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e-InnoEduCO2 Project
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School science e-learning ONE HEALTH e-InnoEduCO2

Strategy for transfer and exploitation of the results
with the formulas to expand the results to other
educational communities and sectors.

P.I.5 Teaching resources for transfer to society



Concello de Outes





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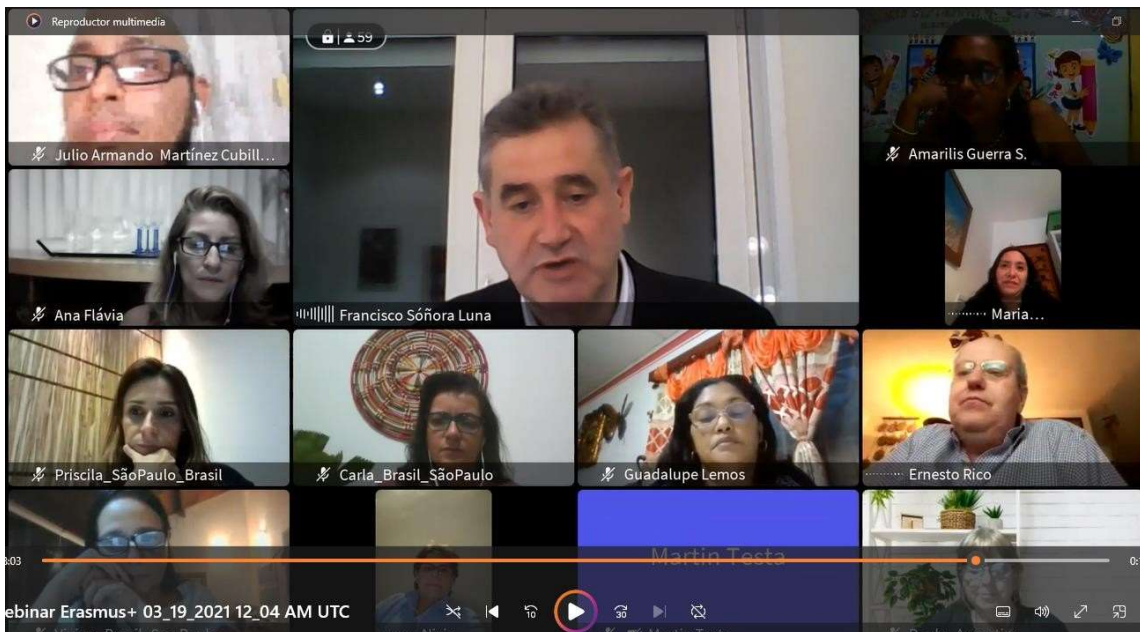


Strategy for the transfer and exploitation of results

The strategy for transferring and exploiting the results with the formulas for expanding the results to other educational communities and sectors is based on the decalogue described below:

1. SEPA-interea is promoting a webinar to present the project to schools in Latin America and the different autonomous communities.

To present the project to schools interested in forming the project's school network. On 19 March at 11 p.m., the project was presented to schools in Latin America. Representatives of 60 schools from Mexico, Panama, Brazil, Colombia, El Salvador, Peru and Argentina participated. The event was inaugurated by the Councillor for Education of the Ministry of Education and Vocational Training in Brazil, Mr. Cortegoso, and by the Vice-Minister of Environment of Panama.



On the 15th at 7 p.m., the same presentation was made to 35 centres from different autonomous communities, with the participation of centres representing most of the autonomous communities.



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Both presentations were given by Francisco Sónora, professor at the University of Santiago de Compostela. In both webinars for schools with interest in joining as pilot centres of this Erasmus+ KA226 and KA227 in which the group of the Faculty of Education Sciences SEPA-interea is a partner. Enmarcó la actividade en el objetivo de tejer una red de centros piloto en diferentes dominios climáticos y realidades socio económicas.

He explained how 'InnoEduCO2: school science e-learning One Health' aims to "compensate for the barriers, gaps and limitations arising from the COVID-19 crisis, promoting an experiential school curriculum based on digital learning", explained the researchers. He explained how the research group to which he belongs weaved agreements with the Council of Outes, and the contributions of the universities of Ulasi, in Romania; and Aveiro, in Portugal; as well as those of the two full partner schools, the Agrupamento de Escolas de Aveiro and the Liceo XXVI of Lodz (Poland), as well as the technological applications developed by the Galician Supercomputing Centre (CESGA).



2. César de la Fuente, Professor of Biotechnology at the University of Pennsylvania, presented microbiology at One Health.

Link: <https://www.youtube.com/watch?v=ypsnVvQshs0>

On 16 April 2021 at 16:30, César de la Fuente, professor at the University of Pennsylvania, was chosen to present to 136 schools interested in the conceptual line of the project his lines of research oriented towards the prevention of bacterial super pandemics.



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Dr. César de la Fuente leads the Machine Biology Group at the University of Pennsylvania, which aims to combine the power of machines and biology to study, prevent, diagnose and treat infectious diseases. In his webinar, he summarised one of his lab's main applications, relating to developing novel approaches to antibiotic discovery, building tools for engineering microbiomes and creating low-cost diagnostics. Specifically, he pioneered the development of the first computer-engineered antibiotic with efficacy in animals, creating new antimicrobial resistance-proof materials. He also referred to his inventions of low-cost rapid diagnostics for COVID19 and other infectious diseases. These types of studies earned Professor de la Fuente recognition by MIT Technology Review in 2019 as one of the world's leading innovators for "digitising evolution to make better antibiotics". He was also selected as the inaugural recipient of the Langer Prize (2019), ACS Kavli Emerging Leader in Chemistry (2020), and received the Nemirovsky Award (2020), AIChE's 35 Under 35 Award (2020) and the ACS Infectious Diseases Young Investigator Award (2020). In addition, he was named Boston Latino 30 Under 30, Wunderkind of 2018 by STAT News, Top 10 Under 40 of 2019 by GEN, Top 10 MIT Technology Review Innovator Under 35 (Spain), 30 Emerging Leaders in the Life Sciences and received the 2019 Society of Hispanic Professional Engineers Young Investigator Award, in addition to the 2021 Cellular and Molecular Bioengineering Young Innovator Award and the 2021 Biomedical Engineering Society (BMES) Rising Star Award. His scientific discoveries have produced more than 85 peer-reviewed publications, including articles in Nature Communications, PNAS, ACS Nano, Cell, Nature Communications Biology, and multiple patents.

Summarising the content of his presentation, he explained to schools the need for computers to understand, read, write, and ultimately create new molecules following a Darwinian evolutionary algorithm to select molecular structures that interact with bacterial membranes, producing the first artificial antimicrobials that kill bacteria both in vitro and in models.



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relevant animals. He also described the development of diagnostic biosensors for COVID-19, reinforcing the potential of bioinformatics in his presentation. He argued that computer-generated designs and innovations at the intersection of machines and biology can help replenish our arsenal of effective drugs and generate novel diagnostics, providing needed solutions to global health problems caused by infectious diseases.

In the colloquium he had the opportunity to reinforce how the continued use of antibiotics ends up generating resistant strains, an aspect that must be taken into account in health and its environmental effects. He was therefore in favour of rationalising their use as much as possible until safe ways are found, such as those sought by his research group.

3. Dr. Carracedo presented the relationship between the environment and genetics of the project.

Link: <https://youtu.be/mBD5i6GVn2w>

This video includes the entire webinar and the subsequent colloquium of Dr Carracedo with 253 schools from Latin American countries, the Autonomous Communities, Poland, Portugal, Italy, Hungary and Morocco, to share with them the concepts of the relationship between genes and the environment involved in the project. The network was set up with the involvement of Education Counsellors from the Ministry of Education of Latin America, led by the Counsellor in Brazil, Mr. Cortegoso.



This event was chosen for World DNA Day, a molecule that is expressed in tune with the environment and therefore contains answers about climate change and pandemics such as COVID 19. The speaker is one of the leading exponents in Genomics in Latin America and this year he was also entrusted with the Genomic Medicine Programme of the IMPaCT infrastructure which was launched in all of the



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autonomous communities and Latin American countries in which there are schools in this educational network. Dr. Carracedo has received numerous awards, including the King Jaime I Research Prize, the Adelaide Medal, the Galien Medal, the Galician Gold Medal, the National Genetics Prize, the Constantes y Vitales Prize and the Prismas Prize for Dissemination.

The webinar - colloquium that Dr. Carracedo entitled "Genes, Environment and Health" integrated the postulates on which the One Health approach of the project was based. The Professor of Legal Medicine at the University of Santiago (USC), Director of the Galician Public Foundation of Xenomic Medicine (SERGAS-Xunta de Galicia) and Director of the National Genotyping Centre-ISCIII focused his main contents on the relationship between genes and the environment and disease from the research of the Xenomic Medicine group that he created and directs, which consists of 10 research groups, several technological platforms and more than 150 people.

Dr. Carracedo, from the capacity for communication, defended that everything we are is the result of genes and the environment and therefore all diseases have both components present. He also defended that diseases are relative to the environment, justifying this postulate with examples such as very white skin leads to disease in Africa or a student with ADHD has more problems in a rigid educational system. So that any participating student could understand the importance of the genome, he made an analogy of this molecule with the message of a book of 3,000 million letters with 22,000 chapters with instructions (genes) that are stored in 23 chromosomes and that occupy a height of 55 metres. On this molecule, the book of life, he reflected on two consubstantial and relevant aspects in his reading: death and mutations. He also expressed the importance of the Human Genome Project, which began in 1990 and was closed 12 years later at a cost of billions of euros and thousands of people working on it. He emphasised the importance of this advance based on the capacity of his group to do this work in a single day for only 900 euros (300 euros for reagents, 300 euros for computing and 300 euros for computer processes).

In his reflections on the confluence of genes and the environment in the disease, he placed the current work of his group in the COVID 19 research, an environmental disease because it is caused by a virus, but also with an importance of the genetics of its manifestations, which places value on personalised medicine to deal with it. He gave an example of how COVID 19 manifests itself as asymptomatic in people, in others it manifests itself as an acute respiratory disease and in certain cases it manifests itself as a systemic disease with a storm of cytokinins that becomes a disease that affects the whole body with a significant risk to life. In this respect, he said that it was already known that the genome has an influence of between 25% and 70% with an average heritability of 45%. In this context, he explained the extent of his study, which covers all the autonomous communities and practically all of Latin America.



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4. World Biodiversity Day was celebrated with the inauguration of the Director of SEPIE and a webinar by the Professor of Ecology of the University of Vigo.

On 21 May, 104 schools attended the presentation of the Ecology contents of the project. At the institutional opening, Alfonso Gentil, Director of SEPIE (Spanish Service for the Internationalisation of Education) spoke. The head of the internationalisation of Spanish education sent a message of support and encouragement to the network of schools and highlighted the relevance of the challenge.



This was followed by a webinar entitled Conserving Biodiversity, restoring ecosystems, preserving the well-being of society, given by Emilio Fernández Suárez, Professor of Ecology at the University of Vigo. With this intervention, Professor Fernández explained the contents of the project to schools in practically all the autonomous communities, most of the autonomous communities and various European countries and Morocco,



5. InnoEduCO2-Erasmus+ School Ecology Research Pilot Experience

Link: <https://www.youtube.com/watch?v=iyom2sGNUjU>

Through this video you can visualise a School Ecology research on *Zostera* in the Testal bivalve shellfish service ecosystem, which was designed as a pilot experience of the InnoEduCO2 project in collaboration with the scientific research project Zosteco of the University of Vigo and the Noia Shellfish Fishermen's Guild.

On Friday 9th April 2021, the professor of Ecology of the University of Vigo, accompanied by collaborators of his research group, met with 45 students and 3 teachers of the IES Poeta Añón in the ecosystem service of the bivalve shellfishing of the Testal sediment in the Muros - Noia estuary, together with 45 students and 3 teachers of the IES Poeta Añón. The students were selected for studying the subject of free configuration.





of 2nd ESO Climantics and also Biology and Geology in 4th ESO.

This initial pilot experience to the school science research project was developed between the Chair of Ecology of the University of Vigo and the Cofradía de Mariscadores de Noia.



The activity that was developed was designed to analyse the plans and recording approaches to incorporate these methodologies into the School Science experimental resources included in the technical report of the InnoEduCO₂ project. Therefore, it is designed so that students can continue working on the analysis of samples and data in the weeks following the day on which the activity is developed for the corresponding analysis of plans and audiovisual data collection approaches to generate the synchronous and asynchronous training content required by this project. Each student participating in the activity was provided with a research notebook in which they collected the data obtained and recorded the results derived from the data processing carried out.



The activity started with a field briefing on seagrass meadows followed by a practical part. The field briefing, which lasted about 20 minutes, covered the following aspects:

- Characteristics of seagrass-forming species: plants versus algae
- Evolutionary origin of grassland species: adaptations to the marine environment
- Structure of *Zostera*: verification of rhizome structure. Reproduction.
- Services provided by grasslands: sediment retention, nursery, carbon sequestration, water purification.
- Grassland-faunal diversity relationship
- Relationship between diversity and stability
- Threats to the meadows: pollution, coastal alteration, mechanical impacts: seabed, shellfishing, etc.
- Grassland-marshland interaction
- Human impact and habitat fragmentation
- Habitat fragmentation-diversity relationship

As for the methodology involved in the development of the field practice, students were organised in groups of 3 (approx. 10 groups).

A large area was delimited covering both dense grassland, fragmented grassland and sediment without vegetation. Ten transects were placed over the area, placing in each



one of them 8 samples approximately 2 metres apart. In each sample, a visual and tactile analysis of the sediment was carried out.

Each group took a sand sample in the internal areas of the meadow patches and in the annexed areas without vegetation, comparing a series of sedimentological variables that will be analysed visually. This analysis will include an estimation of the sediment composition, differentiating between bioclasts (remains of organisms with hard exoskeletons) or detrital grains. In the case of detrital grains, the aim will be to identify the percentage of quartz, feldspars and lico, the most frequent minerals on the beaches of Galicia and easily recognisable to the naked eye. In the sediments associated with seagrass meadows, the proportion of fines is often higher than in adjacent sandy areas, due to the stabilising effect of the meadow on the sediment, which in turn slows down the current speed and favours the sedimentation of fines. A first approximation can be made by the textural effect of the sand in the hands. In addition, the approximate diameter of the *Zostera* patch being sampled (in case the sample is placed on the meadow) shall be noted.



A 20x20 cm sampling square will then be placed and an estimate of *Zostera* coverage will be made.

A sample shall then be taken with a corer of 15 cm diameter.

The collected sediment shall be placed in a 0,5 mm mesh, which shall be taken to the sea for washing, so that as much sediment as possible is removed.

The material retained in the mesh was placed in a plastic bag which was marked with the sample code and a label was inserted inside in case it erased the external code. These samples were taken to the fridges of the Ecology area of the University.



from Vigo to analyse them in the laboratory of IES Poeta Añón on Tuesday of the following week.

Laboratory work The week following the field sampling, on Tuesday 13 April, the samples collected in Testal were analysed. Each group processed the 8 samples collected. Initially, they separated the *Zostera* plants, counting the number of feet in each sample.



All *Zostera* plants were placed on plateau paper and left to dry for 2-3 days. After this period, they were weighed to calculate the dry biomass of this species in each sample.

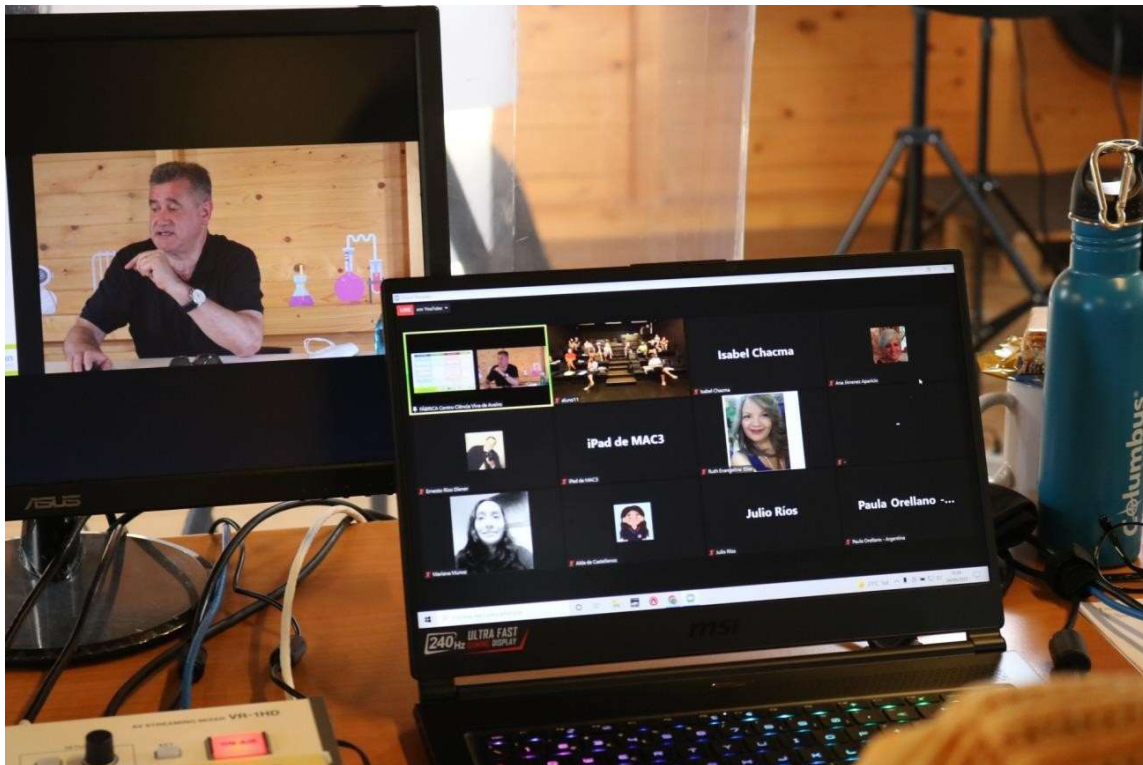
With regard to the fauna, the different organisms found in the sample will be separated, classified into taxonomic groups and the number of individuals in each group will be counted. The investigation will continue according to the plan agreed with the Biology and Mathematics teachers. All the data obtained will be recorded on the corresponding sheet provided to each student. The final phase of the session will be devoted to students drawing conclusions from their research and writing them down in their research notebook. Once the students have processed their data and produced their results, a new session will be held with the three groups of students from different classes. In each group there will be a sharing of results and a presentation of the conclusions reached. The students will be questioned by the teaching staff and their arguments will be recorded and subsequently channelled.



6. International teacher training course in Aveiro to analyse contents and methodologies.

Link: <https://www.youtube.com/watch?v=rlp6e7lyE3k&t=6s>

This course had an accreditation of 24 hours of teacher training issued by the Ministry of Education and Teacher Training. After more than a year of waiting, due to the situation derived from the COVID-19, Fábrica Centro has managed to develop the Teaching Innovation Seminar on climate change entitled "Action-research on new ways of learning and teaching climate change in the CLMNTK21 campus" and held between 3 and 7 September 2021 in the city of Aveiro (Portugal). This activity was framed in the training of teachers from pilot centres for the development of the two new Erasmus+ projects derived from Climántica for the 2021-21023 biennium: e-InnoEduCO2 and EDUCINEMA ClimaTourAction.



The programme of activities, supported by the universities of Aveiro and Santiago de Compostela, has been designed to strengthen the capacity of schools in teaching and training inclusive and digital science and environmental education, in line with the objectives set out in the KA226 e-InnoEduCO2 project. The 28h of training, approved by the Ministry of Education and Vocational Training, combined the four research seminars broadcast on Saturday afternoon, for the connection of teachers from Latin America, with activities only for those attending in person from Spain and Portugal: itineraries and workshops. All the activities were summarised in this video.



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The opening ceremony, held on Friday 3 September, was attended by Artur Silva, Vice-Chancellor of the University of Aveiro, José Ribau, President of the Municipal Chamber of Aveiro and Vítor Silva, Director of the Aveiro Schools Association, Pedro Pombo, Director of Fábrica and Francisco Sónia, Director of Climántica. The five participants showed their absolute involvement with a project that is now in its fourth edition in Lusitania. Afterwards, a guided visit to the educational facilities of Fábrica, Centro de Ciência Viva and the University of Aveiro took place, closing the inaugural day with the visit and analysis of the recently inaugurated Urban Ecological Garden of Fábrica.

Throughout the course, the campus participants attended lectures given by experts in environmental education. The course was divided into 4 seminars and several workshops. The seminar were developed under the formula of Kant's investigative seminar, with the participation of two co-rapporteurs around a certain approach.





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of the climate emergency. These lasted the entire Saturday afternoon and were relayed to the Ibero-American countries with pilot centres. Users from Brazil, Mexico, El Salvador, Panama, Argentina and Peru were connected. Each teacher who followed the 4 Saturday afternoon seminars was assigned a user. In order to place them in the same context and to achieve social separation of the territorial bubble groups, those attending in person shared a user with a moderator in the auditorium, thus remotely attending the communications that were taking place in Fábrica OnLine.



In the first seminar, Francisco Sónora and Aitor Alonso presented the main lines of InnoEduCO₂. The rapporteurs highlighted the importance of the network of alliances created in recent years, both at international and multisectoral level, to tackle challenges such as the production of transversal educational materials, the development of audiovisual and artistic products, the promotion of collaboration between centres and the involvement of students themselves in research tasks, with the aim of establishing a bridge between science and society.

The second seminar, led by Carmen García and Carmen Mellado, heads of service responsible for general education and international programmes, respectively, at the Ministry of Education of the Andalusian Regional Government, addressed the difficulties in implementing environmental education in the educational model due to the instability caused by changes in Spanish education laws, despite the fact that the 2030 Agenda promotes values such as quality education and social and environmental justice. In addition, they presented the Bilingual and Intercultural Border Schools project, a collaborative network between Spanish and Portuguese schools that aims to promote curricular flexibility.



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In the third seminar, José Antonio Caride and Antonio García addressed the climate emergency from an ethical perspective, emphasising the need to educate and train the population in order to facilitate their awareness and participation in the resolution of the conflict. Through psychology and reflection, the speakers invited the audience to reflect on the meaning of ecological citizenship, on which the balance and sustainability of the planet that future generations will inherit depend. There are no simple solutions, so education must be rethought from a more humanistic and interdependent point of view.



In the last research seminar, Pedro Pombo and David Vicente addressed the potential of audiovisual storytelling to raise audience awareness about climate change. Both the Fábrika science show and commercial cinema allow us to explore natural phenomena in a way that is different from our everyday lives, leaving an important mark on an audience that plays,



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experiences and gets emotionally involved with the situations shown through the show. This game of identities, they argue, can and should be used to our advantage to shape the society of tomorrow with the language and tools of today.



In addition to the training seminars, those attending the CLMNTK21 campus took part in various educational workshops organised by Fábrica staff. educational workshops organised by Fábrica staff, which covered a wide range of fields, such as STEAM pedagogy, in which teachers developed group projects using Fábrica's maker resources.





7. Training of the project in a course of the Centro del Profesorado de Elche.

Link: <https://www.youtube.com/watch?v=I9v5RW5A7Gg>

On 1 and 2 March 2022 the Elche Teacher Training Centre of the Valencia Regional Ministry of Education invited the University of Santiago de Compostela to carry out a course to bring the contents and methodologies of e-InnoEduCO2 to teachers in Elche.



- How to bring the IPCC report on the ocean and cryosphere into the classroom through laboratory practice.
- Climate change from a WHO Health perspective.
- STE(A)M technologies for children and youth climate change communication.

Visual conceptualisation with a causal approach and role-playing of the One Health approach. A gamification approach to reflect on arguments that enable the use of STE(A)M technologies.

8. Conferences on the content of the project in Aveiro in September 2022

At September from 2022 on developed presentations by communicators of international level in the contents of the project that were held in Aveiro: On the 1st, 2nd, 3rd and 3rd of October



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4 September, Aveiro hosted conferences by three of the most relevant Spanish communicators on the project's themes.

María Martín, director of the National Centre for Research on Human Evolution (CENIEH) and honorary professor in the Department of Anthropology at University College Lo. She gave two lectures "Hominid migrant: climate, barriers and paths", which can be seen in this video of a lecture she gave at the project 12 years ago, and will guide them towards the contents of her new work, published by Ediciones Destino and entitled *Homo imperfectus* Why do we continue to get sick despite evolution? In several sessions, he tackled the didactic transposition of the contents of his latest work, seeking, through various sessions, answers that link environmental changes with our health through the relationship between the environment and illness, especially the changes in climate that have brought us here as a species, and with the explanation of the fact that the natural selection we experience does not eliminate illness.

Joaquín Araujo is a Spanish naturalist and author of numerous books. A regular columnist in Spain's leading newspapers, he also works as a director, producer, scriptwriter and presenter of television series and documentaries. He is president of Proyecto Gran Simio in Spain. He was a collaborator of Félix Rodríguez de la Fuente, in written works and in the programme "El Hombre y la Tierra", during the 1970s. In 1991 his work was recognised with the UN GLOBAL 500 Award. He also won the Ondas Mediterráneas Award for Dissemination and Awareness 2004 and the BBVA Foundation Award for the Dissemination of Knowledge and Awareness in Biodiversity Conservation in 2006. He is a member of the Royal Academy of Letters and Arts of Extremadura. In this seminar he addressed, from his profound knowledge of the natural and rural world, how to bring the evidence of climate change to schools and the general public in terms of changes in the behaviour and distribution of species under the title *Evidencias del cambio climático para escolares y ciudadanos* (Evidence of climate change for schoolchildren and the general public).

See video: <https://www.innoeduco2.org/evidencias-del-cambio-climatico-en-el-species-behaviour-joaquin-araujo/>

9. Video of the project campus

This video communicates the methodologies, dynamics and various activities of the campus that was held in Aveiro in late August and early September 2022 in which 4 Latin American countries participated (Mexico, Panama, Peru and Brazil), 4 European countries (Poland, Romania, Portugal and Spain), Morocco representing Africa. Half of the Autonomous Regions of Spain participated.



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This video was used to transfer the integration of this project campus to different sectors, the educational communities involved and the network of schools involved in this project.

10. Dissemination of results seminar held in Aveiro from 2 to 6 September 2023.

Coinciding with the completion of the project, a teaching seminar was held to disseminate the results following this programme, which was accredited for 24 hours by the Ministry of Education. This programme was followed:

<https://www.innoeduco2.org/wp-content/uploads/2023/11/Programa-SEMINARIO-DOCENTE.pdf>





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CAMPUS JUVENIL INTERNACIONAL CLMNTK22 E-INNOEDUCO2

FORMACIONES DE LA MANO DE EXPERTOS COMO:



**FERNANDO
VALLADARES**

1 DE SEPTIEMBRE

Profesor de investigación del Centro Superior de Investigaciones Científicas (CSIC).



MARÍA MARTÍN

3-4 DE SEPTIEMBRE

Directora del Centro Nacional de Investigación de La Evolución Humana (CENIEH).



JOAQUÍN ARAUJO

2 DE SEPTIEMBRE

Naturalista. Escritor, periodista y director editorial. Director y guionista de documentales.

¡Participa!



**SELECCIÓN DE
PARTICIPANTES EN:**

www.congresovirtual.climantica.org



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Fernando Valladares. PhD in Biological Sciences from the Complutense University of Madrid and research professor at the CSIC, where he heads the Ecology and Global Change group at the National Museum of Natural Sciences. He is also an associate professor at the Universidad Rey Juan Carlos in Madrid. He has published more than 450 scientific articles and books in ecology and plant biology being a highly cited scientist in the area of Ecology and Environment (he is since 2016 among the 1% most cited scientists in the world with an H-index of 85). He is currently vice-president of the Iberian Society of Ecology. His research has focused on the impacts of global change on terrestrial ecosystems and on the mechanisms of tolerance and survival to extreme environmental conditions. A weekly contributor to numerous media outlets, he is active in direct scientific dissemination on a daily basis on his "Health of Humanity" channels.

Watch video: <https://www.innoeduco2.org/conferencia-del-campus-internacional-one-health-la-comunicacion-del-cambio-climatico-desde-la-ecologia-evolutiva-fernando-valladares/>

Musical developed on the Aveiro campus

During the Aveiro campus of the project, a musical theatre play was developed to bring the contents of the project to the general public.





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An intergenerational performance was chosen to connect with all ages in the awareness-raising process. It involved students from all project countries and was broadcast via streaming.



In this way of communicating the scientific content of the project, all the arts were integrated: music, dance, singing, visual arts and theatre.

Watch video: <https://youtu.be/AEn9Aeypb0Q>



Sustainability plan

Sustainability Objectives:

1. Continuous Integration in the Training Offer:

- The partners USC, UAveiro and Ulasi will integrate the training pathway for trainers in their training offers free of charge for at least 3 years.
- Ensure the continuous availability of the training pathway for teachers and students.

2. Incorporation in Internships and Laboratories:

- AEA and Liceo XXVI will integrate didactic and methodological resources and e-learning systems in their field and laboratory practices.
- Ensure the effective use of the resources developed in practical educational settings.

3. Contact with Stakeholders:

- Implement dissemination activities to establish contact with public authorities, relevant associations, and entities linked to school education and social inclusion.
- Encourage collaboration and promotion of project results and tools.

4. Community Schools Network:

- Develop and maintain a network of community schools disseminating scientific content,
- Bridging the digital divide and the intergenerational divide.

5. Transferability to other educational fields:

- Easily adapt the e-Lab system, training pathway, pedagogical resources and methodologies to other educational settings such as vocational training and higher education.



6. Agreement with Latin American Partners:

- Establish agreements with partners in Latin America to ensure the accessibility of project results to the Latin American community.

7. Supercomputing System hosting:

- Ensure the sustainability of the virtual classroom by hosting it in CESGA's supercomputing system for at least 3 years after the end of the project.

Sustainability Activities:

1. Maintenance of the Web Portal:

- Maintain the project web portal for at least three years after the end of the project with contributions from all partners.

2. Functional Extensions of the Virtual Classroom:

- Analyse functional extensions to the virtual classroom that add value to the project.
- Allow downloading of videos or training materials for user flexibility.

3. Stakeholder Meetings:

- Each partner will conduct at least two stakeholder meetings within three years after the end of the project.

4. Use of Partners' Own Resources:

- Use partners' own resources to sustain results beyond the life of the project.

Expected results:

1. Development of Enhanced Scientific Content:



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- Improving the quality of science education and the social vision of science through content for experimental school science.

2. Expansion of the supply of Science Outreach Centres:

- Extend the offer of popular science content, especially in e-Lab activities, 3D models and Maker content, offering new online content for schoolchildren.

3. Improving the Quality of School Institutions:

- Conduct studies on the impacts of global change on ecosystems and improve the quality of education through e-learning and volunteer programmes.

4. Strengthening Local Policies:

- Strengthen sustainable and healthy shellfishing policies, as well as continuing education in ICT and global change in collaboration with Outes Town Council and other local administrations.

Guarantees for Sustainability:

1. Continuous Analysis and Evaluation:

- Conduct regular analyses of the effectiveness of implemented sustainability activities.
- Adjust strategies as necessary to ensure long-term sustainability.

2. Incentives for Continuing Participation:

- Provide incentives to partners to maintain their commitment and contribution to the sustainability of the project.

3. Collaboration with External Partners:

- Explore opportunities for collaboration with external partners that can contribute to the sustainability of the project.



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This plan provides an overall structure to ensure the sustainability of the project, integrating specific activities and measures that address key aspects of the project and its outcomes. It is important to review and adjust this plan according to the changing needs of the educational environment and lessons learned during project implementation.

All partners will integrate the results of the project into their regular activities in order to further develop and improve them in the future. Relevant actors in the field of school education in the partner countries will implement these results which will ensure their availability in the future. The partners USC, UAveiro and Ulasi will integrate the training pathway for trainers into their training offer free of charge for teachers and students for at least 3 years. AEA and Liceo XXVI will integrate the didactic and methodological resources and e-learning systems in their field and laboratory practices.

Through the dissemination and exploitation activities implemented in the framework of the project, the partnership will have contact with relevant stakeholders who can promote the use of results and tools: public authorities at local, regional, national and European level, relevant associations of people with disabilities and other entities linked to school education, social inclusion, education organisations and institutions and their teachers and trainers and local Community networks.

The strategic plan for transfer to society, developed during the life of the project, will facilitate access for the entire population in a fun and creative way. To this end, the Community Schools Network and the multiplier events will be key. This network will continue to operate in Outes, supported by Outes City Council's own funds, promoting the dissemination of scientific content, the reduction of the digital divide and the intergenerational divide.

The transferability of the project results is guaranteed, as the e-Lab system, training pathway for teachers, pedagogical resources, methodologies, etc., can be easily adapted to other educational fields such as vocational training or higher education, and the agreement with Latin American partners will also be key to make the project results accessible to the Latin American community.

The virtual classroom system will be hosted in CESGA's supercomputing system. This will ensure the sustainability, for a minimum of 3 years from the end of the project, of the virtual classroom as a repository of the methodologies, didactic resources created during the life cycle of the project and future projects developed by the partnership.

The sustainability of the project results is guaranteed not only by the online experimental science curriculum, resources and innovative digital methodologies developed in the project and which will remain active and published after the project period, but also by the fact that the project's results will be published in the future.



implementation of the project, but also by the incorporation and assimilation of the training results produced in the framework of the project within European and international school education (annual virtual campuses).

The results will be transferable to European and international school communities, and to other educational sectors and providers of specialised training, higher education and vocational education and training through dissemination activities. Each partner will start procedures to include the project results in the school education curriculum recognised by regional/national authorities and to transfer this training to vocational and higher education.

The partners will work out from the beginning of the project implementation how to continue dissemination, exploitation of the project and cooperation between the partners after the end of the project. The conclusions will be finally translated into a "Strategic plan for transfer to society" describing the concrete actions agreed upon. This plan will contain, among other agreements, the following activities to ensure the sustainability of the project:

- The OC will maintain the web portal for at least three years after the end of the project; the partners will contribute to this maintenance.

- Functional extensions to the Virtual Classroom will be analysed to provide more added value to the project after its completion, or to support new project opportunities leading to future collaborations of the partnership. The aim is that the Virtual Classroom and the digital systems that integrate it offer users the possibility of downloading videos or training materials to their devices and being able to access them anywhere and at any time, providing them with the greatest possible flexibility.

- Each partner must develop min. two stakeholder meetings within three years after the end of the project.

- The resources to sustain the results beyond the life of the project will be the project partners' own resources, such as relevant organisations in the education and supercomputing sector.

It should be noted:

- At the end of the project there will be a consortium that will be able to address challenges of this nature with more scope in the European educational dimension, as well as a portal that allows the development of online maker and e-lab, e-learning didactic materials and an e-book to support teacher training in terms of telematic methodologies with its technological use manual.



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-USC, Ulasi, UAveiro, CESGA and their research centres will improve their visibility, scientific dissemination and their mission to reinforce educational settings to introduce experiential models with STE(A)M approach. They will also achieve key results after the end of the project by developing content for experiential school science that will help to improve the quality of science education and the social vision of science.

-The Fábrica de Ciencia Viva (UAveiro) science outreach centre will be building a new model that expands the offer of science outreach content. Until now, the offer of these science outreach centres has been made through school visits. With the results of this project, new online content will be generated to be offered to schoolchildren, especially with regard to e-Lab activities, the creation of 3D models and Maker content for online.

-School institutions (AEA, Lyceum XXVI and non-formal partners) will be reaching a higher quality with the study of the impacts of global change on ecosystems serving socio-economically important shellfish populations. They will continue their studies in the field and laboratory with their projection to synchronous and/or asynchronous telematic classes that will be done through a volunteer programme that will form teams of student researchers led and guided by a teacher-principal researcher tandem.

-Ayto. Outes and the local administrations that sign the Plan will strengthen active policies for sustainable and healthy seafood and lifelong learning in the field of ICT and global change, while collaborating to break down social barriers in access to telematic training. Science outreach and supercomputing centres will extend their usefulness for school education.

The EU will be able to develop this school-supercomputing-science-municipality consortium model. There will also be a wide range of technological resources, digital content, an effective Virtual Classroom model and teaching materials based on the WHO's new One Health approach.