and stuff."* In this case the mention of keeping the air clean can relate to climate change, although Youth 6 didn't explain that connection. Although the youth wrote *"recycling,"* she talked about how it is important to recycle instead of leaving garbage laying around. *"All that laying out there is bad for the environment and ... it's also a part of causing stuff to die and not grow."* Green jobs came up as a means for people to work in their community and *"help decrease climate change."* However, she did not describe how the jobs help decrease climate change. Youth 6 also talked about the community in terms of the work of the Climate Crew and that *"we try and teach the community and stuff and get the community involved"*, but didn't elaborate on how that connects to climate change.

Youth 7

Youth 7 only made a slight connection between a few of the terms she drew and climate change. She said pollution related to climate change in terms of air pollution and greenhouse gases. However, from her description, she is unable to accurately articulate the connection. *"It (pollution) mixes up with the climate change and when with the climate usually it gets warmer and that's what greenhouse gases are, I think."* She went on to talk about how pollution doesn't just impact humans, but also impacts animals. Youth 7 also talked about the weather and the climate changing, although it wasn't clear if she was talking about weather in general or how the weather patterns have changed because of climate change. *"With climate change we would learn how the weather, the hurricanes, the tornadoes, have impacted people around and not just in the U.S., but around the world."*

Youth 7 discussed the community in relation to climate change, however when describing the terms she talked more about environmental action and health in general, not specifically in relation to climate change. Youth 7 talked about the benefits of working as a big group to *"get people to listen to us and what we have to say. Lots of people are trying to work on recycling and ... get it greener, and if we get people to listen to us more well I think it would be greener."* She also talked about working together to change something in our community by getting out their message and *"try to have your community engage in things that going on around. And try to solve problems if you have problems around."* Youth 7 went on to connect changes in the community to environmental justice issues in low-income communities. *"If we help the low-income communities. Well, places like big companies ... won't have to come around and open a big factory and pollute the air, which will change the climate also and people also get sick."* Youth 7 also mentioned gardening as a way to help low-income communities get fresh, healthier food from gardens instead of using food produced by factories.

When thinking about climate change, Youth 7 also talked about learning new things during Climate Crew. She said she learned information she doesn't learn on TV or in school, such as gardening. *"We get a chance to look around, go around, learn new things from other people...things like that you don't get to try all the time."*

Youth lacking an understanding of climate change

Two of the youth (Youth 3 and Youth 4) lacked an understanding of climate change and one (Youth 3) even had a misunderstanding of the concept. In comparison to their entry interviews, both youth wrote words in the formative evaluation that suggested they might have slightly increased their understanding about climate change, but how they spoke about the terms suggests that they still don't understand the concept of climate change.

Youth 3

Youth 3 was unable to make a connection with any of the words she wrote and how they relate to climate change. There were a number of words that she said *"just popped in my head"* but was unable to explain why they came to mind. These terms include ecosystem, going green, gardening, and environmental justice. The youth even said that environmental justice came to mind, but *"honestly I don't think that's got a lot to do with climate change."* A few of the terms Youth 3 wrote relate to the concept of climate in a broad sense. For the term "equator" she said, *"If you live closer to the equator, it's gonna be hotter, if you live further from it, it's going to be colder. That's got to do with the climate."* She also said that is you live close to water *"it could be cooler, I think. So that's got to do with climate stuff."* In terms of weather, she said *"weather is climate"* and that climate causes natural disasters. Youth 3 described plate tectonics moving to cause tsunamis and incorrectly stated that was an *"effect of climate change."* Composting and recycling were brought up as means to prevent polluting the air, however when asked how preventing air pollution relates to climate change, Youth 3 responded, *"I don't know."*

Youth 4

Youth 4 mentioned a variety of terms that related to climate change but was unable to describe why they are connected to climate change. Youth 4 remembered talking about green jobs and power plants during Climate Crew activities but couldn't remember how the terms related to climate change. When talking about gardening, Youth 4 talked about growing your own food so that you have fresh food for yourself, however her description did not make a connection to how it relates to climate change. When talking about weather she talked about it in terms of the climate and varying weather, not about how the weather is affected by climate change. She also spoke about changes in the community by helping people and getting involved in *"the climate stuff."* The closest Youth 4 got to making a connection was talking about how climate change affects people's health. However, from her response, it isn't clear if she understood the larger connection to climate change or was thinking more about environmental justice and public health. *"We're in Minneapolis where we were learning about where they were burning the trash and stuff. And it was causing people to get asthma and stuff."*

Appendix A

Personal Meaning Maps - Words & Images

Youth	Entry Discussion	Summer 2010
<i>Youth 1</i>	<ul style="list-style-type: none"> • Global warming • Day After Tomorrow • Winter, spring, summer, fall (undefined seasons) • Oceans, glaciers melting, animals (polar bears, penguins) that live in cold weather • Temperature [with a drawing of a thermometer] • World climate [with a drawing of Earth] • Predicting the weather (7th grade science/STEPS) 	<ul style="list-style-type: none"> • Environmental Justice • Green Economy • Urban Farming - Gardens • Organic farming - saves money • Community (awareness) • Farming techniques (with a drawing of a "pizza garden" and explanation of "basil next to tomatoes (keep pest away vs. pesticides), a drawing of a "u shape(d) layout" for a garden, a drawing of a "rain barrel," a drawing of a "potato" container and an "herb spiral") • NAACP and Sierra Club • Climate change -> Asthma -> African Americans missing school -> Crime... • My school (Roots and Shoots in interview) • People of all ages and colors • Food diversity (water melon, greens, chard, leeks) • Drawing of the Earth
<i>Youth 2</i>	<ul style="list-style-type: none"> • Global warming • Weather • Seasons • Temperature • Rain • Cold • Snow • Heat • Clouds 	<ul style="list-style-type: none"> • Global warming • Weather • Hurricane • Floods • Environmental Justice • People in poverty • Find solutions • Resources lost • Government • People population • Animal population

<i>Youth 3</i>	<ul style="list-style-type: none"> • Weather • Global warming • Precipitation • Climate • Tropical zones • Sun • Equator • Heat • Temperature • °F • °C • Polar zones • Atmosphere • Rain • Snow • Sleet 	<ul style="list-style-type: none"> • Weather • Natural disaster • Going green • Environmental justice • Plate tectonics (I think) • Recycling • Equator • Composting • Ecosystems • Gardening • Water
<i>Youth 4</i>	<ul style="list-style-type: none"> • Different stuff (pollution, stuff from cars) that's affecting the earth • Different seasons • Different views of the outside color, grass, etc. • Weather • Different environments • Lakes and rivers • Outside animals (birds) 	<ul style="list-style-type: none"> • Weather • Green jobs • Gardening • Changes in the community • Power plants • Something with people health (could effect)
<i>Youth 5</i>	<ul style="list-style-type: none"> • Global warming • Corn fuel • Pollution • Dirty • Stronger storms/winds • Deforestation • 2012 • Colder winters, hotter summers • Polar ice caps melting • Hole in the ozone • The earth is dying • Eco-friendly • Recycling • Hybrid • New ways of transportation • CO2 	<ul style="list-style-type: none"> • Non-renewable • Selfish • Less care for low/middle class • Government • \$ • Secretive • Environment • Poverty/sickness • Justice • Renewable resources • More severe weather • Oil • Presidency • Future • Economy/Ecosystem • Generations • Healthcare • State of War • Destruction • Oblivious • Death • Nonchalant

<i>Youth 6</i>	<ul style="list-style-type: none"> • Global warming • Pollution • Weather • Animals • Temperature • Environment 	<ul style="list-style-type: none"> • Community • Recycling • Green jobs • Eco friendly • A drawing of a cloud with rain representing "weather" • A drawing of the sun representing "weather" • A drawing of the earth representing "weather" • A drawing of flowers representing "garden"
<i>Youth 7</i>	<ul style="list-style-type: none"> • Animals [with a drawing of an animal] • Plants • Sun [with a drawing of the sun] • Summer • Winter • Oceans [with a drawing of the ocean] • Tornadoes [with a drawing of a tornado] • Hurricanes • Weather changing • Rain [with a drawing of rain clouds] 	<ul style="list-style-type: none"> • Animals • Weather • Pollution • Gardening • Changing something like around our community • Working as a big group • Learning new things • Having trips to communities and learning how different they are by the problems they have. • Helping people living in low income community • Having fun while we are trying to persuade people to start recycling or planting a tree.
<i>Youth 9</i>	*Youth 9 didn't participate in an entry interview	<ul style="list-style-type: none"> • Migration (Drawing of birds flying) • Renewable energy indicated by a circle made out of arrows • Drawing of a tree followed by two consecutive pictures of the tree cut down • Drawing of a person sweating with the sun beating down • Drawing of a person shivering "brrrr" with either snow or rain falling on them • Climate change affects the water (picture of the earth with the sun beating down from all sides and a dead fish) • Co2 has been rising because of factories (picture of a factory with pollution coming out of the top) which leads to a toxic cloud followed by an arrow to another cloud that is raining acid rain on plants • Musical note: Reminds me of the song we made