

A photograph of two young students, a girl and a boy, both wearing red school uniforms. They are focused on a small, rectangular solar panel held by the girl. The boy is holding a small electronic component, possibly a resistor, and they appear to be connecting it to the solar panel. They are outdoors, with a stone wall and a building with a blue balcony in the background. Other students in red uniforms are visible in the background, suggesting a school setting.

**SIEMENS** | Stiftung

## Climate Change Education in Latin America

Siemens Stiftung and its partner institutions are committed to ensuring that climate change becomes part of science and technology education

[www.siemens-stiftung.org](http://www.siemens-stiftung.org)





A landscape in  
Tierra del Fuego at  
the southern tip of  
South America.





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# Editorial

## A strong partner network promoting innovative climate change education in science and technology education

By Dr. Nina Smidt



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**Dr. Nina Smidt is the Managing Director and spokesperson of the Siemens Stiftung Board of Directors. Her primary responsibilities on the Board of Directors are concerned with the foundation's work in the areas of education and culture.**

Together with its partners, Siemens Stiftung promotes sustainable social development around the globe. In Latin America, as in Germany and Africa, our emphasis is on educational projects focusing on STEM subjects. This acronym, which stands for Science, Technology, Engineering and Mathematics, has now become standard in the international education debate and is at the core of our work on several continents.

A sound basic education in the fields of science and mathematics geared to acquiring digital skills opens up children's minds to deal with complex interdependencies.

In adult life, knowledge of these subjects correlates with active engagement in local and global issues and a willingness to take

responsibility for social processes. STEM skills are, therefore, a vital element in a holistic education that promotes cooperation, communication and creativity.

### **Climate change amplifies political crises and issues concerning society as a whole**

It is becoming increasingly clear that the gulf between rich and poor will widen even further in the coming decades, which will see many millions of people slip below the poverty line. One of the greatest challenges facing us, including in South America, is climate change, which is progressing much faster than previously thought. The 1.5°C threshold will likely be exceeded within the coming decade – with vast and incalculable implications. Droughts, flooding and other consequences of climate change will force many people to abandon their homelands. Migration flows will increase, particularly from rural to urban areas, but also far across national boundaries. The risks of social upheaval are tremendous. While scientific and technical knowledge can help people to develop a capacity to adapt to the shifting natural circumstances around them, the issues at hand have far greater and wide-reaching impact. Societies as a whole must evolve in order to better comprehend the problems associated with climate change and find ways to reduce their vulnerability, become more resilient, and practice solidarity with those who are most severely impacted.

The worlds of politics, business and civil society must converge and cooperate. A systemic approach is called for that can only be achieved through education.

### **Climate change education as a sustainable climate adaptation strategy**

Siemens Stiftung has been active in Latin America for a decade. Given the extreme urgency of climate change issues, we have joined forces with our Latin American partners in order to develop concepts and materials for climate change education and, by working together, anchor the topic in regional and location-specific. In addition to coordinating a growing network of partner institutions across eight Latin American countries, our regional office in Chile is also working to launch and merge project lines in STEM subjects with a particular focus on sustainable development. In future, we will also cooperate even more closely with UNESCO's Latin American office in every area of our activities. Our collaboration with UNESCO is a source of great pride for Siemens Stiftung. Developing teaching content for climate change education is a particularly complex area of STEM education. Hardly any other topic requires such an extensively interconnected and networked knowledge of science, mathematics and technology. At the same time, political institutions and social groups at all levels of society need to be made aware of the entire spectrum of climate change issues. We need to investigate and explain the interactions between the manifold impacts of climate change and work towards structuring and organizing social resilience as an act of solidarity with those who are most severely impacted by climate change. Consequently, climate change education must inevitably be multidisciplinary. It is not only a climate protection strategy, but also a strategy promoting sustainable climate adaptation across entire social systems.

### **Solution-oriented teaching for a climate-conscious lifestyle**

The Potsdam Institute for Climate Impact Research (PIK) has identified six social tipping interventions (STIs)<sup>1</sup> that will enable us to

turn the tide of climate change, one of which is "strengthening climate education and engagement with climate issues". As the study goes on to state, "sustainability cannot be imposed, it has to be learned." Consequently, the authors advocate integrating an environmentally aware and climate-conscious lifestyle much more deeply in school education than is currently the case. High-quality education, the researchers emphasize, promotes standards and values and can achieve rapid changes in how individuals behave and interact with their surroundings. Developing this high-quality education is precisely our mission at Siemens Stiftung. Beyond their topical relevance, the materials developed in our

**"Climate change education is always multidisciplinary. It is not only a climate protection strategy, but also a strategy promoting sustainable climate adaptation across entire social systems."**

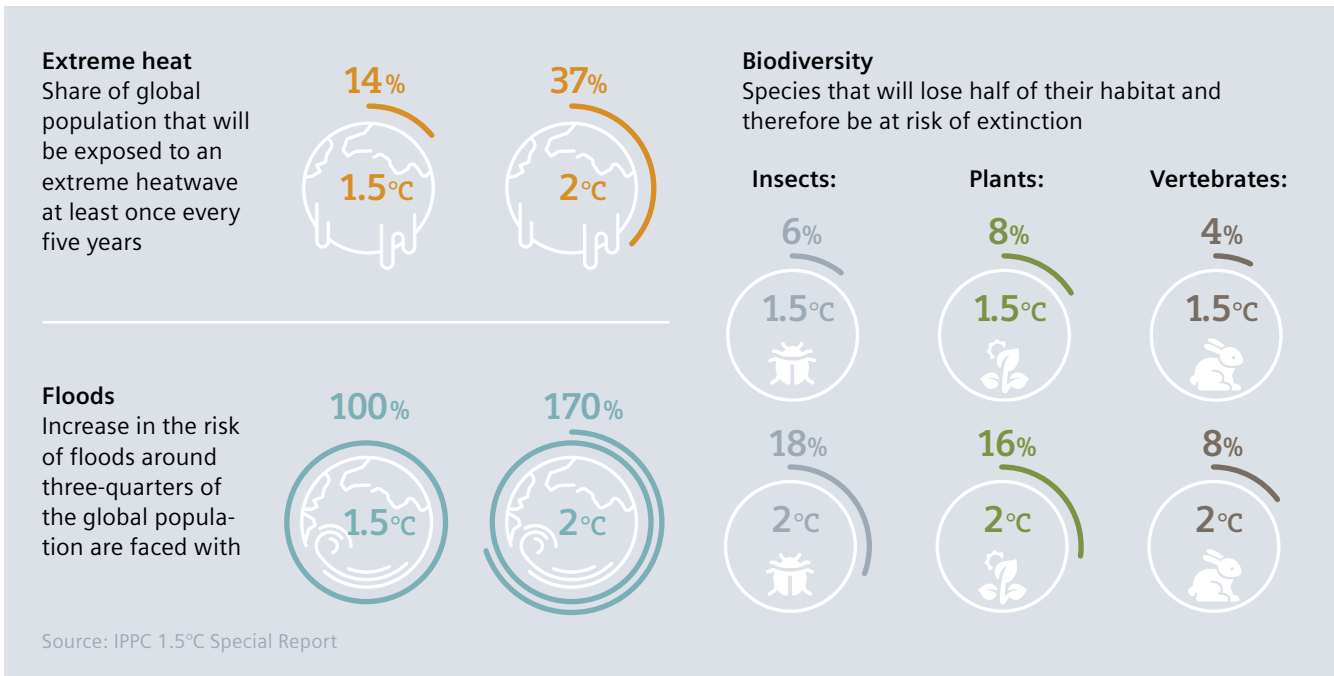
partner network also feature innovative teaching methods. In providing further training for teachers, we place an emphasis on encouraging children and young people to experiment and discuss ideas; taking children out of the classroom and guiding them through their environment facilitates active learning based on their own context. Our goal is to promote project-based, solution-oriented learning, which we perceive as the only way to empower young people to master the climate crisis.

<sup>1</sup>Social tipping dynamics for stabilizing Earth's climate by 2050. Otto, I.M., Donges, J.F., Cremades, R., Bhowmik, A., Hewitt, R.J. et.al. In: Proceedings of the National Academy of Sciences, January 2020

# The context

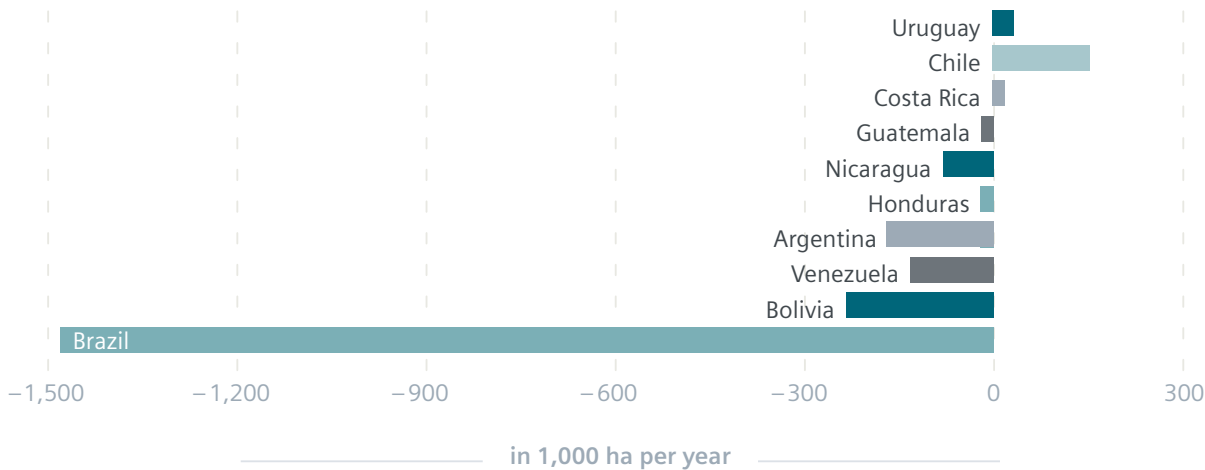
## The impact of an extra half a degree

The more the Earth heats up, the more severe the effects on humans and nature will be. The extra half a degree from +1.5°C to +2°C makes a significant difference.



## Changes to forest land in Latin America

The forests of Latin America are among the largest carbon stores on Earth and play an essential role in climate regulation. Although some countries in the region are planting forests, total forest land is decreasing considerably overall.



Source: Food and Agriculture Organization of the United Nations, Global Forest Resources Assessment 2020, main report.

## Educational opportunities

The United Nations is pursuing 17 Sustainable Development Goals (SDGs) that member countries aim to achieve together by 2030. “Inclusive and equitable quality education” is SDG 4.

## Educational focus

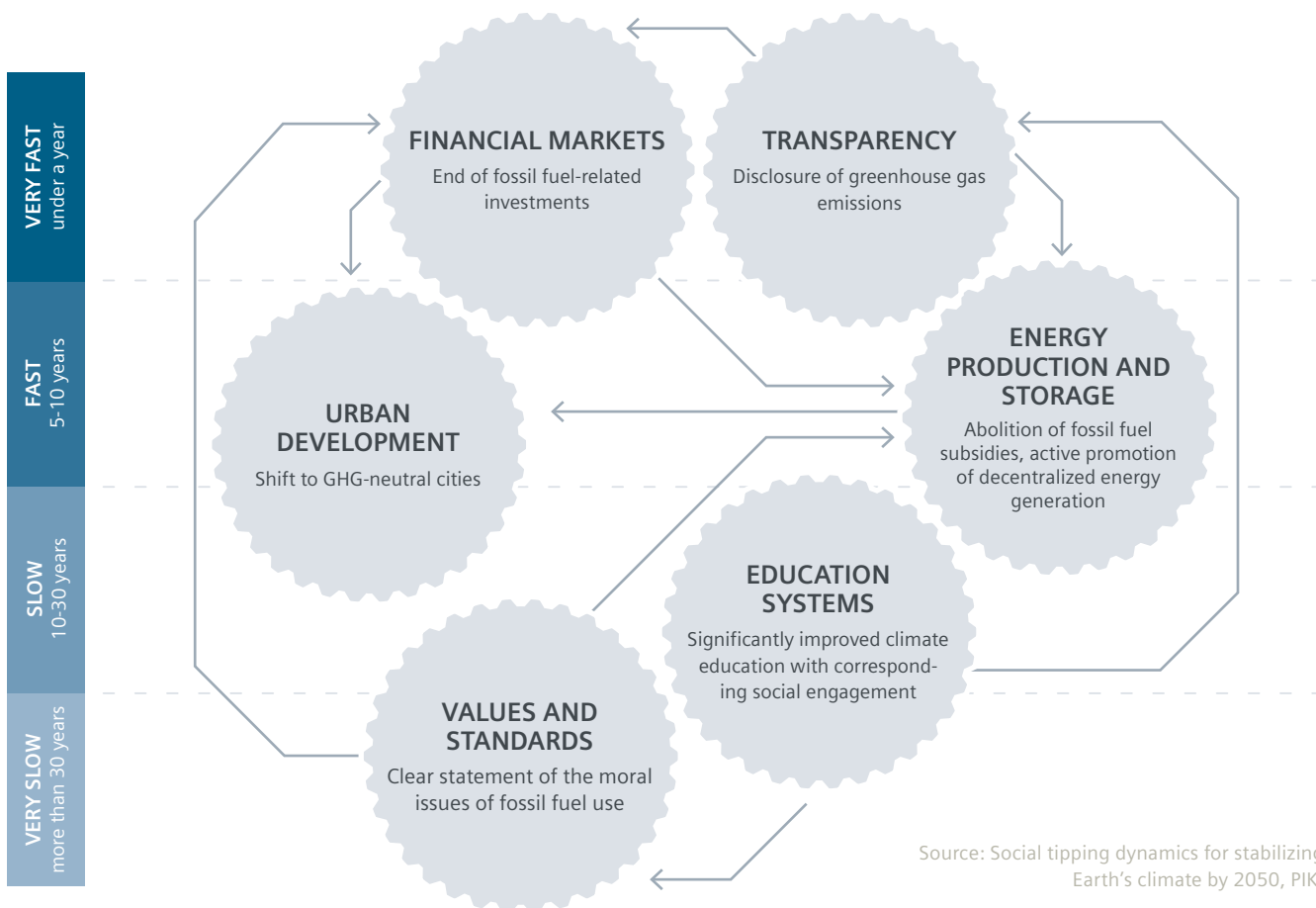
In 2017, 52 percent of UNESCO member states had placed a focus on “education to contain the consequences of climate change and climate protection”.

Source: Global Education Monitoring Report



## Climate education curbs climate change

Greenhouse gas emissions must be reduced to zero by 2050 at the latest in order to halt global warming. This goal will only be achievable if we radically change our lifestyles and economies. An interdisciplinary team at the Potsdam Institute for Climate Impact Research (PIK) has examined which “tipping mechanisms” could engender the necessary changes and identified education as one of a total of six levers. The team of researchers is working on the assumption that climate education, combined with social engagement, has significant potential to establish new values.



# The future begins now

## Education is the key to sustainable development

By Dr. Claudia Uribe



**Dr. Claudia Uribe is Director of the UNESCO Regional Bureau for Education in Latin America and the Caribbean and is also the UNESCO representative for Chile. UNESCO supports member states and their interest groups in their efforts to implement education for sustainable development as part of the Education 2030 Agenda.**

The effects of climate change are causing tremendous suffering for millions of people around the world. As the world hurtles towards the point of no return, it is more important than ever that we come together as a global community and commit to targeted, collective action.

The scope and intertwining of climate change is so massive and its consequences so far-reaching that no country, group or individual will be able to master the challenges alone. In the search for solutions it will be necessary to collaborate across national boundaries and all social groups.

The leadership of global, multilateral institutions has already yielded some success, with goals being agreed to reduce the emission of CO<sub>2</sub> and other gases harmful to the climate. Implementing and maintaining the necessary measures over the long term, however, presents a challenge for many countries.

If we are to combat climate change, we need sustainable, long-term solutions. Once concluded and signed, agreements need to be enforced. It is becoming increasingly evident that senior leadership will be unable to achieve this alone; instead, it will require a basis of mature and informed citizens to monitor undertakings on climate protection and demand that promises are kept.

We will only be successful in our fight against climate change if we realize what is at stake for humanity. We must resolve to raise our voices to call for action. Each and every one of us must fundamentally align our consumer behavior and lifestyle with the principles of sustainable development. Education for sustainable development (ESD) is the key to achieving all of these goals. ESD enables pupils and students to develop the knowledge, attitude, skills and values they need to improve their conditions of life, without robbing future generations of the opportunity to do the same.



Education for sustainable development furthers young people's understanding not only of the causes and effects of climate change, but also of the importance of biodiversity, responsible consumption, and a whole array of other issues – such as sustainable lifestyles,

**“Young people learn that topics like the climate, biodiversity, human rights and non-violence are intertwined with issues of consumption and a sustainable lifestyle.”**

human rights, gender equality, promoting a culture of peace and non-violence, responsibility in a globalized world, and the importance of appreciating cultural diversity for the good of us all. Goal 4.7 of the United Nations' 2030 Agenda places “education for sustainable development” at the heart of the transformation process. Sustainability education should be firmly anchored in national curriculums and in teacher training and also be reflected in pupils' grades.

Leading the charge on this topic on behalf of the United Nations since 2005, UNESCO has recently adopted a new program titled “Education for Sustainable Development: Towards Achieving the SDGs”, or “ESD for 2030” for short.

It aims to integrate ESD and the 17 Sustainable Development Goals in policy, learning environments and teacher training, through increased awareness in young people as well as at local levels.

In the meantime, education ministries in Latin American and Caribbean countries have decided to design and implement comprehensive educational programs. In addition to education for sustainable development, these programs will also promote democratic structures (Global Citizenship Education GCED). This intention was announced in the Buenos Aires Declaration during the first meeting of Latin American and Caribbean education ministers in 2017, held as part of Agenda 2030.

At UNESCO, we are committed to supporting these efforts and invite our partner organizations to follow suit. The future begins now. The challenges are great. Yet the potential for change is just as great. Working closely together with a number of protagonists in the private sector will be a decisive factor in our success. Our partnership with Siemens Stiftung, a foundation that shares our values and mission, therefore represents an outstanding opportunity.

## Siemens Stiftung as a UNESCO partner

Siemens Stiftung will work together with UNESCO, and in particular its Regional Bureau in Latin America and the Caribbean, to promote STEM education in Latin America. Our common goal is to increasingly anchor STEM education for sustainable and social development as well as climate change education in national and regional curriculums. Conveying an understanding of cultural and social diversity, particularly with regard to topics of gender equality and indigenous knowledge, is another key focus.

# Knowledge is the key to change

Countering climate change requires new ways of thinking. Siemens Stiftung and its partner institutions are committed to promoting education that raises awareness and engenders change in Latin America.

The forecasts issued by the Intergovernmental Panel on Climate Change (IPCC) are bleak, with the last five years among the hottest since records began and the threat that temperature increases will continue to accelerate. There are now increasing signs that it will not take until 2040 for us to exceed the 1.5°C threshold and that it might well happen within the next decade.

That's the bad news. The good news is that climate change can still be halted if we collectively change our thinking. This will require an awareness of the problem; ultimately, if people lack knowledge of the causes and consequences of global warming and possible methods of curbing it, they will remain unable to change their mindset. Consequently, the key to achieving this shift of mentality and mindsets lies in knowledge. We have insights from the fields of science, mathematics, computer science and technology to thank for most of what we know about climate change. This in turn suggests that, in order to convey the knowledge required for a collective change in thinking, we should concentrate our efforts in precisely these fields, usually referred to by the acronym STEM (science, technology, engineering and mathematics). Our goal must therefore be to provide STEM teaching focused on climate change. If children and young people receive what has come to be known as climate change education and go on to share this knowledge among their family and friends, it will be a step in the right direction.

## **Knowledge transfer and practical relevance**

Knowledge alone, however, is not enough: halting climate change will require what is known in educational circles as solution-focused competency. The OECD Learning Compass 2030, which formulates educational goals for an increasingly unstable world, recommends not only instilling children and young people with knowledge but also enabling them to actively shape the learning process. This involves giving them the scope to work independently. A position paper published by the International Dialogue on STEM Education (IDoS) tends in the same direction. In the paper, entitled "Using Science for the Common Good", experts call for efforts to promote research-focused learning, scientific thinking and scientific practice. Against this backdrop, Siemens Stiftung and its partner institutions remain strongly committed to promoting high-quality STEM teaching focused on climate change. Together, we are enabling children and young people to play an active role, put their knowledge of climate change to the test in practical scenarios, experiment, design joint projects and practice climate protection in their own surroundings. In doing so, the partner network is following the call issued by the United Nations in Agenda 2030: "By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development."





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### **Latin America – fertile ground for climate change education**

Latin America is a part of the world that gives cause for great concern but also reason to hope. It is a region in which climate change threatens near-unparalleled biodiversity. The advancing deforestation of the rainforest is driving indigenous people from their natural environments and fueling global warming. At the same time, however, Latin America is home to renowned universities committed

to climate change research, such as the Universidad de los Andes in Colombia, the Universidad de Chile and the Center for Climate and Resilience Research (CR2). Academics at these institutions take a keen interest in indigenous communities' knowledge of nature, which is in turn introduced in schools by educationalists. Latin American governments have also announced their resolve to incorporate climate change education in national curriculums.

Martín Bascopé, Head of the Department of Sustainable Development Education at the Pontificia Universidad Católica (PUC) in Villarrica, speaks at the first International Conference for Education on Climate Change in Chile.

## Dealing with thousands of variables

Nevertheless, the challenge is immense. In the first instance, furthering climate change education means training teachers and providing them with teaching materials. In their role at the interface of climate research and educational science, they are key protagonists in the transformation process. The interdisciplinary nature of climate change, however, means it pertains to a multitude of subjects and specialties rather than just one, which complicates matters. The complexity of the subject matter entails additional challenges. The focus is not only on the atmosphere, biosphere, hydrosphere,

cryosphere and lithosphere – which would be complicated enough – but teaching also needs to address the economic, social, cultural and ecological aspects of climate change. Dealing with two variables is already difficult; climate change entails thousands.

## A dynamic network

That being said, even the most highly qualified and trained teachers will be fighting a losing battle if politicians, institutions and organizations fail to do their part. Whether viewed on a global, national or local scale or between different sectors of society, it will not be possible to stop climate change

Design thinking  
kick-off workshop  
at the Pontificia  
Universidad  
Católica (PUC) in  
Villarrica, Chile.



© Siemens Stiftung, photographer: Cristóbal Saavedra



without the resolve to work together and share knowledge. For this reason, Siemens Stiftung sees its role in Latin America as an initiator and a bridge builder, advancing the networking of key actors.

The Siemens Stiftung network is already connecting around 50 organizations, each of which contributes its own network of partners. Our network comprises tertiary institutions such as Colombia's Universidad de La Sabana, NGOs like Mexico's Innovation in Science Education (Innovec), which advises regional education authorities, and political actors including the education authorities of the Peruvian province of Arequipa. Actors are increasingly organizing at the regional level to promote science and technology education, sustainable development and climate protection. To date, there are 14 so-called "Territorios STEM" across Chile, Peru, Colombia and Mexico. Today, key climate education stakeholders are already engaging in close collaboration. Plans to establish further Territorios STEM have already been drawn up, with other regions welcome to join this open networking process.

### **International conference**

Siemens Stiftung is also expanding and is already active in eight Latin American countries. The various threads converge at the Siemens Stiftung office in Santiago de Chile. The office is also responsible for coordinating the Centro Recursos Educativos Abiertos (CREA) education platform. A multitude of regional education stakeholders and both regional and national education authorities have linked their Internet portals with CREA. This has given teachers, pupils and students access to a wealth of teaching materials, available for downloading free of charge. In addition, the Universidad de Chile and its Center for Climate and Resilience Research (CR2) has joined forces with Siemens Stiftung to organize the International Conference for Education on Climate Change (Conferencia Internacional Educación en Cambio Climático – CIECC) for Latin America. This annual gathering allows participants to share their

experiences, receive training, and further reinforce and expand the network. The Office for Climate Education (OCE), an institution co-founded by Siemens Stiftung, also helps to organize the conference. Situated in Paris, the OCE collaborates closely with academies of sciences, provides teacher training workshops, develops teaching content and materials for lessons on climate change and makes them available online.

### **Latin American governments find their voice**

While Latin America has taken the first steps, a long road lies ahead. It would be helpful if the region's governments would make good on their promises and designate climate change education as a mandatory part of their national curriculums – a move that would reach 160 million school pupils. Governments have announced their intention to do so on numerous occasions, most recently in the Buenos Aires Declaration of 2017. At the same time, Siemens Stiftung and its partners hope to see climate change education not only anchored in schools but also in daycare facilities and kindergartens. Especially young children are fascinated by the vibrancy of nature; they love to experiment and reflect on new insights. During their early years, children develop lasting habits and begin to form their worldview. The Little Scientists' House (Haus der kleinen Forscher), a German initiative dedicated to integrating STEM education at kindergarten and elementary school age, has shown that influencing children at this stage is a promising approach to raising awareness of sustainable development.

### **The 25 percent hurdle**

According to research by the Potsdam Institute for Climate Impact Research (PIK), a change in one quarter of the population is sufficient to shift the direction of social development. If one person in four changes their behavior, the rest can follow their lead.

**"25 percent of people need to change their behavior for the rest to follow their lead."**

# New learning avenues

## Public science as a methodological concept

Situated between the Pacific Ocean and the Andes, the Valparaíso Region features spectacular landscapes – and is acutely threatened by climate change. A public science project is now raising awareness of the ensuing consequences. The United Nations has established nine indicators that flag up dangers posed by climate change. Of these, seven apply to Valparaíso, namely low-lying coastal areas at risk

of flooding, arid and semi-arid areas, as well as areas affected by forest damage damage, alongside areas frequently impacted by natural disasters, droughts, air pollution, and sensitive and mountainous ecosystems such as the coastal mountains and the Andes.

Professor Andoni Arenas, an internationally well-connected geographer and educationalist, is a Professor at the

Pontificia Universidad Católica de Valparaíso (PUCV) Institute of Geography. He asked himself how it could be that, despite the scientific evidence of all these dangers facing the Valparaíso Region, there is still no mention of them in local schools. The answer soon became clear to him: the problem is so complex that a traditional curriculum, strictly divided into separate subjects, is simply unable to cope.



MICA digitally enhances geographical maps with information collated by specialists and interested amateurs through an app.

© Costadigital





A map has been created for Valparaíso, depicting the progress of environmental pollution.

## “Public science concepts like MICA disrupt traditional forms of teaching.”

“If we want to teach about climate change successfully, we need to bring scientific disciplines together and bolster the transfer of knowledge within society,” argues Arenas. With the goal of providing climate change insights in an accessible format, Arenas brought together geographers, chemists, educationalists and computer scientists at the Universidad Católica de Valparaíso. Together, they developed MICA (Mapa Interactivo del Cambio Climático), an interactive map that visualizes the impacts of climate change and can be continuously updated.

The special aspect of this project is the fact that the data collection work is not merely limited to scientists: MICA is a public science project, so anyone with an interest in the topic can take part. For one thing, this generates a wide database. In addition, school pupils – one of the main target groups for this project – benefit from practical materials that teach them about the parameters to consider when researching. MICA digitally augments real world map material with new information. This makes it possible to create virtual tours that visualize how glaciers are melting, the impact of droughts and the loss of ecosystems in the region. A map based on this concept has now also been created for the regional capital of Valparaíso, illustrating the continued advance of environmental pollution. Here too, the aim is to harness and utilize the scientific perspective of the problem in the context of teaching. There are plans to develop similar maps for other regions of Chile. MICA comprises a smartphone app, a website and a pull-out paper map

– three elements that can be used in classroom settings. The collaboratively created interactive map is a prime example of project-based learning, as it allows children and young people to learn to observe and document issues. By taking practical action, they contribute to the solution. Concepts like MICA have the potential to disrupt traditional forms of teaching and make a lasting impact in the process.

# The Galapagos project

Children in the Galapagos are to learn to protect their unique islands from an early age. The NGO Ecology Project International (EPI) develops inspiring projects and school curriculums.

The 130 islands that make up the Galapagos are home to numerous plant and animal species not encountered anywhere else on Earth. This flora and fauna led to the Galapagos Islands being designated a UNESCO World Heritage Site. Around 97 percent of the islands' surface is under conservation. In order to preserve the ecosystem and biodiversity, it is first and foremost the children raised on these islands who must learn the value of their unique natural surroundings. The NGO Ecology Project International (EPI) helps to impart this knowledge and develops school-based and extracurricular projects to this end.

## No one size fits all curriculum

EPI was founded in Costa Rica in 2000 and has since launched activities in Ecuador, Mexico, the United States and Belize. Alongside other areas, its regional offices specialize in adapting school curriculums to the features and characteristics of local regions. Schools on the Galapagos Islands, which are part of Ecuador, are subject to the same schedule of lessons as mainland schools – but in such a unique region, that simply isn't enough. With this in mind, Ana Maria Loose,

Director of EPI Ecuador, and her team offer excursions and projects specifically tailored to the Galapagos to school classes on the islands. Working in close coordination with the Ecuadorian Ministry of Education and the Galapagos National Park, EPI organizes project weeks that allow students to engage with issues such as biodiversity, sustainability and climate change. "We want to show children and young people how valuable their homeland is so that they learn to take responsibility for preserving their islands at an early age," says Ana Maria Loose.

## Tracking giant tortoises

During these courses, which last around ten days, children and young people gain an understanding of major sustainability issues relating to the islands. For example, through the collaboration with the Galapagos National Park, pupils are able to research the habitats of giant tortoises and how they live. Following a classroom-based introduction, school groups head to Santa Cruz Island, where park rangers help them to search for giant tortoises. Together with the experts, the pupils collect crucial data such as the size, weight and sex of

the tortoises, some of which are more than 150 years old. The rangers then fit the animals with a tiny transponder relaying their location via radio signals, thereby enabling them to identify the tortoises when they meet again and also calculate the total population of this endangered species. "Our aim in these excursions is to bring knowledge to life," explains Ana Maria Loose. When pupils learn that the temperature of sand determines whether tortoise eggs produce a male or female hatchling, they begin to reflect on climate change in greater depth.

## The road ahead

The value of this approach is demonstrated by a growing group of former students who, inspired by such project days, have developed campaigns for endangered animals, organized excursions and cleaned beaches. Moreover, the Ecuadorian Ministry of Education is also anxious to bring sustainability and climate change education into the classroom as a fixed part of the curriculum, connected with STEM subjects. EPI has been commissioned to draw up a curriculum for the Galapagos Islands which takes the region's





© Ecology Project International

special characteristics into account. As part of a three-year cooperation with the Education Ministry, EPI is now seeking to initiate a broad, cross-sector dialog on the islands in order to develop the topic further. Siemens Stiftung is supporting EPI's efforts to develop an educational initiative on the Galapagos Islands in the shape of a Territorio STEM, with teachers and

pupils at its heart. This work includes Experimento, an international, science-based education program for all grades, which draws on the idea of research-based learning.

In the course of the project, children learn that the temperature of the sand determines whether a tortoise egg yields a male or female hatchling. Content like this is set to become anchored in the regional curriculum.









# Design Thinking makes the grade

Finding good solutions for complex problems is never easy.  
Design Thinking is a concept that can help.

Design Thinking makes complex problems accessible; teams work together to develop solutions.

© Siemens Stiftung, photographer: Cristóbal Saavedra





Climate change and sustainability are complex topics that can be somewhat inaccessible and difficult to understand. Engaging with these topics for the first time, it is easy to feel overwhelmed. Design Thinking is a method of developing creative solutions through a carefully structured process. Often deployed in the fields of business and research, it makes it possible to approach a new product or service from the user's perspective and thereby tailor its form and function accordingly. When used in schools, the method is not only beneficial but also disrupts the teacher-centered model. The Design Thinking process guides groups through various iterative phases, incrementally leading them towards a potential solution. This process can be divided into four phases.

### Process phases in Design Thinking

In the *preparation phase*, the teacher introduces the concept. Pupils form project groups and agree on their respective roles and responsibilities. Each group selects a problem, such as contaminated drinking water, for which they would like to develop a solution. At the end of the preparation phase, the groups should have an outline of the challenge facing them. How and why do the problems arise? Who do these problems affect, and how? What aspects and developments are relevant in this context? The pupils keep a record of all arguments and perspectives put forward.

In the *understanding phase*, users take center stage. Pupils should empathize with the groups of people their solution aims to help. What resources do they have? What do they need? What

are their fears and concerns? What is their cultural, geographical or infrastructural context? The more comprehensive, immersive and empathetic the pupils' understanding is in this stage, the more tangible their project group's grasp of the problem will be.

In the *prototyping phase*, pupils consider potential solutions. Working in groups, they gather ideas based on the insights gained so far. Creativity and candor are encouraged as the keys to finding a solution. Pupils then use models, sketches and role-play to visualize the best solutions they have developed.

In the *implementation phase*, the pupils present their prototypes and discuss them with the other teams. They should incorporate everything they have learned and experienced in a presentation that covers the entire process, with every step individually recorded, presented and critically examined by the class and teacher. If any gaps or discrepancies are identified in the prototype in terms of the situation or user group, this can even result in the process starting over anew.

### Tackling problems independently

The ability to quickly compare the first prototypes against the problem is one major benefit of this method. It provides an opportunity to develop ideas rapidly and work step by step to devise a coherent solution that meets users' needs. Above all, groupwork and the open approach help to promote certain mindsets in the classroom. This encourages pupils to recognize that they are in a position to take responsibility. The method





aims at developing empathy, creative problem solving, innovative capacity and critical thinking – fundamental skills when approaching changing circumstances with an open mind and taking responsibility for shaping the future. Acquiring skills like these is an important element of climate change education.

### **Design Thinking in STEM teaching**

STEM subjects in particular can benefit from Design Thinking. The methodology promotes interdisciplinary working and renders abstract problems tangible, while simultaneously underlining their relevance to pupils' daily lives.

### **First workshops in the project context**

Siemens Stiftung implemented its "Design Thinking in STEM" project in collaboration with Danish organization The Index Project, as well as other experts, in Chile and South Africa. The project groups tackled aspects of the United Nations' 17 Sustainable Development Goals (SDGs), seeking to develop concrete solutions at both local and global levels. This proved an excellent starting point for interdisciplinary teaching.

Visualization  
through models,  
sketches and  
role-play





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During the workshop, teachers practiced the techniques they will later teach their pupils.

## Design Thinking: Rehearsing an ideal methodology for STEM teaching

The Pontificia Universidad Católica (PUC) in Chile is one of the leading universities in Siemens Stiftung's network in Latin America. Imparting new didactic methodologies for STEM teaching is a key focus of ongoing teacher training.

The PUC and its network of teaching staff are spreading the Design Thinking methodology as part of the "Design Thinking in STEM" project. In late 2019, the first 30 teachers and other multipliers attended a two-day workshop in Villarrica to familiarize themselves with the methodology. An in-depth

workshop in 2020 had to be switched to a virtual platform due to the coronavirus pandemic. Teaching staff tried out the methodology for themselves by drawing on regional problems, such as sustainable urban development in neighboring municipalities and access to clean water in the lake district around Villarrica. They are now able to pass on their knowledge to their colleagues and their networks and will therefore be capable of conveying this methodology to around 10,000 Latin American children in the next five years. There are also plans to expand the initiative into Mexico, Peru and Colombia.

# Knowledge creates equality

**There are astonishing parallels between climate change and COVID-19. These crises can teach us how to handle complex problems.**

By Dr. Maisa Rojas



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**Dr. Maisa Rojas is Associate Professor of Geophysics at the Universidad de Chile and Director of the renowned Center for Climate and Resilience Research (CR2). Her primary fields of research are paleoclimatology and regional climate change. She holds a PhD in Atmospheric Physics from the University of Oxford.**

A virus spreading across the world is nothing new. The Black Death of the Middle Ages and the Spanish Flu of 1918 are just two of numerous pandemics, alongside cholera, smallpox, tuberculosis, syphilis and more besides that went down in history. This is perhaps the first time, however, that a virus has so mercilessly exposed the tears in the fabric of our globalized world.

At present, the media is obsessed with the COVID-19 pandemic. At the same time, the atmosphere is warming up, glaciers and marine ice are melting, while extreme meteorological phenomena are becoming increasingly frequent. Never before have the same crises impacted so many people simultaneously and in so many different ways. Health and climate crises can teach us to deal with complex problems. Never before has so much information been available regarding the causes of these problems – which underscores the vital importance of educating young people to enable them to tackle and master the challenges of the 21st century.

One cause common to both COVID-19 and climate change is global networking. Commercial aviation ensured that the virus spread quickly over thousands of miles to almost every country around the globe. And international transport

connections were joined up in the course of globalization in order to satisfy our desire for goods and services. These connections are one of the causes of climate change.

To gain a deeper understanding, we need to examine various interrelations, namely the links between the atmosphere and the Earth's mantle, animal and plant habitats, the sphere of water and ice, and in relation to human influence, the anthroposphere. An exchange of material and energy connects all of these elements. This exchange gives rise to our complex climatic system, which is changing dynamically in both spatial and temporal terms. For example, in addition to their pivotal role in the water cycle, the oceans also influence the average temperature of our planet by absorbing and storing heat from the atmosphere. The interaction between oceans and the atmosphere is a significant factor in regulating the Earth's climate.

Another parallel between the two crises lies in our attempts to come to terms with the risks involved by identifying and analyzing their component parts before implementing measures and then evaluating them. When we consider the rapid spread of COVID-19, it is clear that our national and international



institutions' risk assessment measures have been less than successful. This is despite the fact we should have been prepared, given how the severe SARS and MERS respiratory diseases caused worldwide anxiety in 2002 and 2012, respectively. We also struggle with risk assessment in the context of climate change. The Intergovernmental Panel on Climate Change (IPCC) states that assessments must consider the vulnerability of social systems and ecosystems, along with the degree to which individual regions and population groups are exposed.

This notion leads us to a further parallel between the pandemic and the climate crisis: the unequal impact of these events depending on the level of inequality in society. There are various examples to illustrate this. For instance, although a heatwave might impact the entire population of a city, it will have a markedly lesser impact on those with access to parks, swimming pools and air conditioning. The IPCC and wider research circles indicate that climate change is exacerbating inequality.

When we look at COVID-19, we see a disease that poses a particular risk to the elderly and the sick, although social class also plays a role. In Santiago de Chile, where I live, many people were not able to comply with social distancing guidelines because they live in overcrowded neighborhoods or work jobs that do not allow them to work from home. This inequality has become far more visible at all levels of society during the pandemic and must also be taken into consideration in the fight against climate change.

It is clear that we must adopt an interdisciplinary approach to these two major problems. At the beginning of the pandemic, many thought that

COVID-19 would be a matter for epidemiologists and public health experts alone. However, it soon became clear that input from economists, psychologists, psychiatrists and data experts was indispensable. Only through a systemic approach can we perceive every dimension of a complex problem – and the very same is true for climate change.

When we consider the parallels between the COVID-19 pandemic and climate change, we are faced with the question of which tools we should equip our children with at school in order to navigate complex, global problems. I believe we especially need to give them the knowledge, skills and attitude they need to engage in systemic thinking. Systemic thinking will enable us to reverse the climate-damaging emissions brought about as a result of the pandemic. It will make it possible to achieve the goals set down in the Paris Agreement, namely limiting global warming to 1.5°C. And, working together, we can forge a new and sustainable way of living and doing business – one in which the health of humanity is preserved in combination with efforts to protect the planet.

We have a duty to pass on this conviction to subsequent generations through comprehensive education. Only then will it be possible to establish a robust, resilient society with the participation of key decision-makers as well as business and civil society.



Isabella Villanueva

## The Youth Agenda

Isabella Villanueva is the founder and President of the student environmental organization CEUS Chile (Congreso Estudiantil Universitario de Sustentabilidad). At the second International Conference for Education on Climate Change in June 2020, the activist called on those in attendance to take action. Villanueva urged young people to emphatically campaign for environmental and climate protection and argued that anchoring sustainability in teaching and research would have a decisive impact. Only by taking these steps, she said, can sustainability become the driver of social transformation.

In 2019, CEUS published a detailed action plan to curb climate change that received attention from well beyond the student sphere. In its Youth Action Climate Agenda, CEUS set out measures relating to resources, cities, municipalities and society that can be implemented over the short, medium and long term. CEUS is well networked and works with organizations such as the Center for Climate and Resilience Research (CR2) and the Chilean Ministry of the Environment, among other organizations.

# The pioneer

## The State of Mexico has anchored climate change education in the curriculum

In Rogelio Tinoco's office, the books tower all the way up to the ceiling. Some of them he wrote himself, back when he taught political science at the Universidad Autónoma del Estado de México. He remains passionate about sharing knowledge with young people, but his professional circumstances are now fundamentally different.

Nowadays, Rogelio Tinoco works at the State of Mexico's education authority as State Secretary for Education in Preschools, Elementary Schools and Secondary Schools. Where he was once tasked with nurturing a few hundred students, Tinoco is today responsible for two million pupils – and the 59-year-old has broken new ground in his role. In the State of Mexico, which borders on Mexico City, Tinoco is implementing something that, elsewhere in Latin America, is still in the planning stage: he is anchoring climate change education in the curriculum.

The first few schools have already begun to teach what climate change is all about, how it can be halted, how its impact can be curbed, and how people can adapt. In this context, teaching means allowing boys and girls to gain experience and encouraging them to research and experiment. For example, the very youngest pupils explore the topic of the climate by putting warm and cold water in a glass and leaving it

in the sun, which approximates ocean currents and rising sea temperatures under the influence of the sun.

Meanwhile, older pupils are tasked with weighing a freshly lopped branch before drying it out and weighing it again, which helps them to grasp the role trees play in water and CO<sub>2</sub> storage.

The path to implementing climate change lessons was certainly no cakewalk and called for a great deal of persuasion. Almost half of the 20 million residents of this densely populated region live in poverty, which is officially defined as "the absence of opportunity to satisfy at least one existential need, such as food, accommodation or medical care". In the league table for violent crime, Mexico ranks second-highest out of the 32 Mexican states. Many people here are engaged in a constant struggle to survive.

There were also practical issues. For instance, the question of how to integrate the interdisciplinary subject matter of climate change education into the existing academic structure caused quite a headache. "We trawled through the STEM curriculums and identified where it would be sensible to insert climate change topics," recalls Tinoco.

Providing teacher training and further training also proved problematic. The original plan was to hold workshops to

prepare them for their new assignment. It soon became clear, however, that the first phase – which involved training 11,000 teachers in sessions designed to accommodate just 300 participants each – would take a good deal of time.

When the coronavirus pandemic forced the cancellation of all workshops, Tinoco resolved to grab the bull by the horns. "We moved our entire training offering online," he explains. To his relief, Tinoco realized that teachers were taking up the offer and eagerly clicking their way through the online courses. Over time, every teacher in the State of Mexico – around 90,000 in total – will have the opportunity to complete certified training courses.

"Where we overcame hurdles, we were able to do so because of the support we received," says Tinoco. "If you don't make allies, if you don't go out and network, you won't get far with climate change education." His superior, Education Minister Alejandro Fernández Campillo, decided in 2018 to declare the State of Mexico a Territorio STEM, which proved crucial to Tinoco's success. This large-scale education initiative focusing on sustainable and social development was, in turn, also enabled by the decision of Governor Alfredo del Mazo Maza to make the Agenda 2030 SDGs core elements of the state's development plan – providing Tinoco





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STEM teaching  
at a school in  
Mexico: chemical  
experiments with  
materials and soil.

with support, a framework and an incentive in one fell swoop. However, Tinoco also found allies beyond the limits of the education authorities. The Mexican NGO Innovation in Science Education (Innovec) and the Paris-based Office for Climate Education (OCE) are just two examples, with both providing online teaching and learning materials. Tinoco's cause was also substantially advanced by the Conferencia Internacional Educación en Cambio Climático (CIECC), an annual event first launched in Santiago de Chile in 2019 by the Universidad de Chile and Siemens Stiftung. The conference yielded further

allies for Tinoco and enabled him to reinforce and expand his network. In November 2019, he presented a strategy paper at the Innovation Conference in Toluca, giving an insight into his plans. At the next edition of the CIECC, Tinoco will be able to report on his practical experiences.

# Tapping into ancestral wisdom

**The Sabiduría Ancestral Indígena (SAI) education initiative introduces Colombian children to the knowledge of the country's native inhabitants, who have preserved their natural surroundings for millennia**

For decades, Cecilia Duque has traveled across Colombia on the trail of indigenous peoples. In her youth, the former Director of the Museum of Popular Arts and Traditions in Bogotá headed up Artesanías de Colombia, a state-owned company that helped traditional arts and crafts to win national and international appreciation.

Yet, it was not just indigenous peoples' arts and crafts that fascinated her, but also their way of life and their knowledge of nature, passed down over thousands of years. "These people feel responsible for the Earth," she says. "When nature suffers, they suffer too. I am certain we would change how we live if we had access to their wisdom."

Despite the extent to which indigenous peoples have been marginalized in Colombian society, their knowledge has not yet been lost. Cecilia Duque decided to document in detail the knowledge that indigenous peoples pass down, often only by spoken word, and make it available to the public – and above all, to children. Supported by the SURA Foundation, Duque founded the Sabiduría Ancestral Indígena (SAI) education project. Its name translates into English as "indigenous ancestral wisdom". "Most adults did not receive this knowledge from their forebears," says Duque. "If

we don't secure this knowledge now, it will be lost." SAI has collaborated with relatives of indigenous people as well as anthropologists, educationalists and philosophers in order to create both digital and analog teaching materials to enable children to access this knowledge. Working together, they considered how they could find space for this content within existing academic structures. Ultimately, with the support of the Ministry of Education, the ambitious pilot program shared out content across all school subjects, teaching it to children from the age of four. In total, 1,800 teachers now use the new materials to instruct 50,000 children at 50 schools.

Duque hopes that children and young people will learn to embrace the values of Colombia's indigenous peoples so that they treat nature with respect as adults. There is another matter close to her heart, namely ensuring that the indigenous peoples of Colombia, and of all cultures, are treated as equals. Set down in the Colombian Constitution, this equality should come to bear in practice.

"In a school in the south of Bogotá, we have seen that indigenous children are bullied less since indigenous knowledge was included in the curriculum," explains Duque.

The south of the city is a deprived, social hotspot area. "Other children begin to understand that indigenous peoples' relationship with nature is exemplary and that their myths and legends are precious," she says. "Just a few words in their language can describe an entire spectrum of content that would take numerous sentences to express in Spanish. This discovery piques curiosity."

In the next stage, Cecilia Duque hopes to expand the SAI project across all of Colombia and, with the Ministry of Education's support, introduce indigenous knowledge into curriculums nationwide.

Some of the project's materials, which also exist in digital form, have made it into Siemens Stiftung's STEM-focused media archive. The SAI initiative is also used as a role model in STEM education, including for a biodiversity project in the Amazon and indigenous knowledge in Ecuador.

Cecilia Duque's plans, however, extend beyond a nationwide roll-out. She hopes that SAI in Colombia will inspire other Latin American countries and that schools will launch follow-up projects. Her ultimate goal is to preserve balance in nature and the climate.



**“Across 52 tropical and subtropical countries, indigenous peoples and local communities manage at least 17 percent of all carbon stored in forests. It is therefore essential that we preserve their knowledge.”**

UNESCO Global Education Monitoring Report 2020



# You can't protect what you don't know

## Climate change education on the edge of the Antarctic

Growing up in the Chilean city of Puerto Williams, superlatives are a part of everyday life. Situated at the very outer tip of the American continent with a population of around 1,800, it goes by the moniker of the southernmost city in the world.

It is also home to Alan Maldonado-Márquez, Professor of Biology and Natural Sciences at the Universidad de Magallanes. "Puerto Williams is the gateway to the Antarctic, the world's ice shield," he explains. "The effects of climate change we experience

here bring about changes on a global scale. That's why protecting our region is so important."

Puerto Williams is surrounded by an almost untouched wilderness of national parks. Its lakes and rivers are among the purest bodies of water anywhere on the planet – a unique ecosystem that has been recognized in the Cape Horn Biosphere Reserve. With a view to climate change, however, Alan Maldonado-Márquez fears that worse is yet to come.

"Temperature changes are not the only issue: biodiversity as a whole is under threat."

In view of this fact he has committed himself to throwing light on climate change issues. He wants to raise awareness of the environment and the natural treasures currently under threat and he plans to start with children. "You can't protect what you don't know," he says. Following this approach, Maldonado-Márquez takes school groups from Puerto Williams on research outings in the surrounding area. On his most recent trip, he and the students came across a species of fish at risk of extinction. "The children had never seen this fish before. This is exactly what we're trying to achieve: making the invisible visible, from the insects to the fish that live in the region."

A broad-based education on climate change, however, needs to go further. "As a scientist who conducts research in a specific field, I can only give a partial answer; I can't answer the entire question. That's why we need to strike up alliances with companies, schools and local people to tackle climate change issues."

Javier Rendoll has dedicated himself to environmental education for over a decade.



© Alan Maldonado-Márquez, Universidad de Magallanes





© Alan Maldonado-Márquez, Universidad de Magallanes

Puerto Williams is surrounded by almost untouched wilderness, with its waters among the purest anywhere on Earth.

In his efforts to establish these alliances, he is working with Javier Rendoll, who lives in Puerto Williams and combines a passion for biology with a commitment to environmental education. In fact, he has dedicated himself to this field for the last 11 years. Integrating local communities and the knowledge they bring, as opposed to simply presenting them with ready-made concepts, is an essential step in developing successful education concepts. "It's entirely possible, for example, that as a scientist I'll come across a species of fish for the first time. Yet, someone born and raised by that river might have been fishing that species for 20 years. The only way I'll learn that is by talking to him."

This is what motivated Alan Maldonado-Márquez and Javier Rendoll to hold the first school science meeting in Puerto Williams in 2019,

bringing stakeholders from the worlds of science and education to the same table. The participants jointly developed new, participative workshop formats for students along with training sessions for teachers. In the process, Puerto Williams became the pioneer of a wider vision: the Territorio STEM Patagonia. At the regional level, there are plans to establish strategic alliances between social stakeholders in several cities in southern Chile to collectively promote science education with a focus on climate change. Siemens Stiftung is a co-initiator of this project.

# Leveraging the power of education

**Climate change is a global challenge that we will only overcome through systemic thinking**

By Badin Borde, Dr. Barbara Filtzinger and Ulrike Wahl



Badin Borde,  
Project Manager Inter-  
national Networks,  
Siemens Stiftung

The Earth has always had a natural balance. As humans, we found perfect living conditions almost everywhere on the planet and ushered in the Anthropocene – the epoch in which humans became the most significant factor of influence on biological, geological and atmospheric processes. Man-made climate change, however, is disrupting this sensitive natural balance and pushing the Earth towards tipping points that, once crossed, will be irreversible.

If we are to avoid losing this balance forever, we need to bring about profound ecological, social and economic transformation without further delay. Science and technology education with a focus on sustainable development is the lever we can throw to instigate, accompany and establish this transformation. The Siemens Stiftung project team sees itself as an initiator, a bridge builder and an ally in this transformation, brought together under the acronym STEM4SD (Science, Technology, Engineering and Mathematics for Sustainable Development). Our work combines creative educational approaches with scientific findings and teaching methods; our aim is to support teachers and their pupils as they strive to grasp the complex system of climate change and react to both global and local challenges. By researching and learning, they jointly develop ideas and approaches for sustainable innovations and multiply them in municipalities, regions, states and international bodies. Education can have a far-reaching impact on societies. This conviction drives us and our international network to provide training for teachers in STEM subjects, create teaching material, organize





Dr. Barbara Filtzinger,  
Head of Education,  
Siemens Stiftung

workshops, facilitate scientific dialog and promote work in national and international committees. We understand climate change – and, by extension, climate change education – as global challenges that can be mastered through local learning and actions and by adopting systemic thought processes. In order to tackle these issues at different levels and through an interdisciplinary approach, we draw up strategies as an international project team based in both Munich and Santiago de Chile, while also collaborating closely with partner institutions.

Our activities across different regions are varied and multifaceted. Each region has its own ecological, socio-cultural and economic context that needs to be taken into account. In addition to regional climate risks, this also includes the degree to which the population is vulnerable to the impact of climate change. We also meet with dedicated stakeholders who have different roles to play in national education systems.

**“We understand climate change – and, by extension, climate change education – as global challenges that can be mastered through local learning and actions and by adopting systemic thought processes.”**



Ulrike Wahl,  
Head of Regional  
Office Latin America,  
Siemens Stiftung

They must all be integrated with equal standing in transformation processes, such as when it comes to introducing climate change education into curriculums. Only when we humans learn to accept and take responsibility for our role as the most significant factor of influence on our planet’s natural balance will we be able to preserve the conditions of life that the Earth has granted us. STEM education is a key to accomplishing these tasks.

# Partner institutions in the Siemens Stiftung network





After a decade of work, Siemens Stiftung has established an ever-growing network of partner institutions. In this section, we introduce a number of our key partners; like our numerous other partner organizations, they pursue co-constructive and systemic approaches to education and work together to improve national and regional curriculums.

#### **Innovec – Mexico**

Innovation in Science Education (Innovec) is a non-governmental organization primarily dedicated to research-based learning. Innovec works closely with the education authorities of Mexico's federal states and other partners in order to convey such lesson content to teachers. The NGO draws on a growing network of around 10,000 teachers and educators in eleven Mexican states. In Mexico, Innovec and Siemens Stiftung combine their education programs.

#### **STEM Academia – Colombia**

STEM Academia is the educational program operated by the Colombian Academy of Sciences. Its portfolio includes in particular the development and application of content and media for teacher training purposes. In addition to its Pequeños Científicos program, which is based on an adaptation of the French program "La main à la pâte", STEM Academia also develops media and teaching formats on the subjects of mathematics, engineering, sustainability and on gender issues. Moreover, STEM Academia has adapted and expanded Siemens Stiftung's international education program Experimento for its specific national context. The institution trains teachers and multipliers in Colombia and beyond.

#### **Universidad de La Sabana – Colombia**

At the Universidad de La Sabana in Chía, situated in a town adjacent to the capital Bogotá, project-related cooperation with surrounding municipalities, public schools and private schools is particularly prevalent. The university's faculties develop projects in response to specific challenges in this growth region. STEM education for sustainable development and climate change education form part of this

work. The university also coordinates the Observatorio Sabana Centro initiative, a round-table on regional development involving stakeholders from the chambers of industry and commerce along with companies, schools and foundations.

#### **Universidad Pontificia Bolivariana – Colombia**

Among its other activities, the Universidad Pontificia Bolivariana (UPB) in Medellín coordinates a network of schools and works in concert with a series of regional education institutions. Over many decades, the university has committed itself to improving school education in Medellín, the Department of Antioquia and remote regions. Medellín has a particularly rigorous education agenda that has been recognized by UNESCO on several occasions. The city is also a Territorio SER+STEM, in which SER stands for socio-emotional learning.

#### **Grupo EDUTEC – Ecuador**

The non-governmental organization EDUTEC is active in Ecuador and Peru, specializing in the field of STEM education. It advises education ministries and works with development banks and other institutions to establish knowledge bases, learning platforms and other IT structures, thereby advancing digitalization in the STEM field.

#### **Ecology Project International (EPI) – Ecuador**

Ecology Project International (EPI) is an NGO founded in Costa Rica in 2000 with regional offices in several countries, including in Ecuador. EPI engages in educational projects on sustainable development, biodiversity and climate change. On the Galapagos Islands, EPI is working to develop a school curriculum tailored to the local environment.

Siemens Stiftung is supporting this project, including through the use of Siemens Stiftung's Experimento program.

### **Universidad Peruana Cayetano Heredia – Peru**

The Universidad Peruana Cayetano Heredia in Lima ranks as one of Peru's leading universities in the fields of health, medicine, biology and biotechnics. Its successful extracurricular STEM program, *Diviértete y Aprende*, has been supplemented by Siemens Stiftung's Experimento program for several years. Inspired by this collaboration, the university has integrated the STEM approach into the teacher training courses at its Faculty of Education.

### **Instituto Apoyo – Peru**

Instituto Apoyo is renowned in Peru above all for its excellent mathematics program. *Ciencia para todos – Experimento* is the Peruvian national adaptation of Siemens Stiftung's Experimento program. Together with Siemens Stiftung, Instituto Apoyo launched STEAM-Forum Peru, which unites major universities with national and regional representatives from the spheres of science, business, politics and civil society. STEAM strives to integrate cultural aspects in STEM subjects. The institute also supports the establishment of Territorios STEAM in the regions of Lima, Cuzco, Cajamarca, Arequipa and Tacna.

### **Pontificia Universidad Católica – Chile**

The Pontificia Universidad Católica (PUC) champions educational innovation. This includes reinforcing STEM subjects in teacher training and interdisciplinary collaboration between faculties with a view to sustainable development. The university includes a Center for Sustainable Urban

Development. It also has a leading role to play in coordinating the Territorio STEM Macrozona Sur, a key focus of which is linking the language and lore of the indigenous Mapuche people with STEM subjects.

### **Universidad de Chile – Chile**

The Universidad de Chile works shoulder to shoulder with the Center for Climate and Resilience Research (CR2) and Siemens Stiftung to coordinate annual international conferences on climate change education. It also collaborates with UNESCO, the Chilean Ministries of Education, the Environment and Technology, as well as other partners to this end. The university is in constant contact with the Smithsonian Science Education Center and the Office for Climate Education (OCE) in Paris. The institute is also actively involved in coordinating Territorio STEM initiatives, such as those in Santiago Centro and Antofagasta. Its ECBI (*Educación en Ciencias basada en la Indagación*) STEM program is combined with Siemens Stiftung's Experimento program.

### **Pontificia Universidad Católica de Valparaíso – Chile**

The Pontificia Universidad Católica de Valparaíso (PUCV) has founded a STEM center of excellence (CIDSTEM). Linked to the university and oriented towards the entire Latin American sphere, CIDSTEM continues to enjoy dynamic growth. It is home to an interdisciplinary team of experts focused on STEM education, sustainable development and climate change education. The university also develops innovative teaching materials and teacher training programs. With the support of Siemens Stiftung, PUCV has established a robust center of excellence for STEM education and continues to play a significant role in coordinating the Territorio STEAM Valparaíso.

### **Universidad de Magallanes – Chile**

The Universidad de Magallanes is the most prominent university in Chilean Patagonia. Siemens Stiftung supports the university in the context of its STEM teacher training program, as well as the Territorio STEM Patagonia initiative, which brings together schools, universities, foundations and educational authorities to promote education in relation to STEM subjects, sustainability and the climate.

### **UNESCO Regional Bureau – Chile**

Located in Santiago de Chile, the UNESCO Regional Bureau for Education in Latin America and the Caribbean supports countries in the region as they strive to achieve SDG 4 of the UN Agenda 2030: quality education for all. The regional bureau guides the countries' efforts and provides technical assistance. It works together with other UNESCO bureaus and institutes as well as strategic partners in the course of its work.

### **Fundação Siemens Brasil Fundación Siemens Argentina Fundación Siemens Colombia**

The three local, independent Siemens foundations – Fundação Siemens in Brazil, Fundación Siemens in Argentina and Fundación Siemens in Colombia – are actively engaged in STEM education in their countries and in local communities' development projects. All three are also involved in the regional STEM network coordinated by Siemens Stiftung from Santiago de Chile.



# Territorios STEM

## The education regions



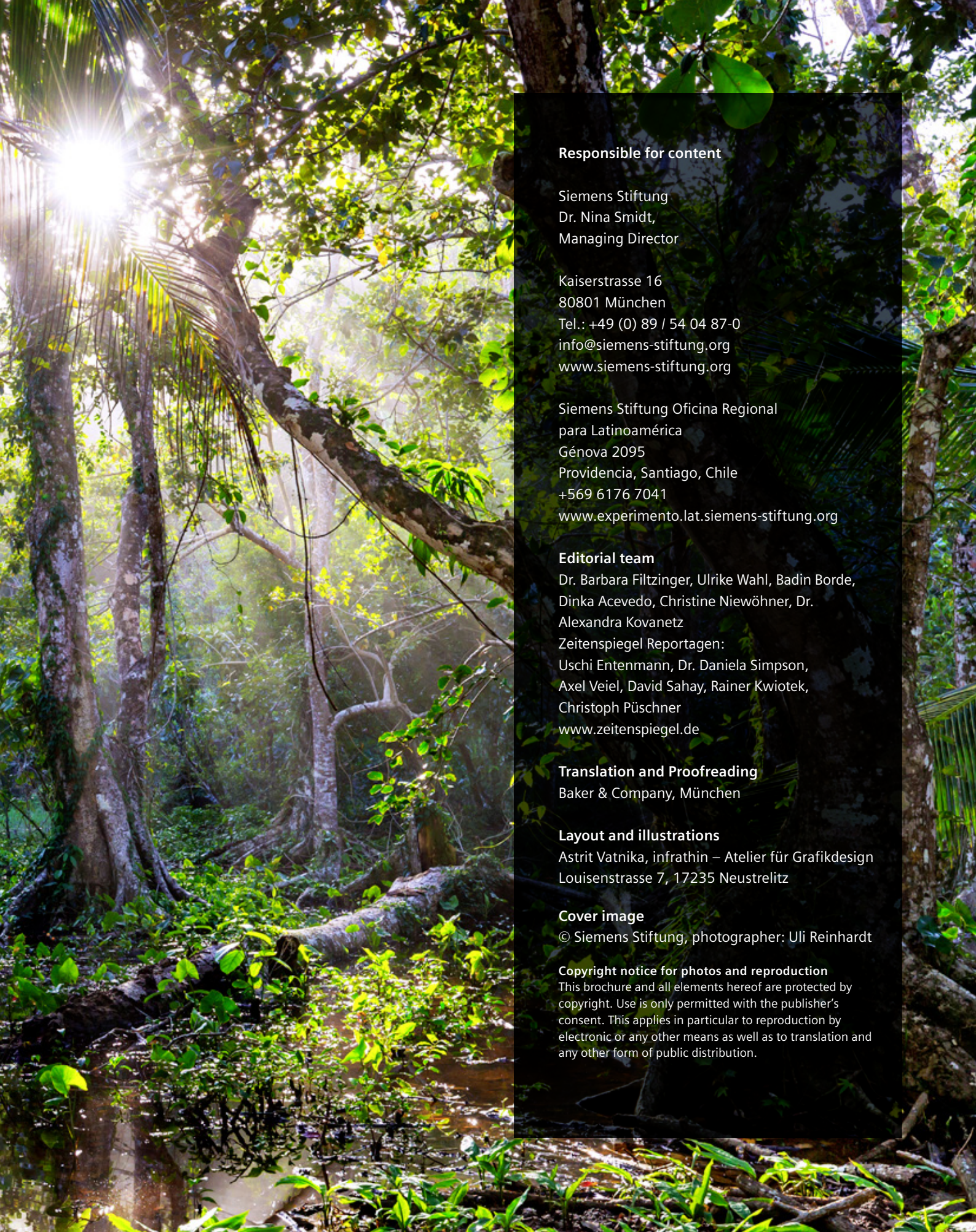
Territorios STEM (or STEAM in Chile and Peru, where the A stands for “Arts” and incorporates a cultural aspect) bring stakeholders from local education systems together with representatives of civil society, science, business and the state. In doing so, they help to form local alliances with a view to advancing STEM education at all levels within a defined geographic area. This means that schools, society and the local administration join forces to improve the quality of life in the region. This approach aims to tackle global challenges in regional and local contexts. Part of this work involves promoting scientific and technical education, as well as skills to help people prosper in a modern, digitalized world.





Colombia's tropical rainforest covers almost a third of the country.





#### **Responsible for content**

Siemens Stiftung  
Dr. Nina Smidt,  
Managing Director

Kaiserstrasse 16  
80801 München  
Tel.: +49 (0) 89 / 54 04 87-0  
[info@siemens-stiftung.org](mailto:info@siemens-stiftung.org)  
[www.siemens-stiftung.org](http://www.siemens-stiftung.org)

Siemens Stiftung Oficina Regional  
para Latinoamérica  
Génova 2095  
Providencia, Santiago, Chile  
+569 6176 7041  
[www.experimento.lat.siemens-stiftung.org](http://www.experimento.lat.siemens-stiftung.org)

#### **Editorial team**

Dr. Barbara Filtzinger, Ulrike Wahl, Badin Borde,  
Dinka Acevedo, Christine Niewöhner, Dr.  
Alexandra Kovanetz  
Zeitungsspiegel Reportagen:  
Uschi Entenmann, Dr. Daniela Simpson,  
Axel Veiel, David Sahay, Rainer Kwiotek,  
Christoph Püschner  
[www.zeitungsspiegel.de](http://www.zeitungsspiegel.de)

#### **Translation and Proofreading**

Baker & Company, München

#### **Layout and illustrations**

Astrit Vatnika, infrathin – Atelier für Grafikdesign  
Louisenstrasse 7, 17235 Neustrelitz

#### **Cover image**

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## Siemens Stiftung

As a non-profit foundation, we promote sustainable social development, a process utterly dependent on access to basic services, high-quality education and an understanding of culture. To this effect, our project work supports people in taking the initiative to responsibly address current challenges. Together with partners, we develop and implement solutions and programs to support this effort, with technological and social innovation playing a central role. Our actions are impact-oriented and conducted in a transparent manner.

In a technology-driven world, understanding scientific and technological interrelationships is paramount for individual development and participation in society. For this reason, Siemens Stiftung is committed to strengthening and supporting science and technology education through active committee engagement and tangible educational work. Our international educational program Experimento provides educators with practice-oriented training courses as well as high-quality teaching and learning materials. These materials are readily available in digital form to provide equal support for all pupils. Our engagement combines research-based learning with actions that help to develop values, thereby shaping strong, socially-oriented individuals.

## Siemens Stiftung

Kaiserstraße 16  
80801 Munich, Germany  
Tel.: +49 (0) 89 / ,54 04 87-0  
[info@siemens-stiftung.org](mailto:info@siemens-stiftung.org)  
[www.siemens-stiftung.org](http://www.siemens-stiftung.org)

Oficina Regional para Latinoamérica  
Génova 2095  
Providencia, Santiago, Chile  
Tel.: +569 6176 7041  
[www.experimento.lat.siemens-stiftung.org](http://www.experimento.lat.siemens-stiftung.org)