Education and New Developments 2022

Volume 2

Edited by

Mafalda Carmo

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BRIEF CONTENTS

FOREWORD

This book contains the full text of papers and posters presented at the International Conference on Education and New Developments (END 2022), organized by the World Institute for Advanced Research and Science (WIARS).

Education, in our contemporary world, is a right since we are born. Every experience has a formative effect on the constitution of the human being, in the way one thinks, feels and acts. One of the most important contributions resides in what and how we learn through the improvement of educational processes, both in formal and informal settings. The International Conference seeks to provide some answers and explore the processes, actions, challenges and outcomes of learning, teaching and human development. The goal is to offer a worldwide connection between teachers, students, researchers and lecturers, from a wide range of academic fields, interested in exploring and giving their contribution in educational issues. We take pride in having been able to connect and bring together academics, scholars, practitioners and others interested in a field that is fertile in new perspectives, ideas and knowledge.

We counted on an extensive variety of contributors and presenters, which can supplement our view of the human essence and behavior, showing the impact of their different personal, academic and cultural experiences. This is, certainly, one of the reasons we have many nationalities and cultures represented, inspiring multi-disciplinary collaborative links, fomenting intellectual encounter and development.

END 2022 received 790 submissions, from more than 45 different countries, reviewed by a double-blind process. Submissions were prepared to take form of Oral Presentations, Posters, Virtual Presentations and Workshops. The conference accepted for presentation 263 submissions (33% acceptance rate), from which, 233 submissions are published in full text in these volumes.

The conference also included:
- One Keynote presentation by Prof. Dr. Alan Singer (Ph.D., Department of Teaching, Learning and Technology, Hofstra University, Hempstead, NY, USA).
- One Invited Talk by Prof. Dr. Elisa Bertolotti (Ph.D., Art & Design Department, University of Madeira; ID+ Research Unit; ITI/Larsys, Portugal) and Prof. Dr. Valentina Vezzani (Ph.D., Art & Design Department, University of Madeira; ID+ Research Unit; Paco Design Collaborative, Portugal).
We would like to express our gratitude to our invitees.

This year we also counted on the support of "Madeira Promotion Bureau", contributing to the success of the event and providing a pleasant experience to all END 2022 participants. We would like to thank the "Madeira Promotion Bureau" for welcoming END 2022 to its beautiful island.

This conference addressed different categories inside the Education area and papers are expected to fit broadly into one of the named themes and sub-themes. To develop the conference program, we have chosen four main broad-ranging categories, which also covers different interest areas:

• In **TEACHERS AND STUDENTS**: Teachers and Staff training and education; Educational quality and standards; *Curriculum* and Pedagogy; Vocational education and Counselling; Ubiquitous and lifelong learning; Training programs and professional guidance; Teaching and learning relationship; Student affairs (learning, experiences and diversity; Extra-curricular activities; Assessment and measurements in Education.

• In **PROJECTS AND TRENDS**: Pedagogic innovations; Challenges and transformations in Education; Technology in teaching and learning; Distance Education and eLearning; Global and sustainable developments for Education; New learning and teaching models; Multicultural and (inter)cultural communications; Inclusive and Special Education; Rural and indigenous Education; Educational projects.

• In **TEACHING AND LEARNING**: Critical, Thinking; Educational foundations; Research and development methodologies; Early childhood and Primary Education; Secondary Education; Higher Education; Science and technology Education; Literacy, languages and Linguistics (TESL/TEFL); Health Education; Religious Education; Sports Education.

• In **ORGANIZATIONAL ISSUES**: Educational policy and leadership; Human Resources development; Educational environment; Business, Administration, and Management in Education; Economics in Education; Institutional accreditations and rankings; International Education and Exchange programs; Equity, social justice and social change; Ethics and values; Organizational learning and change, Corporate Education.

This is the Volume 2 of the book *Education and New Developments 2022* and it contains the results of the research and developments conducted by authors who focused on what they are passionate about: to promote growth in research methods intimately related to teaching, learning and applications in Education nowadays. It includes an extensive variety of contributors and presenters, who will extend our view in exploring and giving their contribution in educational issues, by sharing with us their different personal, academic and cultural experiences.

This second volume focus in the main areas of PROJECTS AND TRENDS and ORGANIZATIONAL ISSUES.

We would like to express thanks to all the authors and participants, the members of the academic scientific committee, and of course, to our organizing and administration team for making and putting this conference together.

Hoping to continue the collaboration in the future.

Respectfully,

Mafalda Carmo
World Institute for Advanced Research and Science (WIARS), Portugal
Conference and Program Chair

Madeira, Portugal, 18 - 20 June, 2022

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KEYNOTE LECTURE

"WELCOME TO THE ANTHROPOCENE: TEACHING CLIMATE HISTORY – THERE IS NO PLANET B"

Dr. Alan Singer
Ph.D., Department of Teaching, Learning and Technology, Hofstra University, Hempstead, NY (USA)

Abstract

As climate transformation continues unabated because of human action and inaction, 2021 was a year of climate extremes. Levels of methane in the atmosphere increased by the largest amount since measurements began. The Arctic and Antarctic ices sheets and northern permafrost continued to melt and there were record wildfires across the globe. Meanwhile the burden of climate change falls hardest on the least developed economies that have the smallest carbon footprint and while scientific evidence of human caused climate change and the prospects for a catastrophic near future is overwhelming, climate denial supported by powerful financial fuel corporations stalls international action. Welcome to the Anthropocene. Climate cycles, both long and short-term are natural consequences of geological history, but there is no question that recent changes since the start of the Industrial revolution are caused by human action. A study of past climate changes provides scientific evidence to explain current transformations. It is questionable whether a globalized capitalist system or technological innovations can effectively address climate change. The debate in classrooms and the political realm should not be whether climate change is happening or how much it places human civilization at risk but over how societies and individuals must respond to stabilize climate and reverse the most damaging impacts.

Keywords: *Climate change, environment, teaching, activism.*

Humanity has a collective choice to make and it will not be an easy decision-making process because some individuals, nations, and corporations are much more powerful than others and they benefit from the current situation, or at least they think that they do. They horde short-term profit and either ignore or minimize long-term consequences. We are living in a climate emergency that threatens the decline and perhaps the collapse of civilization as we know it and humanity must decide if we will abandon fossil fuels to avoid a climate catastrophe. One reason I am delivering this paper today is to recruit you as intellectuals, educators, and activists in your home countries who can influence people and policy. This is an international struggle for the future of mankind.

Welcome to the Anthropocene, a newly named geological epoch defined by human caused climate change. According to Swedish teenage climate activist Greta Thunberg and the Intergovernmental Panel on Climate Change (IPCC), in 2019, humanity was less than 12 years away from tipping points that could produce a climate catastrophe threatening large parts of the Earth and human civilization. It is now three years later. If Ms. Thunberg and the IPCC were correct in 2019, and the most recent IPCC climate report suggests that they were, human civilization in in the midst of a climate emergency and an irreversible climate catastrophe is today less than nine years away (Thunberg 2019; IPCC 2022).

Like Greta Thunberg, I am scared, and you all should be also. I am seventy-two years old and I will most likely not live to witness the worst impacts of climate change, but my partner and I have four grandchildren and we worry about their futures and the futures of all young people. I don't want the legacy of my generation to be the destruction of human civilization.

Portugal is exceedingly vulnerable to climate change because of exposure to extreme meteorological events sweeping across the Atlantic Ocean, rising sea levels, and its proximity to the Mediterranean basin that will be susceptible to prolonged droughts and an enormous reduction in humidity. According to some climate projections, metropolitan Lisbon, currently home to 3 million people and the Portuguese capital, may be a desert by the year 2100 (TPN/Lusa 2021; Rathi 2016).

The face-to-face component of this conference is taking place in the beautiful city of Funchal, located on the Portuguese Madeira Archipelago in the Atlantic off of the coast of West Africa. According to a 2004 study, annual precipitation in Madeira, with a population of about 250,000 people, will decrease

by up to 35% by the end of the 21st century, especially on the southern coast where Funchal is located, making it hotter and drier and causing serious water stress (Santos *et al* 2004).

In addition, a Senior Scientist at IPCC Working Group III warns that people on Madeira should anticipate that rising sea levels will "promote erosion of the entire coastal region and eventually landslides" and that "increasingly longer, drier summers" may also "increase the occurrence and risk associated with forest fires" (Pereira, 2020).

Madeira is not the only Portuguese site threatened by climate change. In Portugal the peak wildfire season usually starts in early July and continues until October. Prior to the 1980s, individual fires on the Portuguese mainland never destroyed more than 10,000 hectares or 100 square kilometers, about 40 square miles. In the first two decades of the 21st century, two wildfires burned over 20,000 hectares, 200 square kilometers, about 80 square miles. In 2017, a record year for wildfires in Portugal, half a million hectares of Portuguese eucalyptus and pine forests burned, 5,000 square kilometers, about 200 square miles, killing 121 people. During the 2020 wildfire season there were almost 10,000 individual wildfires destroying about 700 square kilometer or 270 square miles of forest (Faget 2020).

Uncontrolled wildfires are occurring across the global caused by rising temperatures and shifts in rain patterns resulting from 250 years of burning fossil fuels during the Industrial Era. In 2017 and 2018 wildfires devastated areas in Portugal, Greece, California and British Columbia. In 2020, fires raged for months in Australia, Siberia, and in the Brazilian Pantanal, the world's largest tropical wetland, and California had its worst fire season in recorded history with an area larger than the state of Connecticut enveloped in flames. Six of the twenty largest wildfires in modern California history occurred in 2020. On one day in September 2020, multiple mega-fires were burning more than three million acres of forest and millions of Californians were exposed to smoke and toxic air. The U.S. Pacific Northwest burned in 2020 and again in 2021. These fires were so intense they generated tornado strength winds and caused or contributed to rolling electrical blackouts during triple-digit heat waves, dangerous chemicals entering ground water and aqua-filters, and insurance companies canceling homeownership policies (Leonard 2022).

As climate transformation continued unabated because of human action and inaction, 2021 was a year of climate extremes. The IPCC's sixth assessment report, released in March 2022, was written by over 250 scientists from almost seventy countries and spelled out how bad the approaching climate catastrophe will be. United Nations Secretary General António Guterres called it "an atlas of human suffering and a damning indictment of failed climate leadership." According to the report, climate change is happening more rapidly than expected with increasingly devastating results (Guterres 2022).

The average global temperature has increased by 2° F since the start of the 19th century Industrial Revolution with the mass burning of fossil fuels. International cooperation is required to address the climate emergency, but the world remains divided into independent, sovereign, competing nation-states that emerged in the 18th and 19th centuries and cooperation, regulation, and reduced greenhouse gas emissions remain voluntary even after international climate conferences and agreements signed at Rio in 1992, Kyoto in 1997, and Paris in 2015. While some United States Presidents have agreed to abide by the guidelines, the U.S. has never formerly endorsed them, which would require a highly unlikely two-thirds vote of the U.S. Senate (IPCC 2022).

Key findings of the IPCC report include that in 2019 alone, storms, floods and extreme weather produced 13 million climate refugees in Asia and Africa; Millions of people are at risk of hunger and malnutrition as heat and drought kill crops and trees; Mosquitoes carrying diseases like malaria and dengue are spreading into new areas including in the United States; Half the world's population faces severe water scarcity at some point during the year (Plumer and Zhong 2022).

Climate change affects different regions of the Earth differently. Warming in regions above the Arctic Circle in Siberia, Alaska, and Canada has increased twice as fast as in other areas of the planet. The temperature in the Eastern Siberia town of Verkhoyansk reached 38^0 C (100^0 F) in June 2020. It was the hottest Arctic Circle temperature ever recorded. Permafrost, permanently frozen ground in the Northern Hemisphere, contains vast amounts of carbon accumulated from dead plants and animals over the course of hundreds of thousands of years. Estimates suggest that permafrost could hold twice as much carbon as there currently is in the Earth's atmosphere. Rotten organic material is exposed as permafrost thaws. A broad thaw caused by global warming would release the stored carbon into the atmosphere as carbon dioxide (CO_2) and methane (CH_4), another greenhouse gas. The release would trigger even greater planetary warming and more thawing. To understand the process, leave frozen chicken on the kitchen counter. You will soon have a puddle of water and eventually the chicken will start to smell as it decomposes. Warming leads to more warming until there is a tipping point with rapid and irreversible change. Ice sheets melt, ocean currents shift, coastal regions flood, the oceans release dissolved greenhouse gases, and civilization as we know it ends (Schädel 2020; BBC 2020).

Another region where climate change will have dire consequences is the Amazon Rainforest in equatorial South America. The Amazon River is almost 4,000 miles long and runs roughly along the equator eastward from the Andes Mountains to the Atlantic Ocean. Its immense tropical rainforest, containing about

half of the Earth's remaining rainforests, is 2.6 million square miles in size with 1.4 billion acres of dense forest and covers approximately 40% of the land area of South America. The rainforest extends into seven countries, Brazil, Bolivia, Peru, Ecuador, Colombia, Venezuela, Guyana, Suriname, and one European colony, French Guiana, although most of its acreage is in Brazil. Brazil is the fifth-largest country in the world, it's the seventh most populous, and it has the eighth-largest economy. Sixty-two percent of the country is forested and less than 10% is considered arable. Brazil's carbon footprint ranks the country thirteenth in the world for contributing CO_2 to the atmosphere, China, the United States, and India rank 1, 2, and 3. Economic expansion by Brazil continually puts it at loggerheads with global environmental concerns because it would come at the expense of the rainforest, which has been described as the "lungs of the planet" (Rice 2019; WWF; CIA; De Bolle 2019).

Because of its size and location, the Amazon Rainforest is home to about 25% of the Earth's biodiversity and plays important roles in several of the planet's natural cycles that influence climate. Its plants and trees annually absorb 2 billion tons of carbon dioxide, approximately 5% of CO_2 emissions. Nearly 100 billion tons of carbon is stored in the Amazon's trees, which equates to almost 400 billion tons of carbon dioxide that is kept out of the atmosphere.

The Amazon is gradually losing its ability to recover from droughts and land-use changes and scientists worry it is approaching a tipping point where it will be replaced by grassland. It has already shifted from a CO_2 sponge to a CO_2 emitter. Eventually an additional 90 billion tons of heat-trapping carbon dioxide would be emitted into the atmosphere. As water evaporates from the tropical rainforest, the Amazon Rainforest also acts as a giant cooling system moderating temperatures and providing rainfall in South America and sub-Sahara Africa (Rice, 2019). As the Amazon Rainforest is defoliated, much of the Earth's Southern Hemisphere will be dramatically impacted (Fountain 2022, A5; NOAA 2021).

In Southwest Asia, a major global conflict region, temperature is increasing at nearly twice the rate of the world overall and temperatures are rising at a faster rate. By 2100, average temperatures there are expected to increase by up to 4º C degrees, exacerbating water shortages, creating enormous health risks for the area's people, and further undermining regional stability (Haas and Drukman 2021).

Meanwhile nations and corporations act as if there was an unlimited amount of time to adjust. None the world's leading economies, I repeat none, including the entire G20, is meeting carbon reduction commitments they made in the 2015 Paris climate agreement.

This is after climate pledges by Russia, Iran and Saudi Arabia were deemed "critically insufficient," pledges by Australia, Brazil, Canada, China and India "highly insufficient," and pledges by the United States, the European Union, Germany and Japan were ranked "insufficient." The only country to meet its target for carbon reduction was the African nation of Gambia, which already had an infinitesimally small carbon footprint. At the same time, according to the United States National Oceanic and Atmospheric Administration, in 2021 levels of methane gas in the atmosphere increased by the largest amount since measurements began. While there is less methane in the atmosphere than there is carbon dioxide, as a green house gas methane has a greater impact on global warming (Milman 2021; Zhong 2022).

Major companies continue to be guilty of practices that will decimate the human environment. Microsoft claims to be committed to a "carbon negative" future, but between June 2020 and June 2021, its carbon emissions rose by over 20% because of the construction and operation of new data centers and the manufacture and use of its electronic devices. The semiconductor industry is also highly energy intensive, a typical factory has a carbon footprint equivalent to a small city. While all-electric cars emit far fewer greenhouse gases than either gas-fueled or hybrid cars, they still leave a carbon footprint. Because they draw from the local power grid, if electricity is generated by coal-fueled plants, they could even have a greater carbon foot print than a hybrid car. Bitcoin is the cryptocurrency that hopes to pioneer a cashless and possibly greener financial future. The problem is that the greenhouse gas emitted while generating the electricity needed to power Bitcoin computers is greater than the amount produced by New Zealand or Argentina. A Bitcoin transaction has a carbon footprint equivalent to over 700,000 credit card purchases (Ewing and Boudette, 2021, A1; Zafar, 2019; China Water Risk, 2013; Tabuchi and Plumer, 2021, B5; Sorkin, 2021: B1; Eavis 2022, B3; SCOTUS Blog 2022).

Friday, April 22, 2022 was Earth Day. As the impending climate catastrophe draws closer, Earth Day in the United States has gone mainstream, becoming a feel-good holiday stripped of serious messages, much like Mother's day. The White House issued a Presidential proclamation declaring "For the future of our planet, for our health, and for our children and grandchildren, we must act now. Let us stand united in this effort to save our planet and, in the process, strengthen our economy and grow more connected to each other and the world we share." The U.S. Commerce Department Office of Sustainable Energy and Environmental Programs posted Happy Earth Day greetings on its website and its newsletter included photographs from its 2022 Earth Day Photo Challenge (White House 2022; U.S. Department of Commerce 2022).

In recent years, corporate America jumped on the Earth Day bandwagon in embarrassingly small ways. Schick introduced a new sustainable razor for people experiencing "Greentimidation." SodaStream

started a campaign to save a million baby sea turtles. Uber riders in Miami, Los Angeles and Washington can win free, nature-inspired rides. The Wrangler Westward 626 Earth Day jeans are made from organic cotton and feature eco-friendly finishes. BMW North America ran an ad featuring an all-electric car. Samsonite recycled used luggage as coasters (Napolitano 2022; Houston 2022).

Disney has an annual Earth Day celebration at its Animal Kingdom theme park outside Orlando, Florida to "honor the magic of nature through family-friendly experiences and specialty offerings." The Earth Day specialty items Disney was selling included "water bottles, tumblers, reusable bags, and a limited-edition trading pin featuring Te Fiti from *Moana* and a cuddly plush inspired by the species that call Disney's Animal Kingdom theme park home" (Disney 2022).

From the banal to outrageous, in 2019 the petro-company Koch Industries posted a video for Earth Day on its Facebook page celebrating the fossil fuel company's "pollution prevention practices" with the line "You love the Earth. So do we." In 2021, ExxonMobil, one of the all-time leading polluters and a spreader of climate denial misinformation for decades, released a video celebrating its eco-friendliness with claims that its employees are "work[ing] tirelessly to reduce emissions and move towards a low-carbon future" (Taft 2022).

Climate denial plays on a general public misconception of what is meant by a scientific fact. In colloquial language, a "fact" must be 100% true and unchanging, something that basically never happens. For scientists, a fact is something that is overwhelmingly supported by the evidence that we have available, but scientists are always willing to change what they consider to be facts if new evidence appears. For scientists, human induced climate change is a fact. For climate deniers, unless there is 100% certainty, they dismiss the fact of human induced climate change and the impending climate catastrophe as mere opinion and as an excuse not to take immediate action (Singer 2022).

Even if the world's nations and corporations finally make deep cuts in greenhouse gas emissions, the risk of extreme wildfires will continue to increase. Scientists project a 14% increase in extreme wildfires by 2030, 30% by 2050, and 50% by 2100. These fires, once rare, are burning longer, hotter, and more intensely, making firefighting and fire control virtually impossible. By 2100, we will witness extreme wildfires in Arctic tundra as plant material now trapped in permafrost melts and dries. Previously wet regions like tropical rainforests in Indonesia and the Amazon will be at greater risk (UNEP 2022).

One of the reasons that the world's dominant economic powers have treated climate change so cavalierly is that the burden of climate change falls hardest on the least developed economies and people living in countries with the smallest carbon footprint. They are not responsible for global warming, but suffer its worst consequences. The average American produces about 17.6 tons of carbon dioxide a year, almost ten times the carbon footprint of the average person living in India, although India ranks right behind the United States as the world's third largest CO2 emitter. Globally, the average CO2 emission per person is 4.79 tons. In Vietnam the per capita CO2 footprint is 2.2, the Philippines 1.22, Yemen .94, Sri Lanka .88, Pakistan .87, Bangladesh .47, Nigeria .44, Kenya and Sudan .33, Mozambique .21, Tanzania .18, Madagascar .12, Chad .11, and Mali .09. Vietnam, the Philippines, Sri Lanka, Bangladesh, Nigeria, Madagascar, and Mozambique each face serve coastal flooding. Yemen, Pakistan, Kenya, Sudan, Tanzania, Chad, and Mali record temperatures and desertification (Dennis, Mooney, and Kaplan, 2020; Worldometer).

Lagos, one of the fastest growing cities in the world where the population is expected to reach 25 million by 2050, is at "extreme" risk. The city is located on the Gulf of Guinea and as sea levels rise there will be coastal erosion and potable drinking water will be contaminated by seawater. Haiti will also be impacted by rising sea levels and the salinification of water needed for agriculture. Haiti is also especially vulnerable to hurricanes that will grow in intensity as the oceans warm (Princewill 2021; Climatelinks).

Manila in the Philippines is another densely populated coastal city that is already susceptible to flooding and has ineffective drainage and sanitation systems. Virtually the entire Philippines archipelago is at risk of flooding and salinification. Small island nations like Kiribati, Vanuatu and Tuvalu located in the Pacific Ocean and the Maldives and the Solomon Islands in the Indian Ocean are in danger of completely disappearing as sea levels rise (Amnesty International UK; Thomas 2020).

As temperatures heat and water dries up, wars have ripped apart countries in the Sahel region of Africa and in Yemen on the Arabian Peninsula as desertification has increased competition for already limited water supplies. These include the Darfur conflict where water scarcity pitted herders against farmers after rainfall was between 30-75% below expected levels. Fighting in Mali, Burkina Faso, Niger, Nigeria, Ethiopia, and Somalia where droughts displace millions of people is often attributed religious differences, but the clashes are often rooted in underlying climate changes that pit people against each other in competition for diminishing resources. Of 20 countries located in the Sahel region, at least 12 have been plagued by ongoing warfare (Law 2019; Mulhern 2020).

Extreme heat also affects the poorest and most vulnerable populations in the United States, especially older Americans. A study published in March 2020 estimated that between 2010 and 2020 as many as 12,000 people died each year from heat-related ailments, 80% of who were older than age 60. In

Houston, Texas, where the average temperature rose by more than 3.5^0 F between 1970 and 2020, sweat "pools" in the boots of Mexican-American day-laborers working outdoors in the hot and humid summer heat and many suffer from heat exhaustion. Because of what is known as the "urban heat island" phenomenon, Brownsville, Brooklyn, one of the poorest neighborhoods in New York City, has average daytime temperatures about 2^0 F higher than the city average because there are few parks and trees and asphalt pavement absorbs and hold onto the heat (Shindell *et al* 2020; Mohajerani, Bakaric, and Jeffrey-Bailey 2017; Senguata 2020).

The world is already seeing climate vast migration within and between countries. Almost 8 million people from Southeast Asia have already trekked to the Middle East, Europe, and North America. Millions of Africans have abandoned Sahel farmland d and migrated to coastal areas. Semiarid regions of Guatemala in Central America will grow more desert like as annual rainfall there declines by as much as 60% and the push north into the United States, El Norte, will grow larger and larger. It is estimated that by 2070, about 20% of the currently inhabitable regions of the Earth will no longer being habitable, impacting billions of people. Parts of China and India will become so hot that people will die just by going outside. As climate migration increases more affluent countries, facing their own climate issues, will erect higher barriers to keep out the desperate, denying entry because climate migrants are not considered refugees under current international law (Lustgarten 2020).

Climate cycles, both long and short-term are natural consequences of geological history, but there is no question that changes since the start of the Capitalist Industrial Revolution in the 18th century are caused by human action and unregulated economic activity. Capitalists argue that when market conditions are right, new technologies will emerge to slow or ever turn back climate change, allowing human civilization time to adjust. However, it is questionable whether a globalized capitalist system with competing nation-states and corporations or technological innovations can effectively address climate change (Singer 2022).

I am most familiar with politics in the United States where a bill proposed by President Joseph Biden to cut U.S. greenhouse gas emissions to half of 2005 levels by 2030 was blocked in the U.S. Senate by Republicans who were joined by Democrat Joe Manchin (W.Va.) whose family business invests in power plants that use "dirty" coal, coal that is highly polluting because it contains large amounts of impurities. Meanwhile, the rise in gas prices because of the Russian invasion of Ukraine led to calls for greater fossil fuel production, further jeopardizing the environment, and in April 2022, the U.S. Interior Department announced it would sell the rights for additional oil and gas drilling on public land (Silverman 2022; Davenport 2022).

Something I find even more threatening to the future of the environment and the Earth, the United States Supreme Court, which has a rightwing anti-regulatory anti-science majority, is considering a case, *West Virginia v. Environmental Protection Agency*, that will decide whether the national or federal Environmental Protection Agency even has the legal authority to regulate greenhouse gas emissions and limit the climate impact of coal companies (Joselow 2022).

But increased fossil fuel production and a shift to highly polluted fuel sources did not just happen in the United States. As China's economy slumped from the double-whammy of COVID-19 restrictions and oil and natural gas delivery interruptions following the Russian invasion of Ukraine, it increased the use of coal in its electrical power plants and importing of coal, including from Russia, despite international calls for a boycott. Prior to these decisions, China already was responsible for the largest increase in carbon dioxide emissions in 2021 (Sengupta 2022).

The debate in classrooms and the political realm should not be whether climate change is happening or how much it places human civilization at risk but over how societies and individuals must respond to stabilize climate and reverse the most damaging impacts and it cannot be limited to just academic discussion. In the United States, teachers are expected to promote responsible civic action as part of preparation for life in a democratic society. I suspect there are similar curriculum expectations in most if the economically developed liberal world and I would like to hear from you about what is permitted in your countries (NCSS 2013).

The alternative to climate action in the classrooms and in the streets is the iconic scene in the last frame of the 1968 movie *Planet of the Apes* where the character played by Charlton Heston breaks down after realizing that the planet they have landed on, a planet where human civilization has perished, is the Earth.

In 1967, Reverend Martin Luther King, Jr. posed the question "where do we go from here?" to American civil rights activists. We need to ask and answer they question about today's climate emergency (King 1967). Our first job as teachers and academics is to LEARN and where possible to conduct research. Our second job is to TEACH about the climate emergency to help spur activism. We have a responsibility to PROPOSE climate solutions and to LOBBY for new laws. But we already know there are powerful forces aligned against us so we must be willing to join PROTESTS our selves and through our actions

REFUSE to be complicit with those who are destroying human civilization, always remembering there is NO planet B.

If you would like to read more about the Anthropocene, the climate emergency, and the science behind the impending climate catastrophe, consider my recent book, *Teaching Climate History: There is NO Planet B* by Routledge Press. I am not going to focus on the Greenhouse Gas effect and the science of climate change during this presentation, but I will if you ask follow-up questions (Singer 2022).

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Biography

Dr. Alan Singer, Ph.D., is a social studies educator and historian in the Department of Teaching, Learning and Technology at Hofstra University, Long Island, New York. He is a former New York City high school teacher and regularly blogs on *Daily Kos* and other sites on educational and political issues. Dr. Singer is a graduate of the City College of New York and earned a Ph.D. in American history from Rutgers University. His most recent book is *Teaching Climate History: There is NO Planet B* (Routledge, 2022). In the book he traces the Earth’s climate history looking at natural cycles and transitions to explain the science behind impact of human caused climate change during the Industrial Era and the threat of an impending climate catastrophe. Dr. Singer is also the author of is the author of *Education Flashpoints* (Routledge, 2014), *Teaching to Learn, Learning to Teach: A Handbook for Secondary School Teachers, 2nd edition* (Routledge, 2013), *Social Studies for Secondary Schools, 4th Edition* (Routledge, 2014), *Teaching Global History, 2nd Edition* (Routledge, 2020), *New York and Slavery, Time to Teach the Truth* (SUNY, 2008), and *New York’s Grand Emancipation Jubilee* (SUNY, 2018). He is the co-author of *Supporting Civics Education with Student Activism* (Routledge, 2021).

INVITED TALK

LEARNING BY WALKING. EDUCATIONAL EXPERIENCES IN THE OUTDOORS TO DEVELOP A (DESIGN FOR) SUSTAINABILITY MINDSET

Dr. Elisa Bertolotti[1], & Dr. Valentina Vezzani[2]
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Abstract

The island of Madeira is attracting an increasing number of tourists from all over the world who are drawn to it by the lush diversity of its natural subtropical landscapes and ecosystems. With the local economy focusing most of its investments on the tourism sector, the island's biodiversity is already being endangered due to the increasing pressure on the balance between the cohabitation of humans and other living species (Bertolotti & Vezzani, 2021). Islands like Madeira are vulnerable territories and, as such, require the application of new methods and tools to help them transition towards regenerative and distributive systems that would make local economic growth more sustainable and ethically just towards nature, communities and ecosystems.

This talk will share some of the learning experiences we have been developing since 2018 through several international design research actions on the island, and in our teaching at the BA in Design at the University of Madeira. These include a series of exercises structured to train the designer's ability to change perspective with a post-anthropocentric sensitivity (Braidotti, 2016; Puig Della Bellacasa, 2017; Escobar, 2018; Fuad-Luke, 2022). Living and working on a peripheral and island territory allows us to observe and reflect on the challenge of sustainability and sustainable development from an unique angle. From an island perspective it is easier to think about boundaries, and therefore to visualise the aspects of circularity, interrelation and interdependence (Borgnino, 2022). In the context of design education for sustainability we consider it to be fundamental to reflect on the complexity of interrelations that exist among different natural elements and ecosystems. For this reason, our methods are based on the idea of learning outdoors in contact with nature, and bringing together people from different disciplinary backgrounds to develop, through the action of walking, a shared consciousness about challenges to a specific landscape and its communities (human, plant and animal). Finally, the talk is an opportunity to reflect with the audience on some of the challenges we encounter as (design) educators trying to switch towards a more bio-inclusive approach that would allow future generations to contemplate and build a more sustainable and just world.

Biography

Elisa Bertolotti works with storytelling, the moving image, and communication design. With a PhD and postdoc from Politecnico di Milano, she is currently teaching at the University of Madeira, Portugal. She considers that listening, poetry, having fun and collaborative making, play a central role in her work. At this time, Elisa is experimenting with ways of changing points of view in design in a post anthropocentric perspective, through forms of collaboration with different disciplinary fields, and using walking and movement outdoors as ways of learning.

Valentina Vezzani has got a PhD in Design, and a MSc in Service Design. She is Assistant Professor in Design at University of Madeira and co-founder of Paco Design Collaborative. Her research and teaching interests are in the field of strategic design, service design, sustainable development, social innovation. She believes in collaboration and participation as fundamental tools to solve today's problems, and design as a creative approach to build communication bridges.

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