

CAL OER



AUGUST 4-6, 2021

OER/C-ID Initiative

Global Climate Crisis

August 5, 2021

Ron Rusay

<http://chemconnections.org/rusay.html>

CAL OER FREE
VIRTUAL CONFERENCE

*Elaine Bernal, Tara Bunag, Ana Garcia-Garcia,
Fred Hochstaedter, Ngozi Oniya, Kevin Crane*

Opening California
for Learning

Complete Slide Deck

Global Climate Crisis

OER/C-ID Initiative

- Purpose is to personalize & connect aspects of the Global Climate Crisis by incorporating this topic into most higher education courses.
- Directed primarily at the majority of 2.5-3 million undergraduate students in California's public institutions.
- Delivered via OER modules that relate current, scientific, socio-economic & equity issues to required individual C-ID course descriptors, content & objectives.
- Modules are linked by relevant global & local themes and narratives.
- The STE(A)M course modules are free, adaptable & accessible to **anyone**: *any instructor* and *any student*, over the open Internet.

Global Climate Crisis

OER/C-ID Initiative

The Initiative aims to connect & personalize aspects of the Global Climate Crisis by providing OER modules, which relate current, scientific, socio-economic & equity issues to individual course C-ID content & objectives required of students matriculating through these courses. It centers on critical over-arching global & local themes and narratives that link the collection of lower-division, higher-education STE(A)M course modules, which are adaptable & freely accessible to **anyone**: *any instructor* and *any student*, over the open Internet.

Global Climate Crisis

OER/C-ID Initiative

What is OER?

<https://asccc-oen.org/>

The Initiative treats OER as defined by teaching and learning materials that are freely available online for everyone to use and includes course modules, lectures, homework assignments, lab and classroom activities, pedagogical materials, games, simulations, and many more resources contained in digital media collections from around the world (as defined by OER Commons).

(OER most often refers to openly-licensed textbooks and ancillary materials that are available at little or no cost to students.)

[https://cvc.edu/open-educational-resources/
oer-zero-textbook-cost-degree/](https://cvc.edu/open-educational-resources/oer-zero-textbook-cost-degree/)

<https://libguides.csun.edu/affordable-learning-solutions>

Global Climate Crisis

OER/C-ID Initiative

What is C-ID?

<https://c-id.net/resources#AG1>

- C-ID is a course identifier.
- A unique, common number for a course with the same minimum set of required content, pedagogical & administrative standards at any of California's 116 community colleges, 23 state universities (CSUs) or 10 research universities (UCs).
- Each C-ID course has a "descriptor" and standards, which were developed by a committee of inter-segmental faculty from each discipline.
- There are currently over 23,000 courses in 81 disciplines on the C-ID master list with 2-3 new courses added each day.

Global Climate Crisis

OER/C-ID Initiative

What is C-ID?

<https://c-id.net/resources#AG1>

C-ID is a course identifier. It provides a unique, common number that is assigned to a public California community college, state university and research university course, which meets the same common, minimum set of content, pedagogical & administrative standards. The number is assigned based on a course "descriptor", which was developed for each individual course by a committee of inter-segmental discipline faculty respectively representing California's 116 public community colleges, 23 state universities, and 10 public research universities. Colleges submit their course outlines of record (COR) for review & approval against a uniform course descriptor. When validated, the college is granted approval for including this as a C-ID course in the college's catalogue and in class schedules. The unique C-ID number is associated with all other courses in all of California's institutions of higher education. It allows California's 2.5 to 3 million students who enroll in post-secondary higher education to articulate their matriculation throughout the entire system of 149 real & virtual campuses.

C-ID Courses

23,687 CCC & CSU courses are on the approved C-ID Master List
(7/11/2021)

<https://c-id.net/courses/>

2 to 3 new courses added daily

It is estimated that more than 85% of the total courses on the C-ID master list, which is comprised of over 400 course descriptors in 81 C-ID disciplines, offer one or more courses that could incorporate Global Climate Change modules based on the respective C-ID required course content & objectives.

<https://c-id.net/resources>

Global Climate Crisis

OER/C-ID Initiative

Why Global Climate?

**Relevant & critical to most every student's concerns & future.
Topical bridge between all Science, Math & Humanities courses. [STE(A)M]**



[CC] Time Magazine Cover:
Climate is Everything

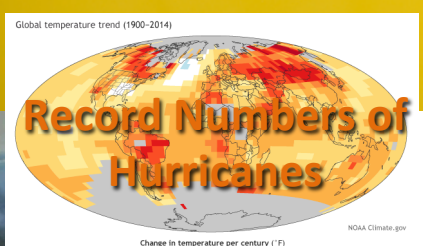
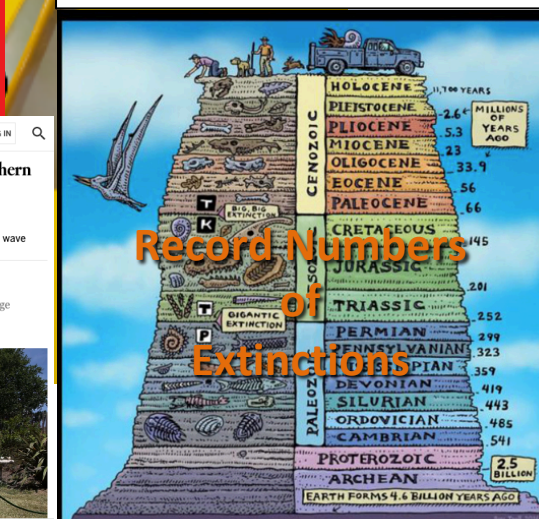
Home » News & Features » Climate Q&A » What's the difference between global warming and climate change?

What's the difference between global warming and climate change?



Melting Ice Caps & Glaciers

Climate Change Drove Western Heat Wave's Extreme Records, Analysis Finds



THE NEW YORKER

ANNALS OF A WARMING PLANET

IT'S NOT THE HEAT, IT'S THE DAMAGE

Two questions lie at the heart of the climate crisis.



By Bill McKibben

August 4, 2021



A person walks along a section of highway near Mayschoss, Germany, that was damaged from heavy rains and flooding, in mid-July. Photograph by Christof Stache / AFP / Getty

The Economist

The World in 2021

No Safe Place



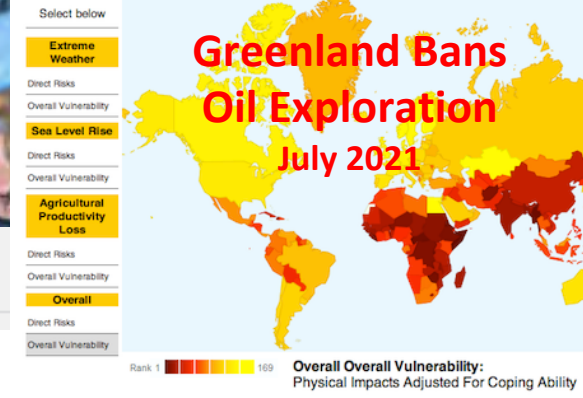


The Climate Justice Playbook for Business

How to centre climate action in Climate Justice

[CC] Collage: News Headlines
 Climate Justice = Human/
 Social Justice

University of Colorado Boulder



Environmental Center

DIVISION OF STUDENT AFFAIRS

News

- Energy & Climate Justice
- Zero Waste
- Transportation
- Greening CU

Home > Energy & Climate Justice > General Energy & Climate Info > Climate Change > Climate Justice

Climate Justice



Greta Thunberg



[CC] Greta Thunberg
"Racist, ...
...Climate Denier.... Just Be Quiet?"

<https://www.youtube.com/watch?v=NixNAC6ZFzU>

Global Climate Crisis

OER/C-ID Initiative

The
Economist

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The World Ahead

The World in 2021

The world could turn a corner on climate change



NOT all Gloom & Doom!

[CC] Economist Magazine:
"Global Climatestry"



For centuries, 'ulu (breadfruit) has served as a major staple food in the Pacific Islands, and starting 200 years ago has spread widely across the global tropics. Lauded as a crop that could potentially transform tropical agriculture and address global hunger, 'ulu has high productivity, an excellent nutritional profile and is a long-lived tree.

A study from the University of Hawai'i at Manoa's College of Tropical Agriculture and Human Resources (CTAHR) gives another reason for 'ulu's promising future: ***an expanding habitat suitable under climate-change scenarios over the next 50 years.***

OER/C-ID Global Climate Initiative

Proof of Concept Developmental C-ID Course

C-ID: Chem 100

“Chemistry & Society”

Individual Campus Catalog Names:

Chemistry and Society
Chemistry for Non-Science Majors
Chemistry for the Citizen
Chemistry for the Liberal Arts
Chemistry in Action
Chemistry in Society
Everyday Chemistry
Exploring Everyday Chemistry
Exploring Our Chemical Environment
Introductory Chemistry
Molecules Matter
The Chemistry of Energy and Environmental Issues
The Chemistry of Everything

A transferrable non-science major's course with a laboratory component, which satisfies degree requirements for a science course with a lab.

C-ID: Chem 100

(Proof of Concept Course)

“Chemistry & Society”

17 California Community Colleges & State Universities (CSUs) currently offer &/or include course in their catalog

4 members of the Initiative team either have developed & taught or teach a Chem 100 course at the highlighted campuses

Bakersfield College

Chaffey College

College of the Canyons

Columbia College

De Anza College

Diablo Valley College

Laney College

Modesto Junior College

Monterey Peninsula College

San Joaquin Delta College

San Jose City College

Shasta College

California State University, Channel Islands

California State University, Dominguez Hills

California State University, Los Angeles

California State University, Northridge

California State University, Long Beach

C-ID: Chem 100

(Proof of Concept Course)

“Chemistry & Society”

<https://c-id.net/descriptors>

- Descriptor: Chemistry & Society

“This course introduces students to basic concepts of chemistry and *requires analyses of the socio-cultural contexts within which chemistry plays a central role*. The course is designed to provide a general educational exposure to the physical sciences, specifically chemistry, and is not recommended for science majors.”

- *socio-cultural context:*
Global Climate Crisis

C-ID: Chem 100

(Proof of Concept Course)

“Chemistry & Society”

C-ID Descriptor “Content”:

Fundamentals of Chemistry:

- Units of measure, light, heat and temperature, problem solving and dimensional analysis
- Principles of chemistry, including
- introduction to the fundamental particles [electrons, protons and neutrons] and their relationship to atomic structure;
- atoms, ions and molecules;
- ionic interactions and covalent bonding;
- the states of matter the nature of solutions including classifications of solutes

Contextual Topics such as:

- Lighting the human environment
- Human mobility: ships, planes, trains, automobiles and bicycles
- Energy: sources of energy, distribution and impact on the human condition; production of oil-based materials
- The politics of pollution - including water-based pollution concerns
- Chemicals in our foods and food supply chain
- Population dynamics - the chemistry of contraception
- Chemistry and chemical dependency
- Diseases of chemical origin

C-ID: Chem 100

(Proof of Concept Course)

“Chemistry & Society”

C-ID Descriptor “Objectives”:

“At the conclusion of this course, the student should be able to...”

- **Apply scientific reasoning in contexts** involving chemistry and society
- **Use** chemical theories, principles, and models, in conjunction with the scientific method, **to analyze socio-cultural phenomena involving chemistry and society**
- **Critique** the **benefits and limitations** of applying the scientific method to problems in the analysis of socio-cultural phenomena involving chemistry
- **Explore independently contemporary topics** in which chemistry has a significant role

C-ID: Chem 100

(Proof of Concept Course)

“Chemistry & Society”

<https://c-id.net/descriptors>

- **Initiative’s First Benchmark:**

Develop & Publish Chem 100 OER modules that are aimed at the C-ID student learning objectives, which can easily be adopted, edited & adapted by instructors and incorporated into any Chem 100 and related (CCC, CSU, UC) course & LMS as

PLUG & PLAY

*(An OER “Module” is **any** student-centered activity.)*



Global Climate Crisis

OER/C-ID Initiative



What is a module?

A module is considered to be any student centered activity that employs OER teaching-learning materials & methods, which serve to improve interactive, student-centered learning. *(Usually authored by faculty & students.)*

The activities can be face-to-face or virtual, individual or group, digital or hard copy, synchronous or asynchronous, and include exercises, lessons, case studies, stories, videos, lectures, simulations, homework assignments, games, and many, many more different resources and pedagogies.

Modules serve as tools, which continue to evolve, grow, and provide options as customizable sets of OER for instructors & students.

Activity List for ChemLinks/MC² Modules
Started by Susan Kegley, refined by module authors
Ventura, CA, Jan. 1998

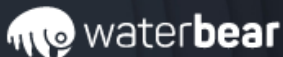
- Jigsaw
- Class worksheets, individual or group
- Given a table of data/observations interpret and analyze
find trends, generalize, make rules
- Graphical interpretation or creation of a plot
explain the graph
plots → predictions (fit to a model)
demonstration to show actual result
solve a problem graphically
- Instructor demonstrates and students explain
- Students experiment and explain
- Multimedia/simulations: Do and explain, predict and test
- Microscopic models → predictions of macroscopic behavior → do it to test
- Research a topic (library or Web) and write a short essay
- Write a one-minute paper
- Make a concept map
- Draw a sketch/cartoon to summarize
- Teach someone else what you have learned
- Group problem solving: simply work a difficult problem together
- Describe information needed to do a task
- Describe what your answer will look like (number, concept, +, -, large, small, etc...).
- Explain or create a picture which is a microscopic model of reality
- Describe what you don't know about the problem/question at hand
- Use or construct an animation or simulation
- Answer multiple choice questions with tempting alternatives, why tempting?
- Ask questions which challenge commonly held beliefs (create cognitive dissonance)

*A page from a 23 year old MC² project list of what can define a module.
(Susan Kegley/MC²)*

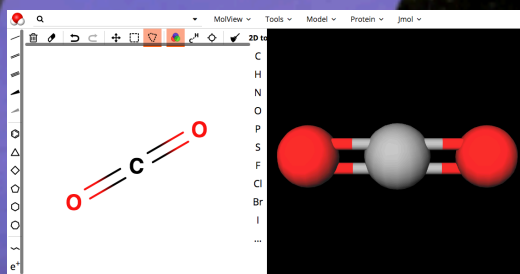
OER/C-ID Initiative: Examples of Modular Resources for Interactive Activities

Resources:

CONNECT



[CC]: 5 OER Resource links to Climate Solutions



<https://www.climateinteractive.org/tools/en-roads/>
Welcome to the beta version of En-ROADS from Climate Interactive and MIT Sloan's Sustainability Initiative. The simulator is most powerful when used in a role-play game or policy workshop. Join our trainings. Please visit support.climateinteractive.org to ask us questions, review our forums, or send feedback.

CLIMATE JUSTICE
Series of five videos
MARY



<https://ed.ted.com/search?q=climate#ted-ed-lessons>

Discover Create Manage Support

TED-Ed Lessons

- Can animals adapt to climate change? (680,008 Views)
- Can wildlife adapt to climate change? (16,295 Views)
- Why I must speak out about climate change - James Hansen (52,982 Views)
- Climate change will displace millions. Here's how we prepare - Colette Pichon Battle (108,128 Views)
- CLIMATE CHANGE: EARTH'S GIANT GAME OF TETRIS (02:48)
- THE ARCTIC CANARY IN THE COAL MINE (06:11)
- OUR CHAOTIC CLIMATE (06:11)
- CLOUDY CLIMATE CHANGE: HOW CLOUDS AFFECT EARTH'S TEMPERATURE (06:40)

<https://phet.colorado.edu/>

PHET Simulations

- Energy Forms and Changes
- States of Matter

<https://molview.org/>

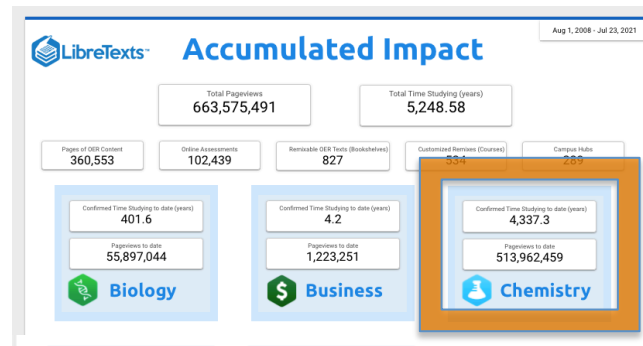
AGPLv3 Free Software Free as in Freedom

Climate Crisis Solutions

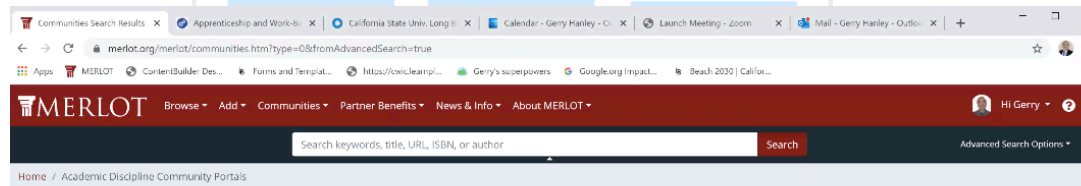
OER/C-ID Global Climate Initiative

Module Distribution & Developmental Support

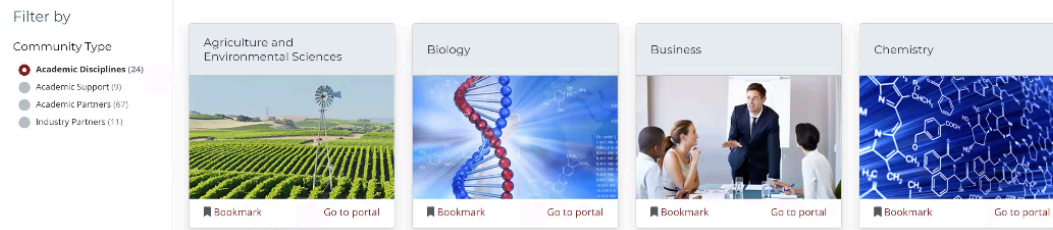
Modules will be distributed on-line through Web-based partners
LibreTexts & Merlot



**Over ½ billion pageviews
averaging
~150,000 user visits/day
(4.5 million / month)**



<https://www.merlot.org/merlot/materials.htm?keywords=Climate+Change&sort.property=relevance>



94,754

Learning Resources

186,009

Registered Members

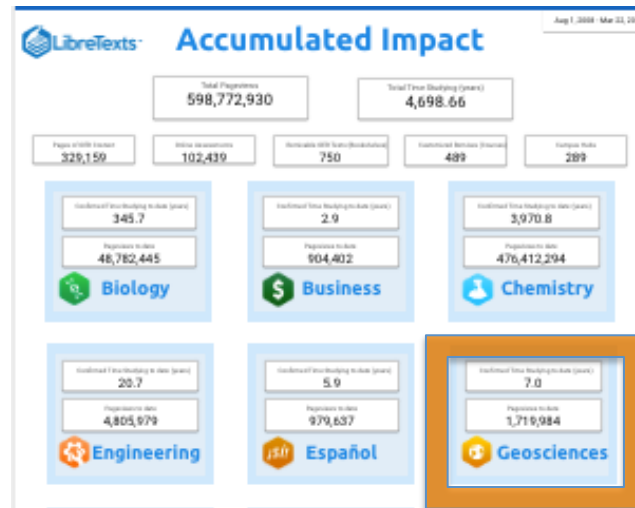
4,353

Member Institutions

C-ID: Geol/Chem 100

Earth Sciences (Geol C-ID)

Further Module Development I



Adapting Chem100 to Earth Sciences C-ID
Workspace: *LibreTexts Geosciences*



C-ID: Math 110

“Introduction to Statistics”

Further Module Development II

92 of the 116 California Community Colleges (80%) & 9 of the 23 CSUs (40%) currently catalog a total of 221 unique Math 110 courses in several departments and in different variations, including:

Mathematics/Statistics, Biology, Sociology, Psychology, Business, Economics, Political Science, Administration of Justice, and Anthropology

C-ID: Math 110

“Introduction to Statistics”

CSUs & Colleges:

C-ID Descriptor	Institution	Institution	Local Course Title(s)	Numbers	M
Introduction to Sta	California State University, Baker	California	Introduction to Statistical Concepts and M	MATH 22	
Introduction to Sta	California State University, Chan	California	Elementary Statistics	MATH 20	
Introduction to Sta	California State University, Chan	California	Biostatistics	MATH 202	
Introduction to Sta	California State University, Chan	California	Quantitative Methods for Biology	BIOL 203	
Introduction to Sta	California State University, Chico	California	Statistics	MATH 10	
Introduction to Sta	California State University, Domi	California	Elementary Statistics and Probability	MAT 131	
Introduction to Sta	California State University, Fresn	California	Statistical Analysis I	DS 73	
Introduction to Sta	California State University, Fresn	California	Elementary Statistics	MATH 11	
Introduction to Sta	California State University, Fresn	California	Statistical and Computer Applications in Cr	CRIM 50	
Introduction to Sta	California State University, Fresn	California	Public Health Statistics	PH 92	
Introduction to Sta	California State University, Fuller	California	Intro Probabil + Statistics	MATH 12	
Introduction to Sta	California State University, Long	California	Statistics for Everyday Life	STAT 108	
Introduction to Sta	California State University, Long	California	Introductory Statistics	PSY 110	
Introduction to Sta	California State University, Stanis	California	Statistics	MATH 16	
Introduction to Sta	California State University, Stanis	California	Statistics for Decision Making	MATH 1610	
Introduction to Sta	San Francisco State University	California	Elementary Statistics	MATH 12	
Introduction to Sta	San Francisco State University	California	Business Statistics I	DS 212	
Total		9	39 %		
Community Colleges		92	80 %		

C-ID: Math 110

“Introduction to Statistics”

<https://c-id.net/descriptors>

*Math 110 C-ID Descriptor
Is under 5 year review*

C-ID Descriptor:

The use of probability techniques, hypothesis testing, and predictive techniques to facilitate decision-making. Topics include descriptive statistics; probability and sampling distributions; statistical inference; correlation and linear regression; analysis of variance, chi-square and t-tests; and application of technology for statistical analysis including the interpretation of the relevance of the statistical findings.

Applications using data from a broad range of disciplines.

C-ID: Math 110

“Introduction to Statistics”

C-ID Descriptor (Draft):

*Math 110 C-ID Descriptor
Is under 5 year review*

Course Content:

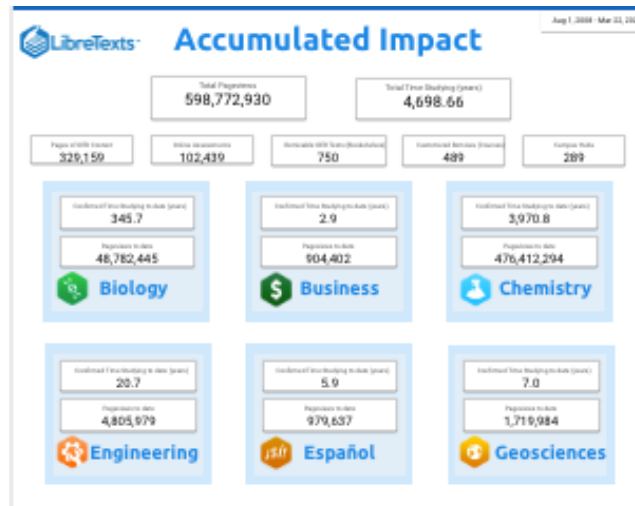
1. Summarizing data graphically and numerically;
2. Descriptive statistics: measurement, measures of central tendency, and variation;
3. Sample spaces and probability;
4. Random variables and expected value;
5. Sampling and sampling distributions;
6. Discrete distributions – Binomial;
7. Continuous distributions – Normal;
8. The Central Limit Theorem;
9. Estimation and confidence intervals;
10. Hypothesis Testing and inference, including t-tests for one and two populations, and Chi-square test;
11. Correlation and linear regression/analysis of variance (ANOVA);
12. Applications using data from at least four of the following disciplines: business, economics, social science, psychology, political science, administration of justice, life science, physical science, health science, information technology, and education
13. Technology based statistical analysis.

- *Apply*
- *Use*
- *Critique*
- *Explore*

C-ID: Math 110

“Introduction to Statistics”

Further Module Development II



Actively recruiting course champion(s)

Workspace: *Libretexts Statistics*



***Math 110 C-ID Descriptor
Is under 5 year review***

Global Climate Crisis

OER/C-ID Initiative

Amanda Cassel, Editor-In-Chief
March 16, 2021

The Economist

Menu Search

My account



The World Ahead

The World in 2021

The world could turn a corner on climate change



JUST A THOUGHT...

“Taking action to reduce our own carbon footprints or engaging in climate justice begins with being informed about global climate change.”



Amanda Cassel

Midway staff

Taking action to reduce our own carbon footprints or engaging in climate justice begins with being informed about global climate change, and that education must begin within our science curriculum, writes editor-in-chief Amanda Cassel.

<https://uhighmidway.com/11260/opinion/climate-education-must-be-in-required-science-curriculum/>

NOT all Gloom & Doom!

Global Climate Crisis

OER/C-ID Initiative

- Modules will be added and continuously updated, providing current data, content & pedagogy appropriate for each course that relate to required C-ID content & pedagogy.
- When completed, the OER Global Climate STE(A)M module collection will encompass most all of the lower division undergraduate courses in California's public higher education, beginning with, but not limited to a majority of the more than 23,000 currently approved C-ID courses in more than 80 disciplines, which can be adapted to fit K-12 curricula.

Beyond C-ID Courses

Adaptations suiting K-12 curricula:

Students' ages 5 to !!!



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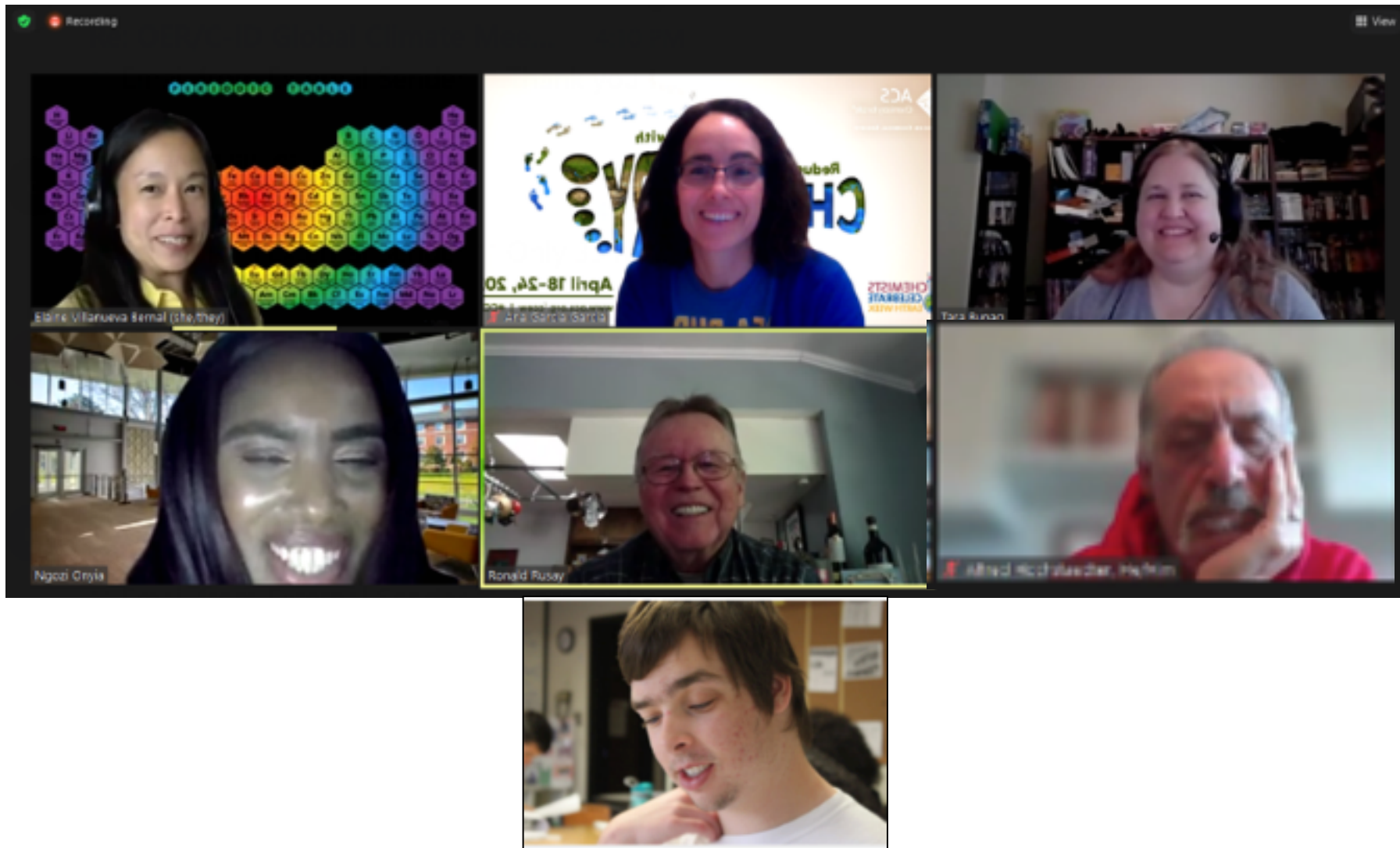


*For information on how to become involved
with & support the
OER/C-ID Initiative, please e-mail.*

[mailto: oer.c-id@chemconnections .org](mailto:oyer.c-id@chemconnections.org)

Opening California
for Learning

Thank You





UN CLIMATE
CHANGE
CONFERENCE
UK 2021

IN PARTNERSHIP WITH ITALY

26th UN Climate Change Conference
31 October – 12 November 2021.

**The moment
is now.
The action
starts here.**

Glasgow
November 3–11
2021

https://climatehub.nytimes.com/?launch_id=11362285

https://climatehub.nytimes.com/?launch_id=11362285

The New York Times

Climate Hub

**The moment
is now.
The action
starts here.**

Glasgow
November 3–11
2021

