Evidence-Based strategies for climate change education - A global perspective

Eric Guilyardi
President
Office for Climate Education

TASUED Staff Professional Development Workshop
03/07/2025

We need education if we are to address the climate crisis

"Education is the most transformational climate adaptation action"

Stefania Giannini

Assistant-Director General for Education, UNESCO

Education for sustainable development vs. climate change education

ESD: recycling to « save the planet »

CCE: understanding complexity, agency and looking forward to the future

The pitfalls of 'depoliticising' and taking things out of context:

- the scientific dimension should take precedence - risk of scientism, narrow visions, out of touch and/or far removed from the issues facing society
- relativism, magical thinking, out-of-context gestures

Carries values and world views – difficult topic for teachers !

A strong demand for Climate Education

… but too little implementation
(UNESCO, 2021, World Bank 2024)

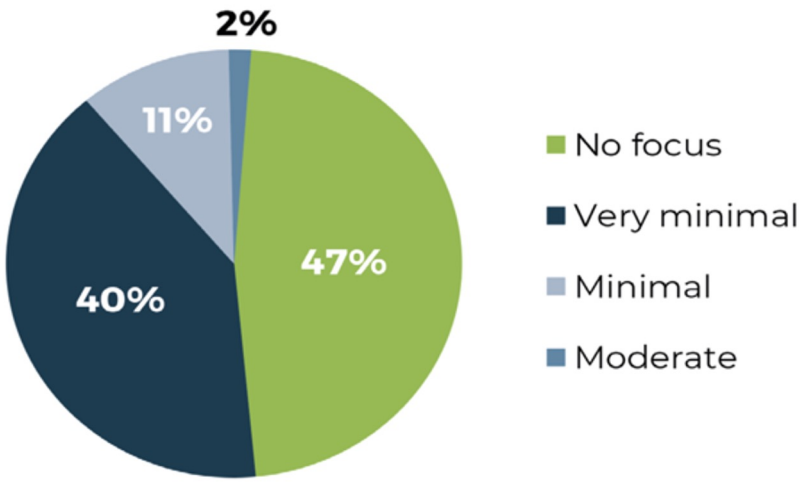
Very low or no integration of CC in curricula

95 % of teachers believe that CCE is important

Less than 30% fill able to teach it

Only 2% of schools implement CCE

Percentage of documents by extent of climate change focus



UNESCO (2021)

Consequences on students

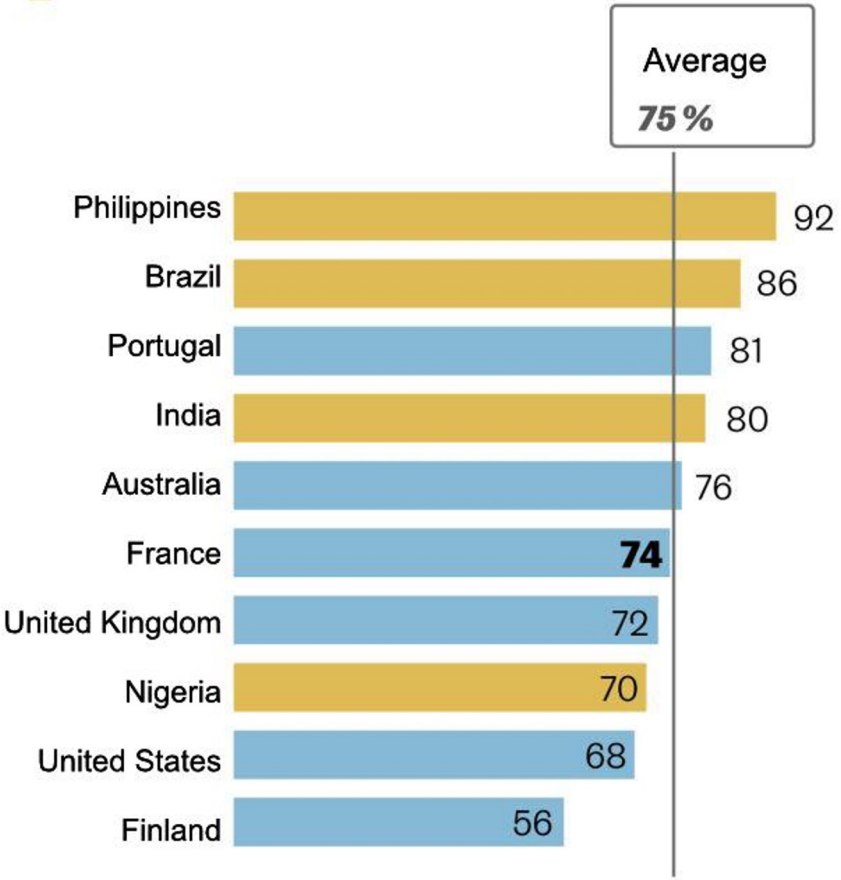
- 70% of the Youth cannot explain CC

  (UNESCO, 2022)

- 75% of teenagers and young adults suffer from eco-anxiety

  (Hickman et al. 2021)

Fraction of Youth suffering from eco-anxiety
(Hickman et al., 2021)



Climate change education works!

- CCE leads to improvement of knowledge and attitude for parents and grand parents
  (World Bank 2024, Li et al., 2022, Parth et al. 2020, Williams et al. 2017, Hu et al. 2016)

  Intergenerational learning effect for knowledge and mitigation/adaptation behavioral intentions

  This effect is stronger with girls

  Worldwide, 67 % of youth believe they have influenced their parents to make environmentally friendly choices

Education can lead to action, not only for tomorrow, but also for today

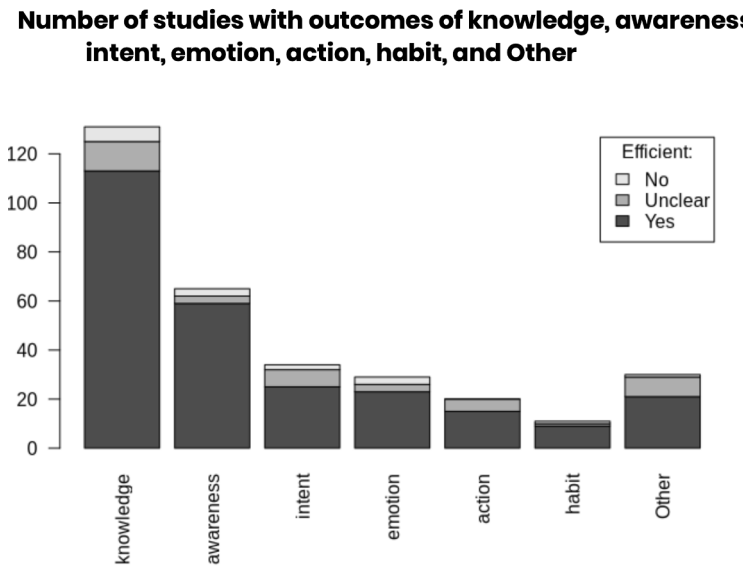

What works?

CCE must build on strong science education (active pedagogies)

- Climate science is universal
- Misconceptions about CC are similar everywhere and often perpetuated by incorrect schoolbooks
  (Bonilla et al. 2023, AFD 2023, Bhattacharya et al. 2020, Choi 2015)
- Debunking misconceptions and practicing science activities is key
- Active pedagogies are more efficient
  (Olsson et al 2022, ALLEA 2020, Murphy 2019, Karpudewan et al. 2017)
  - Inquiry-based pedagogy + explicit
  - Nature of science

How to bridge the knowledge – behaviour gap?

- Important to go beyond the "knowledge only" approach (Wang et al. 2022)
  - Creates anxiety
  - Does not lead to action
- Work on solutions and develop self-efficacy
  - Project-based pedagogy (DeWaters et al. 2014)
  - Role playing games (Meya et al. 2018)
  - Outdoor activities (Khadka et al. 2021, Barrable et al. 2021)
  - Intergenerational contact (Hu et al. 2016)



AFD (2023)

Be modest: CCE projects must remain education projects!

- Self-efficacy (DeWaters et al., 2014, Ojala, 2012)
  - Each small success reinforces the positive perception that success is possible
  - Failing to implement action will limit or annul otherwise effective interventions
- A personal experience…
- Vital role of local and personally relevant climate issues
  - reduces psychological distance
  - motivates students
  - develop of sense of responsibility
  - inspire action

How to provide teachers with effective professional development?

Effective teacher education for CCE…

ALLEA (2020), Monroe et al. (2019), Learning policy institute (2017)
+ OCE's experience

- Is content focused
- Incorporates active learning
- Supports collaboration
- Uses models of effective practice
- Provides coaching and expert support
- Offers feedback and refection
- Is of sustained duration (~ 50-80 hours)

Objectives of Climate change education

- Be a core curriculum component in every country
  (primary school, middle school, high school)
- Focus equally on knowledge, attitudes and skills
  (« head, heart and hand »)
- Develop a systemic and interdisciplinary vision
- Understanding complexity
- Develop critical thinking
- Develop ethics and empathy
- Act individually and collectively

Climate change education needs a systemic approach

Students

Agents of change (self-efficacy)

Teachers

- Lifelong professional development
- Education materials
- Field support

Scientists

- Bring expertise for resources / training
- Stick to facts (denialism, catastrophism…)

Education systems

- CCE specificities (complex, invisible, global, long-term, dis-information, critical thinking, adaptation/mitigation)
- Curriculum (systemic view, whole school approach, central role of science and active pedagogies)
- Not reinventing the wheel (GEP)
- Political leadership

Civil society

- Education systems can't do it alone (global crisis)
- Education as an investment and not as a cost
- Avoid activism
- Resources and funding
- Agility -> innovation, pilot programs

These are exciting times!

Climate change education – an exciting international landscape

Article 12 Paris agreement - 2015

- Action for Climate Empowerment
- Glasgow COP - NDC

GEP – 2022 (United Nations)

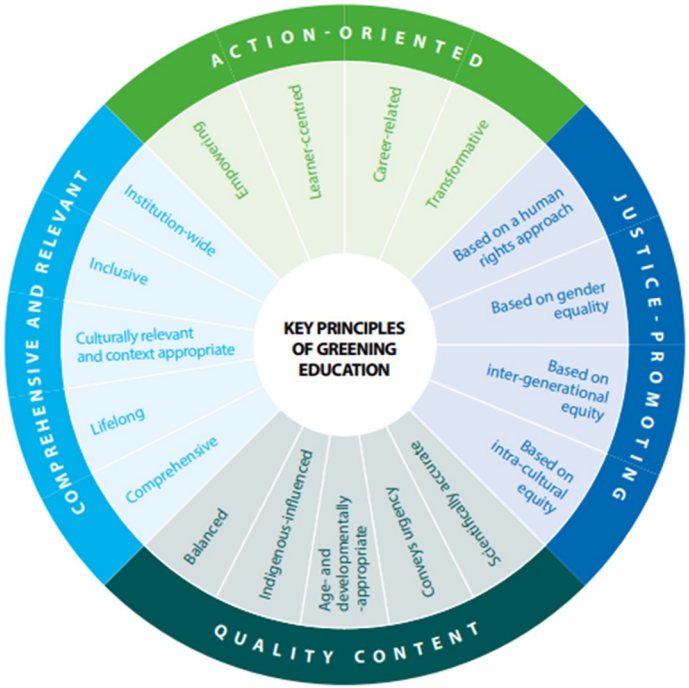
- +100 countries, 1700 stakeholders
- Networking, standards, pilot implementations
- Capacity building

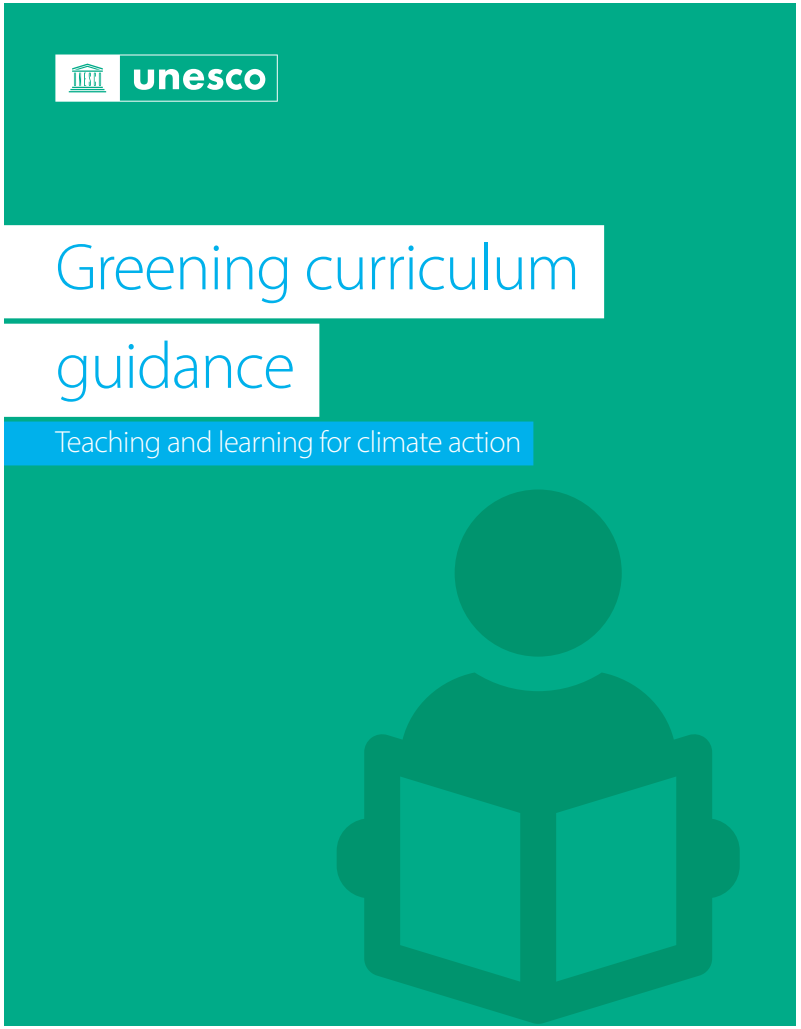
PISA – 2029 (OCDE)

- Climate literacy competences

UN's Greening Education Partnership

- Greening curriculum guidance – June 2024





Greening Curriculum Guidance. Key concepts, Topics and Learning outcomes

Six associated key concepts have been developed:

- Climate Science
- Ecosystems and Biodiversity
- Climate Justice
- Resilience-Building
- Post-Carbon Economies
- Sustainable Lifestyles

In turn, for each key concept, a set of topics has been identified, with each topic associated with specific key ideas and learning outcomes organized according to age groups (5-8 years, 9-12 years, 13-15 years, 16-18 years, and 18+ years). Attention to TVET.

Greening Education Partnership
Getting every learner climate-ready

The Office for Climate Education

What is the Office for Climate Education (OCE)?

OFFICE FOR CLIMATE EDUCATION

unesco Centre Under the auspices of UNESCO

- Created in 2018 in response to article 12 of the Paris Agreement
- Operational team of 20 persons
- Head Office in Paris – Sorbonne University
- Network of ~ 70 partners in ~ 30 countries

https://oce.global

Observing organisation of

ipcc INTERGOVERNMENTAL PANEL ON climate change WMO UNEP

Co-coordinator of

Greening Education Partnership
Getting every learner climate-ready

OCE's mission : provide capacity building for quality Climate Change Education

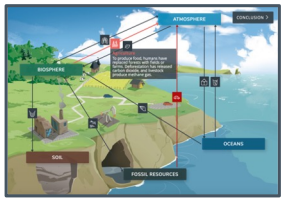
Teachers

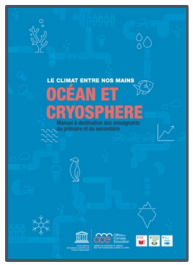
Primary and secondary schools

Developing and developed countries

Professional development

Networks of practice





Production of pedagogical resources

Support to educational systems

Capacity building, pilot projects

Support to science community

OCE's guiding principles

- Scientific foundation
- Cooperation
- Interdisciplinarity
- Accessibility and relevance
- Active pedagogies
- Long-term impact and legacy

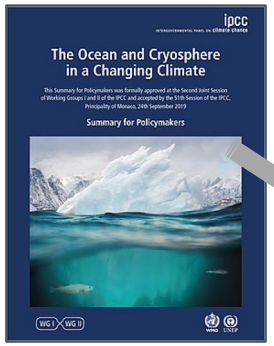
Scientific and Pedagogical Committee actively involved

OCE resources and prof. dev. freely available – open source license (UNESCO policy)

« Critical minds, hopeful hearts, able hands »

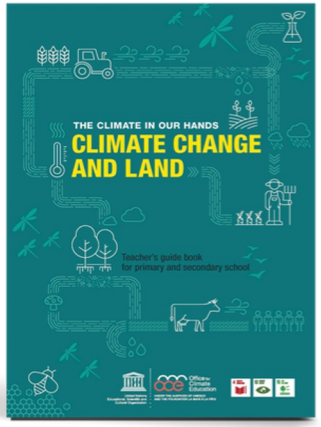
Resources for climate change education

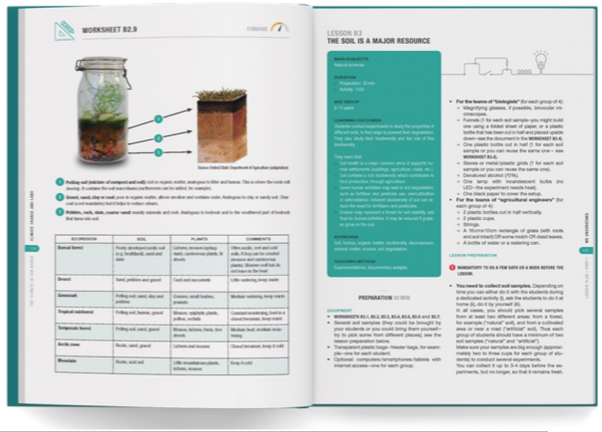
Summaries for teachers



Co-construction With IPCC TSUs

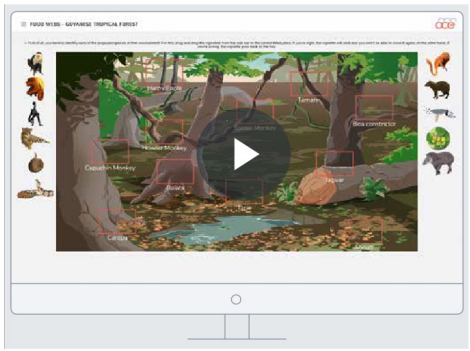
IPCC reports





Teachers' guide books

Videos & multimedia animations



Teacher training protocols

Pedagogical resources: new lesson plans 2024

- Climate negotiation (COP simulation)
  - Internationalisation of the French version of the kit published in 2023 with AFD
  - Translation into English
  - Publication pending (AFD)
- Climate modelling (ESM2025 project)
  - Published in English
  - Translation in French planned for 2025
- Permafrost (PRISMARCTYC project)
  - Published in French
  - Translation planned for 2025
- Extreme events (XAIDA project)
  - Completed, under test in classes
  - Publication on-going
  - Translations planned for 2025

Cross-cutting approach

- Climate science topics (IPCC reports)
  - Climate
  - Biodiversity
  - Ocean, cryosphere, land
  - Extreme events
  - Future resources: food, cities, energy…

- Links with SDGs
  - Health
  - Inequalities
  - Gender
  - Global citizenship

- Cross-cutting approach
  - Critical thinking
  - Eco-anxiety, new narratives
  - Creativity, arts
  - Green jobs…

Teacher professional development

- Targets
  - Teachers
  - Teacher trainers
  - Inspectors and policy makers
- Complementary training approaches
  - Hands-on workshops (2-5 days)
  - Distant workshops
  - Field accompaniment
  - Self-training : MOOC + tutorials

  -> It takes ~30 hours to train a teacher
- ~100,000 teachers and trainers trained since 2018

ALEC: Latin America – first pilot phase (2020-2024)

- **7 000 teachers and trainers trained** Mexico, Colombia
- **17 000 classes reached through tailored activities**
- **~ 30 teaching resources developed or adapted to local contexts**
- **14 alliances with local secretaries of education**
- **Extension planed for 2025 – 2027**
  - Mexico and Colombia (new regions)
  - Brazil
  - Peru
  - Equator

Impact, relevance, scale = adaptation = bridging the gap between global and local

ARRICE

African Regional Resilience Initiative on Climate Education

- The project
  - 4 years
  - Developingg CCE in 3 African countries: Kenya, Mauritius, Senegal
  - 3 M€
  - Coordinated by OCE
- Ongoing
  - Funding agreement with AFD – FFEM
  - Partnership agreements with local partners
  - Kickoff meeting July 2025

PROJECT IMPLEMENTED BY

OFFICE FOR CLIMATE EDUCATION

unesco Centre Under the auspices of UNESCO

ENDA ENERGIE

Kenya Organization for Environmental Education

MAURITIUS INSTITUTE OF EDUCATION

reef CONSERVATION

IN PARTNERSHIP WITH

FFEM

PRINCE ALBERT II OF MONACO FOUNDATION

RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

ADEME
AGENCE DE LA TRANSITION ÉCOLOGIQUE

SIEMENS | Stiftung

Key numbers (2018 – 2024)

- **100+ education resources developed**
  -> teacher handbooks, multimedia animations, video clips, serious games…
  in FR, EN, ES, GE (+ other local adaptations)

- **100,000+ teachers trained**
  50% France, 50% international
  ~30 hours of training

- **3 millions students involved** in climate change educational projects

- **70+ high level events**

- **4 Teachers'COP** (4000+ teachers involved)

- **Projects in** France, Europe, Latin America, Africa (and soon, Asia)

Climate change education: global opportunities, local challenges

- Exciting times for CCE, UN's Greening Education Partnership
- Central role of science education
- Active pedagogies (Inquiry-based, project-based, role-playing games…)
- From anxiety to agency (self-efficacy)
- Curricula, systemic view, all disciplines, school & community approach
- Teachers need
  - Quality professional development
  - Quality education materials
  - Field support
- Requires political leadership for success

Some references on quality CCE (research papers)

Baldwin et al. (2022) Knowledge and self-efficacy of youth to take action on climate change

Olsson et al. (2022) The effectiveness of education for sustainable development revisited – a longitudinal study on secondary students' action competence for sustainability

Sandhu et al. (2022) Centring indigenous worldviews in environmental education

Li et al. (2022) Effectiveness Evaluation of a Primary School-Based Intervention against Heatwaves in China

Wang et al.(2022) Fear emotion reduces reported mitigation behavior in adolescents subject to climate change education.

Hickman et al. (2021) Climate anxiety in children and young people and their beliefs about government responses to CC: a global survey

Barrable et al. (2021) Enhancing Nature Connection and Positive Affect in Children through Mindful Engagement with Natural Environments

Bhattacharya et al. (2020) Empirical research on K-16 climate education: A systematic review of the literature

Trott et al. (2020) Science Education for Sustainability: Strengthening Children's Science Engagement through Climate Change Learning and Action

Monroe et al. (2019) Identifying effective climate change education strategies: a systematic review of the research

Murphy et al (2019) A Starting Point: Provide Children with Opportunities to Engage with Scientific Inquiry and Nature of Science

Williams et al. (2017) As the climate changes: Intergenerational action-based learning in relation to flood education

Learning policy institute (2017) Effective Teacher Professional Development

Hu et al. (2016) Place-based inter-generational communication on local climate improves adolescents' perceptions and willingness to mitigate climate change

Ojala, M. (2012) Hope and climate change : The importance of hope for environmental engagement among young people

Some references on quality CCE (reports)

JustEd (2023) Advancing climate action, justice and equity goals through environmental education: Lessons for policy and practice from the JustEd study

Smithsonian Science Education Centre (2023) Educating for Sustainable Development, perspectives of U.S. and Global Educators

AFD (2023) Worldwide effects of climate change education on the cognitions, attitudes, and behaviors of schoolchildren and their entourage

UNESCO (2022) Youth demands for quality climate change education

UNESCO (2021) Getting every school climate-ready : how countries are integrating climate change issues in education

ALLEA (2020) A snapshot of climate change education initiatives in Europe

UNESCO (2019) Country progress on Climate Change Education, Training and Public Awareness