



**THE STATE OF
GLOBAL CLIMATE AND
ENVIRONMENTAL EDUCATION**





EARTH DAY NETWORK

Earth Day Network's mission is to diversify, educate and activate the environmental movement worldwide. Growing out of the first Earth Day, Earth Day Network is the world's largest recruiter to the environmental movement, working with more than 75,000 partners in nearly 192 countries to build environmental democracy. More than 1 billion people now participate in Earth Day activities each year, making it the largest civic observance in the world. We work through a combination of education, public policy, and consumer campaigns.



Connect4Climate is a global partnership program launched by the World Bank Group and the Italian Ministry of Environment, Land and Sea, together with the German Federal Ministry for Economic Cooperation and Development, that takes on climate change by supporting ambitious leadership, promoting transformative solutions and empowering collective action.

The Connect4Climate community connects about 500 partners around the world including civil society groups, media networks, international organizations, academic institutions, youth groups, and the private sector.

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INTRODUCTION

The purpose of this research project was to assess the current status of climate and environmental education in formal education systems across the world to establish benchmarks for environmental literacy. The research aimed to identify best practices for successful and long-term implementation that would lead to the ultimate goal of environmental literacy. Globally, climate and environmental education exist across the spectrum from decades of formal implementation to continued exclusion of the topic as a whole. Many countries silo the topics of the environment, climate, ecology, and natural resources solely within the science disciplines while some have started to showcase the interdisciplinary opportunities for environmental topics.

This paper will detail the definitions and foundations of the field and concept of environmental education and environmental literacy then report on the current status, challenges, and opportunities for including environmental education within the formal education system for the increase in environmental and climate literacy levels, and ultimately a more sustainable planet.

DEFINITIONS

To be consistent in terminology and background, the following section provides definitions for the vocabulary used within.

Definition of environmental education

In 1977, UNESCO and the UN Environment Program convened in Tbilisi, Georgia for the first ever intergovernmental conference on environmental education (EE) and provided its definition. The definition of EE that evolved from the meeting in Tbilisi is a learning process that increases people's knowledge and awareness about the environment and its associated challenges, develops the necessary skills and expertise to address the challenges, and fosters attitudes, motivations, and commitments to make informed decisions and take responsible actions. There have been several iterations and evolutions of the definition of EE, but nearly all include the core concepts of awareness to action through lifelong learning.

Definition of environmental literacy

The concept of environmental literacy originated over 50 years ago, around the time of the first Earth Day and the modern environmental movement. Charles Roth first used the term in a 1968 article within the Massachusetts Audubon publication (McBride et al., 2013). The article stemmed from a response that people who polluted the environment were functionally environmentally illiterate, yet there was no current definition of what an environmentally literate person looked like. Roth revisited this concept in a 1992 publication for the US Department of Education entitled, *Environmental Literacy: It's Roots, Evolution, and Directions in the 1990s*. He saw environmental literacy as not only a goal for EE

specifically, but all education generally. To be successful citizens and stewards of this planet, and to sustain a functional society and economy, natural resources need to be use wisely and efficiently and we need to protect all ecological systems to ensure clean air, clean water, and food security, our basic survival needs.

The concepts of ecological literacy (introduced in 1986) and ecoliteracy (introduced in 1997) sought to evolve the concept of environmental literacy to include sustainability concepts, the human impact on environmental systems, and complex decision making. All three concepts each have varying definitions but are constantly evolving to encompass our multifaceted relationship with the environment. And while arguments over definition will continue, all scholars will agree we need to develop a citizenry who understands our complex ecological systems, and how individual and community actions and decisions impact the health and survival of our natural resources

OVERALL EDUCATION REVIEW

The education system worldwide is vastly different in structure and implementation. Through a comprehensive literature review and research analysis of 35 countries across the world, there were some clear trends of how education systems incorporate environmental education for the goal of increasing environmental literacy in students.

Education can be: optional or mandatory; coeducational or gender specific; publicly funded or private; coordinated and facilitated at the national, regional, or state level; include faith and religious principals or be secular; and can be informational, skill focused, or vocational. There is no consistent model or success story for a perfect education system. The system must be tailored to the needs of the students, but is often complicated by many variables including funding, access, politics, religion, culture, and even environmental factors. Urban and rural disparities often make sweeping generalizations about an education system quite difficult. For example, while urban areas of large nations may offer many resources and opportunities which result in high test scores, rural areas which lack funding, high performing educators, and easy access to schools or transportation, can bring down national averages, but often have a smaller population which ultimately doesn't impact national averages too dramatically.

The countries examined for this research include those from North and South America, Eastern and Western Europe, Asia, the Middle East, and Africa. Even within the regions the education systems vary greatly. The countries with government mandated environmental education programs include, India, Brazil, Kenya, Philippines, China, Japan, Tanzania, Colombia, and Finland. This means that policy exists within at the federal level that environmental education must be formally embedded into the primary and/or secondary education system (to specify, many countries have different names for the education system levels, for the purposes of this document primary and secondary education includes students ages 6 through 18, higher education is not included). Case studies for India, Brazil, and the United States are included below that detail the opportunities and challenges of these education systems.

COUNTRY RESULTS

Many countries with environmental education formally included in their education system initially did so as a reactionary response to some type of major environmental issue including drought, severe storms, flooding, crop failure, biodiversity crash, or other major event that greatly altered quality of life. These nations implemented environmental education into their formal education systems to solve problems and prevent future environmental disasters. South Africa, influenced by the drought situation, is working to shift education priorities from students passively learning *about* the environment to actively learning *for* the environment and developing skills and action steps for students to make change.

Another major push for environmental education came from UNESCO in the early 2000s. The UN Decade of Education for Sustainable Development (ESD), which occurred from 2005 to 2014, was an opportunity for countries to focus time, money, and effort on developing educational goals to ensure a safe and healthy future for not only individual countries but the planet as a whole. Global meetings constantly stress the crucial importance of educating citizens on fundamental life skills that equate to a sustainable future for all. The Decade of ESD was designed in response to nations realizing that our environmental issues were interconnected as the impacts of global climate change became more prevalent.

ESD is another form of environmental or climate education that evolved out of the new focus of sustainability and sustainable development in the 1990s. The definition provided by UNESCO is, “ESD empowers learners to take informed decisions and responsible actions for environmental integrity, economic viability and a just society, for present and future generations, while respecting cultural diversity. It is about lifelong learning, and is an integral part of quality education. ESD is holistic and transformational education which addresses learning content and outcomes, pedagogy and the learning environment. It achieves its purpose by transforming society.” Some environmental educators saw ESD as replacing EE, some saw EE as the early stages of ESD, but ultimately, there are many shared goals, and due to broad and varying definitions, the two fields can ultimately coexist and have similar goals.

Some countries have been incorporating EE or some relative since its inception, or even earlier. China, which has had some type of environmental education included in its education system since 1973, evolved to a more formal and inclusive mandate in 2003. However, due to its large geographic range and unequal resource distribution across urban and rural areas, many areas are not successfully adhering to the mandate.

Countries with high performing students and schools have great pressure to perform well for testing standards and content. So while their knowledge of environmental principals and hard science concepts is impressive, there is little to no emphasis on synthesis, analysis, and other higher order thinking skills about complex environmental issues. Students do not tend to move very far along the spectrum from awareness to action. For example, while South Korea and Japan have high functioning

school systems, there are some criticisms about students' ability for critical and creative thinking which often goes untested in a standardized way (see Assessment and Science Literacy below).

Internationally, the creation of the UN Sustainable Development Goals (SDGs) has been an extremely beneficial resource to focus education attention on the goal of environmental literacy. Launched in 2015 and set by the UN General Assembly, the 17 global goals include a variety of environmental literacy themes such as Quality Education (#4), Clean Water and Sanitation (#6), Affordable and Clean Energy (#7), Climate Action (#13), Life Below Water (#14), and Life on Land (#15). However, countries like the United States have not used this initiative to its advantage and teachers and students are less familiar with the SDGs and how they can enhance environmental literacy.

ASSESSMENT AND SCIENCE LITERACY

There is unfortunately no international tool used to measure and assess environmental literacy. However, the development of environment and climate literacy tools is underway and there are initiatives to increase their use, validation, and consistency to make international comparisons.

In order to assess international levels of scientific literacy which includes concepts about the environment, we utilized the Program for International Student Assessment or PISA. The National Center for Education Statistics publishes a science literacy report every three years, tracking international trends in average scores of 15-year-old students on the Program for International Student Assessment (PISA) conducted by OECD. Based on the 2006 to 2015 reports (which also overlaps with the UN Decade for ESD), most raw scores have steadily increased. However, a few countries have demonstrated significant increases. Twenty of the seventy-five countries included in the INCES science literacy report have exhibited statistically significant ($p < 0.5$) shifts in literacy scores. Of these twenty countries six exhibited statistically significant increases in average science literacy scores, while the rest had scores that decreased.

There appears to be no clear correlation between countries with national policies on environmental education and an increase in science literacy over the nine-year period. Finland, which is ranked fifth in science literacy, and has a strong national environmental education curriculum has still experienced an average decrease of over thirty points from the 2006 PISA to the 2015 PISA. On the other hand, Colombia was one of the six countries that saw an increase in science literacy over the course of the nine-year study. The Columbian Ministry of Education and the Ministry of the Environment created the Interinstitutional Technical Committees of Environmental Education, which implemented national environmental policies. These policies may have had a more drastic effect in a country like Colombia that ranks sixty second in science literacy versus a country like Finland that regularly ranks among the top five.

Even within the same country there can be differences in the average PISA score. In Macau, China science literacy increased over the nine-year period of the NCES study, but in Hong Kong literacy rates

fell over the same period. Regional differences may be responsible for these disparities. In preparing the report it has become obvious how difficult it is to properly gauge the effectiveness of environmental education with limited data from international tests. National policies differ by country, and just because a country has experienced a drop in average PISA scores does not necessarily mean that their education system is a failure. Two of the three case studies below include PISA scores where available to indicate scientific literacy levels.

BARRIERS TO SUCCESSFUL EE IMPLEMENTATION

While the previous section details the many countries who have worked hard to formally embed environmental education into their curriculum over the past 20 to 30 years, the section also highlights that these programs have not been especially effective in the overall goal of developing environmentally literate students. It needs to be emphasized however, that the lack of environmental literacy is not a result of flawed environmental education. There are countless variables that are impeding the success and promotion of environmental literacy. Problems that plague the entire education systems are the root cause for the lack of environmental literacy in students.

Economics

Many countries experience economic disparities that weaken the overall education system. For example, in Argentina, wealthy parents transfer students from public to private schools where the teachers are less likely to strike. Or Tanzania, where school is free, but many students cannot afford mandatory uniforms. In Thailand, public school is also free, but a large portion of youth cannot afford the transportation fees to safely access school and busses are not provided. Even large, developed countries such as Australia include severe disparities for low-socioeconomic families, with a large proportion of those families being indigenous. Countries with struggling economies such as Nicaragua are not able to keep schools open for full days because of inability to pay teacher salaries and building operations. The economic impacts also directly correlate to lack of resources, specifically technology resources, to keep teachers and students up to date with tools, skills, and information. This is especially detrimental to topics such as climate change which constantly evolve with new scientific findings,

Government

The involvement and structure of the government can be a major barrier. Government mandates about how students learn, what they learn, and from whom they learn can decrease the likelihood or success of environmental and climate education. A major finding from the final report of the Decade for ESD highlighted the critical importance of a government structure and support for a solid education system for young students. The final report notes that there was a strong trend of governments not successfully supporting its education system or impeding its success by underpaying teachers, not providing resources for mandated programs, and not equally distributing resources across the nation.

Gender, Culture, and Society

Many developing nations are still working to overcome disparities in gender access to education. Not only are there fairly recent policies prohibiting the education of females, but lack of access to sanitary toilet facilities and running water can disproportionately impact females going through puberty. In countries such as Tanzania, their pastoral traditions make a formal education experience near impossible with few alternatives.

Though there are some success stories like Qatar. While trailing in some education benchmarks, the country actually has a higher percentage of females in STEM academic programs than males at the higher education level. This interest in STEM disciplines begins in the primary and secondary education levels and is promoted through special, targeted programs and successful role models.

CASE STUDIES

BRAZIL

Education Structure

The formal education system in Brazil is structured through policies outlined in the 1988 Constitution and the 1996 National Education Guidelines and Framework Law. The Constitution declared education to be a universal right and the Framework outlined the national standards for curriculum, evaluation, vocational opportunities, and provisions for special and indigenous education. Supervision and operation of education in Brazil is shared between multiple municipal, state, and federal agencies. The Ministry of Education operates national funding and legislation, and appoints Secretariats to oversee the components of the national educational system. The Ministry also regulates private educational institutions. Early childhood education is free but not compulsory and is managed at the municipal level. Primary and secondary education is free and compulsory and is managed at the state and district level (IEM Spotlight). According to UNESCO's 2017 reporting, there are 37.3 million students in Brazil in the compulsory school attendance age range of 4-17 years old (UNESCO).

In 2015 The Program for International Student Assessment (PISA) conducted a survey of around 540,000 students to demonstrate the status of content mastery for 15-year-olds as they approach the end of their compulsory education. This survey revealed that the average performance of students in Brazil is significantly lower than students in countries belonging to the Organization for Economic Cooperation and Development (OECD). 43% of students in Brazil are at the bottom 20% of PISA's international index of economic, social, and cultural status, and this survey showed that socio-economically disadvantaged students showed a lower performance than their comparably advantaged peers. Since the 2003 PISA, Brazil increased school enrollment of 15-year-olds by 15%, without declining overall performance. Government spending on education has also increased since 2012, but the additional expenditures have not necessarily yielded improved academic outcomes. In terms of

science education in Brazil, 8% of students are not required to attend any science lessons, and students at socio-economically disadvantaged school are more likely to not attend science classes. (PISA)



History of Environmental Education (EE)

Brazil's formal governmental operations in environmental management began with the creation of the National Secretary of the Environment in 1972. The creation of environmental organizations and collaborations between citizens and non-governmental organizations (NGOs) increased in the 1980s and 90s, leading up to the Conference of Environment and Development in 1992 in Rio de Janeiro. This meeting led to representatives from all regions establishing Brazil's National Network of Environmental Education which now organizes bi-annual forums. A series of national education policies regarding Environmental Education were passed in subsequent decades (Carvalho & Frizzo).

Brazil EE Policy Timeline (Carvalho & Frizzo)

- ⇒ *1988: The Brazilian Constitution establishes that EE in all level of education is a citizenship right and a duty of the state*
- ⇒ *1989: Establishment of the National Environmental Fund to support EE projects*
- ⇒ *1992: Establishment of the Ministry of Environment*
- ⇒ *1994: Launch of the National Environmental Education Program in line with the Treaty of Environmental Education for Sustainable Societies and Global Responsibility*
- ⇒ *1997: Establishment of the National Curricular Parameters and Guidelines with environment as one of the crosscutting themes*
- ⇒ *1999: Implementation of the National Environmental Education Policy that determines the inclusion of EE at all educational levels*

- ⇒ *2001: Launch of the Curricular Parameters in Action Program that included EE as required for all levels of education*
- ⇒ *2002: Implementation of the National Environmental Education Policy by Decree 4.281/2002 and launch of the Brazilian Agenda 21*
- ⇒ *2012: Establishment of the National Curriculum Guidelines for Environmental Education*
- ⇒ *2013: Launch of Direct Money in School Program for Sustainable Schools*
- ⇒ *2014: Implementation of the National Sustainable Schools Program*
- ⇒ *2015–2016: Development of Common National Base Curriculum*

Current EE Inclusion

While the record of EE policy in Brazil appears to demonstrate an established integration of EE into the educational system, the implementation has not rooted deeply. If implemented, the initiatives tend to be during specific time periods, or short-lived, not in accordance with the guidelines of providing EE at all educational levels. Despite the political framework produced to support national EE, the establishment of EE in schools has faced obstacles. The framework allowed EE predominantly in higher education, and the laws established at the federal level were at times unrealistic for implementation at the state and local levels. A 2005 survey conducted by the Ministry of Education sought to evaluate the status of formal EE in Brazil. The survey found that the majority of schools that demonstrated an increased utilization of EE were initiated by proactive teachers, and less so because of national curriculum standards.

Brazil's implementation of EE relates to an issue raised in other Latin American countries around the difference between EE and education for sustainability or sustainable development (ESD). The most recent Common National Base Curriculum had no specific reference to EE, but cited sustainability as an integrating theme. Environmental educators argue that EE is distinct in that it integrates history and social context of the area into the learning methodology. Awareness of this distinction and educational contexts could improve the implementation of, and integration between, ESD and EE.

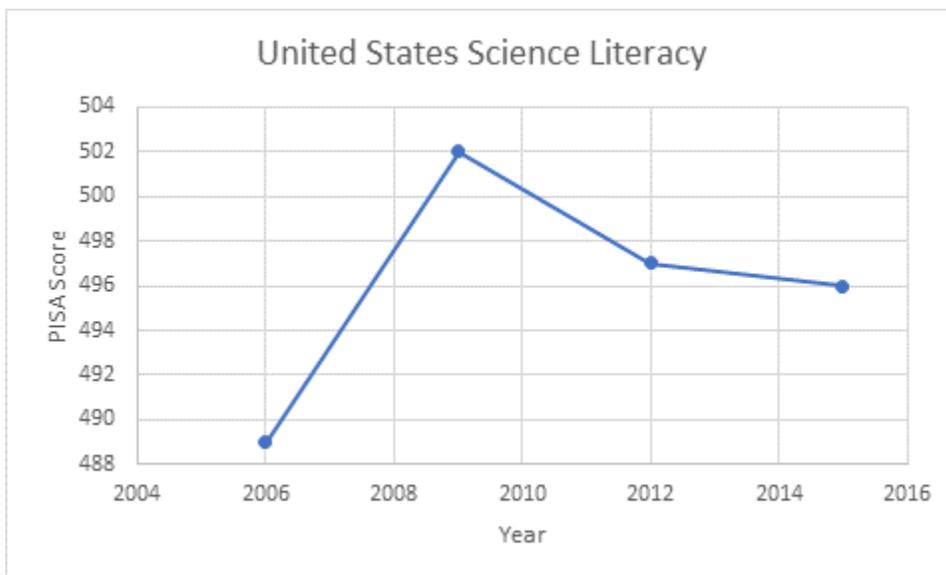
UNITED STATES

Education Structure

Regulation of the United States education system is shared between federal and state agencies. The Federal Department of Education, headed by the Secretary of Education, works to establish and enforce educational policy and collect data on the performance of US schools. The Department is also responsible for securing and protecting privacy and civil rights in the educational sphere. The management of the US education system is left primarily to each individual state, where decisions on funding, standards, compulsory education laws, etc. are made. Management is further divided into school districts within states that are run by local school boards. Public schools depend on the tax

revenue of their local communities to fund many of their programs and initiatives, resulting in cultural and local values influencing the operations of schools. This leads to a variation in program offerings across the country. While the age range of required school attendance varies by state, the average school age of students spans from five to seventeen. According to UNESCO's 2017 reporting there are 56 million K-12 students in the United States.

While the US historically outperformed many developed nations in student and school rankings, recent years has seen American students slowly drift down the list. The US PISA score increased from 2006 to 2009, but then has steadily decreased since then, though not dramatically.



History of Environmental Education (EE)

EE was formalized in the United States in 1990 with the passage of the National Environmental Education Act, which established the Office of Environmental Education within the Environmental Protection Agency (EPA). The Act recognized the significant role of environmental issues in students' lives and that the efforts to inform the public of these issues had since been insufficient. It works to address the growing need for students to develop knowledge and skills to adapt to the changing world and established policy for educational institutions to promote education on the environment and career development in environmental fields. Because the US does not have national education standards, the Act dictated that the EPA work with State agencies, NGOs, and other organizations pertaining to education to develop curricula and programs to increase awareness and understanding of environmental problems and build capacity for environmental career seeking. The Office of Environmental Education also provides grants, educator training, and resources to enhance EE in the US.

On the state level, environmental education initiatives have been spearheaded by both state government agencies and NGOs. The North American Association for Environmental Education

(NAAEE) and the National EE Foundation (NEEF) are both leaders in national and state efforts to implement formal and informal EE programs. While Earth Day Network (EDN) works on an international level, it has a long history of supporting and promoting EE in the United States. EDN was a founding partner of the US Department of Education Green Ribbon Schools program. This program recognizes schools, districts, and institutions who make great strides in greening all aspects of the education system from curriculum to facilities. EDN also formally endorses national and state policy initiatives to increase environmental and climate literacy such as Senate Bill 720 in California that passed in 2018 to enhance California Environmental Literacy and the current proposed federal legislation, the Climate Change Education Act which was introduced on Earth Day April 2019.

Current EE Inclusion

The No Child Left Inside Act was introduced in 2009 as an amendment to the No Child Left Behind Act of 2001. The bill proposed that teachers would be provided with professional development and technology that would enhance their ability to address environmental literacy. It also aimed to address healthy living and nutrition. While the act has not been passed officially to US law, it sparked the Chesapeake Bay Foundation to create the No Child Left Inside Coalition which has over 2,000 members including schools, gardens, zoos, museums, and more. These coalition members represent 50 million Americans who support the movement for schools to officially promote environmental literacy and EE.

In response to the potential of the passage of No Child Left Inside Act, states began to develop Environmental Literacy Plans (ELPs). These plans, which outlined how each state would formally embed environmental education standards and practices, would be required to be adopted by the state's Department of Education to be eligible for the federal funding. The ELP was typically coordinated through the state affiliate of NAAEE, representatives from state agencies, and other vested NGOs. While there were common frameworks, each state developed a plan that would best work within the constraints of their education system.

NAAEE surveyed representatives from all 50 states and Washington, DC to evaluate the status of Environmental Literacy Plans across the country. The 2014 State Environmental Literacy Plans Status Report demonstrates the efforts of 13 states in the US who have created formal implementation plans for environmental literacy in schools. In addition, 34 other states are in the drafting, completion, or adoption stage of establishing their Environmental Literacy Plans. They found that 61% of states' efforts were being spearheaded by the state NAAEE Affiliate, and that 74% of states' Departments of Education was supportive of these efforts. The survey also showed that support from State Departments of Education included less than 20% financial contributions. Without any formal adoption of No Child Left Inside or any other Environmental Literacy initiative, there is still no funding or support at the federal level.

INDIA

Education Structure

India's education system is divided into primary education for students ages six to fourteen years old and secondary education for students ages fourteen to eighteen years old. Primary education is divided into lower primary and upper primary levels. As mandated by the Indian Constitution, primary education is mandatory and free of cost to all children. A majority of students attend government funded public schools, though private schools do account for approximately 30% of student attendance. India has an enormous education system with approximately 434 million students in primary and secondary education (UNESCO). While China currently outranks India in total population, India has many more students than China with a much younger population.

The Department of School Education and Literacy is within the Ministry of Human Resource Development. Education Policy is created at both the state and national levels in India, with State Government Boards of Education and the Central Board of Secondary Education setting curricular standards. State Boards create standards and examinations that are locally specific and are conducted in regional languages. The Central Board of Secondary Education conducts Grade 10 and 12 board exams that are offered nationally in Hindi and English. Secondary education is geared towards the passage of the board exams that lead to earning a diploma, though many secondary schools partner with organizations to provide vocational training. India does not participate in the PISA testing, so no results are available.

History of Environmental Education (EE)

India's Constitution states that it is every citizen's fundamental duty to protect or improve the natural environment, and the government has recognized education as a tool to achieve that directive. EE is compulsory at all levels of education in India as a result of the efforts of the National Council for Education Research and Training (NCERT) in 1991. EE became mandated by the Supreme Court of India and all initiatives are overseen by the NCERT. The 1986 National Policy on Education implemented initiatives to increase environment awareness, science and technology education, and integration of traditional practices like Yoga. Protection of the environment is listed as a priority for curriculum framework development. The Policy also worked to restructure the school system with social implications of each state and emphasized the significant role that education plays in developing a more educated and career ready female population. The Ministry of Environment, Forests and Climate Change, the Ministry of Human Resource Development, and the Department of Science and Technology, and a variety of NGOs have also developed projects to support EE in India.

Current EE Inclusion

The Global Environmental Education Partnership conducted a case study of compulsory EE in India in order to assess the nation's successes and challenges. Their study found that content was often taught to be memorized and opportunities to do more impactful hands-on learning activities were not being offered. They also found that professional development and support for teachers is a key element to achieving EE goals in schools. Since the EE mandate is one of few nation-wide education requirements, the practice of implementing programs across such a vast, diverse country is underdeveloped. Utilizing resources, like textbooks, with EE concepts infused in them and adapting content to local issues can lead to better outcomes.

In 2017 Earth Day Network India facilitated 28 roundtable discussions across the nation to assess what were the challenges and opportunities in developing more environmentally literate students through the formal education system. These roundtables uncovered that teachers and students often demonstrated low enthusiasm for the content and activities and that EE was not introduced early enough in the students' school tenure. The discussions also lead to the recommendation of nature experiences to be built into the school calendar, as to combat the impacts of Nature Deficit Disorder. Another concept discussed in the roundtable was that the responsibility of developing an environmentally conscious citizenry was the onus of teachers as well as teachers and society. Improving the development of communication skills in students was said to be a strategy to allow students to disseminate what they learn to their communities.

CONCLUSIONS

There continues to be more attention on the principals and goals of environmental literacy as the climate crises become more prevalent every day. Students participating in Climate Strikes every Friday across the world demonstrate that there is a desire and a need to increase environmental education and environmental literacy in global youth. The 50th Anniversary of Earth Day in April 2020 is a monumental opportunity to refocus all schools on the goals of environmental literacy and will provide the resources to do so.

In response to the findings above, we suggest several initiatives that will help countries enhance environmental and climate change education programs for the ultimate goal of environmental and climate literacy.

1. EE needs to be included in all subjects, not just science. The environment is inherently interdisciplinary and this needs to be reflected in the curriculum. Students need to understand and see how they connect with environmental issues and how their actions have a role in the climate crisis. This cannot be taught solely within the hard science disciplines. STEM needs to be expanded to STEAM and allow students with artistic talents and understanding to use alternative learning strategies and expressions.
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2. EE needs to be scaffolded across grade and age levels. Just as the topic needs to be woven throughout the curriculum, it needs to be scattered across the grade levels. It needs to be introduced at an age-appropriate level in early childhood education and then continued to include more advanced concepts and complexity as the student gets older.
 3. There needs to be practical applications including environmental literacy graduation requirements for not only academic credits, but service hours. Students need to be able to apply what they learn in real world situations.
 4. Environmental and Climate Literacy will come from creative, critical, and systems thinking. Students need to be taught beyond the levels of rote memorization. Project-based and inquiry-based learning needs to be utilized and assessed.
 5. Teacher professional development needs to include environmental topics. All of the above suggestions will only be successful if we also provide educators the opportunities and support to alter and enhance their teaching strategies through continued education and professional development in both content and pedagogy.
 6. There needs to be top down, governmental support including funding for field-based experiences, professional development for educators, up to date environment and climate resources, and high functioning schools that are able to successfully incorporate environmental and climate education. Policies need to be adopted that not only mandate implementation but then also monitor and enforce high-quality implementation.

This research and document demonstrate the many successes that have evolved over the years to enhance global environment and climate literacy yet shines a light on the many opportunities that exist to enhance literacy levels through new initiatives. The climate crisis is at an all time high and a tipping point for action.

Further research is needed to better understand the full scope of global climate education initiatives and to implement a global climate literacy assessment similar to the PISA. A validated tool that can provide consistent results needs to be adopted to compare climate and environmental literacy rates across countries. This tool also needs to be sensitive to large-scale variations within a country.

There is much hope that national education institutions see the opportunity in how they can improve their climate and environmental literacy rates and Friday Climate Strikes demonstrate that students are eager to learn.
