



# iREEC 2019

International Researchers of the  
Education for Environmental Citizenship

## 1<sup>st</sup> International Conference

# iREEC 2019

## International Researchers of the Education for Environmental Citizenship 2019

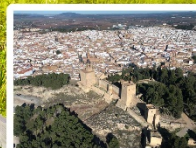
### 7-8 of November 2019

## University of Malaga, SPAIN

**Malaga**



**Antequera**



Funded by the Horizon 2020 Framework Programme  
of the European Union



European Network for  
Environmental Citizenship  
Cost Action CA16229



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**European Network for  
Environmental Citizenship**  
Cost Action CA16229

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# 1. Welcome to the iREEC 2019 Málaga-Antequera Conference

Dear Colleagues,

We are delighted to welcome you to the iREEC 2019 International Conference in Málaga - Antequera (Spain), November 7-8, 2019.

Contemporary environmental challenges require a comprehensive and holistic education that is change-oriented. Such education could contribute to empowering a capable environmental citizen who could bring those changes in the environment and society protecting the environment and achieving sustainability.

Education for Environmental Citizenship which is the theme of the International Conference iREEC 2019 lays into this direction. We hope that iREEC 2019 can be intellectually stimulating, enriching our scientific discussions with a visionary spirit, for a more sustainable future of the global environment and the global society. We hope also that iREEC 2019, will lead to an innovative, active and effective scientific community, the community of the International Researchers on the Education for Environmental Citizenship.

It is a great honor for University of Málaga to hold such an important International Conference on Education for Environmental Citizenship in Europe in the framework of the COST Action "European Network for Environmental Citizenship". We strongly hope that your stay in Málaga and Antequera will be enjoyable. Both cities are considered good examples of relevant historical and environmental sites. We hope that the beauty of the surroundings will inspire our research and promote a pleasant context for the discussions and visits during the conference.

Inspired by the conference theme, we have selected six topics that will include in parallel sessions oral presentations, an interactive poster session and a symposium. An opening and closing speech and an interesting field trip to Antequera and its surroundings will be also present. All this, enriched by social events will help to create the conditions for an inspirational scientific environment regarding Environmental Citizenship.

Together with the ENEC Steering Committee, the International Scientific Committee and the Local Organising Committee, we are looking forward to seeing you in southern Spain.

Enjoy the iREEC 2019 conference!

## 2. Introduction to iREEC 2019

Environmental Citizenship is a key factor in EU's growth strategy (Europe 2020) and EU's vision for Sustainable Development, Green and Cycle economy and Low-carbon society (EU-roadmap 2050). Environmental Citizenship has been an influential concept in many different arenas such as economy, policy, philosophy, organizations' management, leadership and marketing and could be better exploited and established furthermore in education. Environmental Citizenship is recognized as an important aspect in addressing global environmental problems such as climate change (Stern et al., 2011; Ockwell et al., 2009), whilst providing support to pro-environmental organizations and individuals, contributing also to public pressure for political action (signing petitions, writing to politicians and newspapers).

Education has a lot to contribute in adopting and promoting Environmental Citizenship. The under-explored (until now) potential for pro-environmental behaviour change through Environmental Citizenship should be more emphasized (Dobson, 2010) and can contribute greatly to a more sustainable world. Education for Environmental Citizenship (EEC) has a lot to contribute to this direction. In other words, Environmental Citizenship is about empowering people to develop their knowledge, competencies and dispositions necessary for responsible environmental engagement and civic participation. The European Network for Environmental Citizenship (ENEC), which is active in 38 countries, was established to promote theoretical and applied understanding of the Education for Environmental Citizenship and provides the following definition of EEC:

*"Education for Environmental Citizenship" (EEC) is defined as the type of education which cultivates a coherent and adequate body of knowledge as well as the necessary skills, values, attitudes and competences that an environmental citizen should be equipped with in order to be able to act and participate in society as an agent of change in the private and public sphere, on a local, national and global scale, through individual and collective actions, in the direction of solving contemporary environmental problems, preventing the creation of new environmental problems, in achieving sustainability as well as developing a healthy relationship with nature. "Education for Environmental Citizenship" (EEC) is important to empower citizens to exercise their environmental rights and duties, as well as to identify the underlying structural causes of environmental degradation and environmental problems, develop the willingness and the competences for critical and active engagement and civic participation to address those structural causes, acting individually and collectively within democratic*



*means and taking into account the inter- and intra-generational justice (ENEC 2018)[1].*

Education for Environmental Citizenship can be examined in different educational levels such as primary and secondary education and in different educational settings such as formal and non-formal education. In the iREEC 2019 international conference, the different ways and educational approaches with which Environmental Citizenship can be promoted will be emphasized.

The iREEC 2019 is an international conference in which original research papers, theoretical papers and reports from throughout the world dealing with the Education for Environmental Citizenship in all levels (pre-primary, primary, lower-secondary, upper-secondary, tertiary, higher education) and all settings-formalities (formal, non-formal, informal education) can be presented. The purpose of the iREEC 2019 is to contribute advance understanding of environmental and sustainability education through a focus on research works examining and promoting environmental citizenship through education. Multidisciplinary research and approaches combining environmental education, sustainability education, science education and citizenship education are also accepted.

iREEC 2019 International Conference Aims to:

- Present research on scientific and educational activities that exemplify developments toward achieving environmental citizenship.
- Emphasize educational research which focus to empower citizens to exercise their environmental rights and duties, to identify the underlying structural causes of environmental degradation, as well as to develop the competences for critical and active engagement and civic participation.
- Conduct scientific dialogue on educational challenges deriving from the theoretical foundations of environmental citizenship (as a field that integrates knowledge, skills, values, attitudes and competences) and demonstrate how these are addressed in formal and non-formal education.
- Promote and support best practices that cultivate the type of values, attitudes, skills and competences that an environmental citizen should be equipped with in order to act and participate in society as an agent of change.



### 3. General conference information

#### Conference Venue

iREEC 2019 Conference will take place at Hotel Eurostars (former Sercotel) Málaga from 7 to 8 November 2019. Conference sessions on Friday will take place in several venues in Antequera (Málaga) (see Programme). Buses provided by organizers will take participants for that (start/end point at Hotel Eurostars).

<https://www.eurostarshotels.com/eurostars-malaga.html>

Calle Héroe de Sostoa, 17, 29002 Málaga

H59+W4 Málaga

+34 951 01 01 50

#### Getting to and from the Conference Venue Hotel Eurostars

Málaga centre is 1.4 km away from Hotel Eurostars and central train station (called María Zambrano) is just 4 minutes away by foot. It is located 6.5 km away from Málaga Airport, that is connected to the train station and the city centre by bus, taxi and district train

In the airport, currency exchange facilities are available in both airport terminals (A & B). A tourist office can be found in Terminal A. From there, there are different ways of getting into town.

**Taxi:** There are taxi ranks at both terminals. A taxi to downtown Málaga costs about €25 and takes about 25 minutes.

**Málaga airport transfer:** You may arrange your Málaga airport transfer to take you straight to your hotel to avoid having to wait around once you have arrived at the airport. The estimated time to get downtown is 25 minutes. The price for the single run is about €25 per vehicle (though it might vary slightly depending on the exact destination) and €58 for the return one, if you need a private transfer (1-4 passengers). If you need a mini-bus (for 5-8 passengers) then the price could rise a bit, ranging from €48 (per vehicle, (in a single one way) and €95 for the return.

**Airport bus:** The Airport bus (#A) runs every 23 - 30 minutes either way from 6:25 a.m. to 11:00 p.m. The full schedules are "Airport-city centre", from 6:25 a.m. to 00:45 a.m. and "City centre- Airport" from 6:30 a.m. to 01:30 a.m., daily. For further info.: [www.emtmalaga.es](http://www.emtmalaga.es) The bus stops just outside the Arrivals Hall, and goes to the city centre (Alameda Principal). The closest stop to the hotel is "Explanada La Estación"



(7 min. by foot). The trip takes about 30 minutes and the cost of the one-way ticket is €3. See Maps below to take the bus in the airport (Aeropuerto Llegadas).

**Airport train:** Since the RENFE train station is adjacent to the Hotel Eurostars, you can take either the Airport bus or the district train (follow directions given in the Arrivals Hall to the Airport train station). There are regular services to the center of city of Málaga as well as to other Costa del Sol destinations, such as Torremolinos, Benalmádena-Arroyo de la Miel and Fuengirola (last stop). The train (line C1) runs from 6:44 a.m. to 00:54 a.m. (Airport-Centro Alameda) and from 05:20 a.m. to 23:30 (Centro Alameda-Airport). The trip to Málaga takes around 15 minutes. The cost of a one-way ticket on a working day is €1.80. Check schedules (Origin airport, destination Malaga-María Zambrano) at <http://www.renfe.com/viajeros/cercanias/malaga/> The Malaga María Zambrano (Central Station) destination train station is less than 5 minutes walking from Hotel Eurostars.

You need a 15 minutes walk to reach the city centre or take a taxi or uber, that sometimes needs a similar time depending on the traffic. UNITAXI +34 952 333 333.

### **Wi-Fi**

Wireless internet access is freely available throughout Wifi; connection details will be given at the venue.

### **Registration and Information Desk**

The registration desk is located on the first floor of the Conference Center at Hotel Eurostars. All attendees must be registered and are required to wear their official conference badge at all times. Pre-purchased lunch tickets (7 Nov) will be given at the same time as the conference badge for participants that don't stay at Hotel Eurostars). Care should be taken with these tickets as replacements cannot be issued.

Registration Desk Opening Times: 08:30 - 19:00 Thursday 7 November.

### **Catering**

On Thursday 7 November Coffee breaks will take place close to the Conference Center at Hotel Eurostars in the morning and in the afternoon (See Programme).





## **Tourist Information**

A tourist Infopoint will be available close the Registration Desk. Moreover, the Municipality of Málaga offers numerous discount vouchers to visit many city sights and museums in Málaga, as well as a lot of information that will make your visit easier by the app available in: <https://malagacongresscard.com/es/login>.

For login, click "Registro" and complete your personal information: Name, Family Name, e-mail and a password to use this app. Select in the Conference list "iREEC 2019" and finally click "Registrarse". After that, you will receive an email to activate your account and you are ready to use this App. You can use this App to organize your visit in Málaga before arriving.

## **Welcome reception in Málaga**

Date: 7 November 2019

Location: Ayuntamiento de Málaga (Town Hall) - Avenida de Cervantes, 4. 29016 Málaga

Welcome from the Mayor President Municipality of Málaga, Mr Francisco de la Torre Prados

Time: 21:00 - 22:00

Dress Code: Smart / Casual

Buses will take participants to the venue

## **Joint Lunch in Antequera**

Date: 8 November 2019

Location: Hotel La Magdalena - Finca de la Magdalena. Urb. Antequera Golf, s/n. 29200 Antequera, Málaga. +34 673 542 187

Time: 13:30 - 15:00

Dress Code: Casual

Buses will take participants to the venue

## 4. Organisation of the conference

### International Scientific Committee

- Dr Andreas Ch. HADJICHAMBIS, Chair of ENEC
- Prof Pedro REIS, Vice–Chair of ENEC
- Dr Marie-Christine KNIPPELS, Dissemination Board Coordinator of ENEC
- Dr Audronė TELESIENE, Leader of the ICC Committee of ENEC
- Prof Daphne GOLDMAN, Vice-Leader of the ICC Committee of ENEC
- Dr Demetra PARASKEVA-HADJICHAMBI, Grant Holder Manager of ENEC
- Dr José Jesús DELGADO PEÑA, Chair of the Local Organizer Committee of iREEC 2019.

### Local Organising Committee

- Dr José Jesús DELGADO PEÑA, Chair of the Local Organizing Committee of iREEC 2019
- Dr Carlota Angela ESCUDERO GALLEGOS
- Dr Remedios LARRUBIA VARGAS
- Mr Gabriel MARÍN FERNÁNDEZ
- Dr Juan José NATERA RIVAS
- PhD Student Abraham NUEVO LÓPEZ
- Dr María Jesús PERLES ROSELLÓ
- Dr José Damián RUIZ SINOGA
- Dr José María SENCIALES GONZÁLEZ
- PhD Student José María ORELLANA MACÍAS
- PhD Student Ana DE LA FUENTE ROSELLÓ

### ENEC Steering Committee

The Steering Committee (SC) is consisted from:

- Dr Andreas HADJICHAMBIS (CY), Cyprus Center for Environmental Research and Education (CYCERE), Ministry of Education and Culture, Cyprus, Cyprus University of Technology (Action Chair & Grand Holder SR)
- Prof Pedro REIS (PT), University of Lisbon, Portugal (Action Vice-Chair)

Working Group Leaders:

- Dr Marta ROMERO ARIZA (ES), University of Jaen, Spain (Primary Formal)
- Dr Jelle BOEVE-DE PAUW (BE), University of Antwerp, Belgium (Primary Non Formal)
- Dr Niklas GERICKE (SE), Karlstad University, Sweden (Secondary Formal)



- Dr Demetra PARASKEVA-HADJICHAMBI (CY), Cyprus Center for Environmental Research and Education (CYCERE), Ministry of Education and Culture, (Secondary Non Formal)

Other Members:

- Dr Andri CHRISTODOULOU (UK), University of Southampton, UK (Early Career Investigator and Gender Equality Coordinator – STSM Coordinator)
- Dr Marie-Christine KNIPPELS (NL), Universiteit Utrecht, Netherlands (Dissemination Board Coordinator – Communication Manager)

## 5. iREEC 2019 Sessions

1. Social, economic and political dimensions of Environmental Citizenship
2. Environmental Citizenship as a psychological construct (Knowledge(s), Values, Beliefs, Attitudes, Skills and Competencies and Environmental Citizenship)
3. Environmental Citizenship in the context of Environmental Education & Education for Sustainability (Responsible Environmental Behaviour, Youth Activism, Education for Sustainability and Environmental Citizenship)
4. Environmental Citizenship in different sectors (heritage, tourism, transport, cities, etc.)
5. Education for Environmental Citizenship in Formal Education
6. Education for Environmental Citizenship in Non-Formal Education

## 6. Reviewers of iREEC 2019

- Andreas Ch. HADJICHAMBIS, Cyprus Center for Environmental Research and Education (CYCERE), Ministry of Education and Culture, Cyprus University of Technology, Lemesos, Cyprus
- Pedro REIS, Instituto de Educação da Universidade de Lisboa, Lisboa, Portugal
- Marianna KALAITZIDAKI, University of Crete, Rethymno, Greece
- Jelle BOEVE-DE PAUW, University of Antwerp, Antwerp, Belgium
- Niklas GERICKE, Department of Environmental and Life Sciences, Karlstad, Sweden
- Demetra PARASKEVA-HADJICHAMBI, Cyprus Center for Environmental Research and Education (CYCERE), Ministry of Education and Culture, Lemesos, Cyprus
- Marie-Christine KNIPPELS, Universiteit Utrecht, Utrecht, Netherlands
- Andri CHRISTODOULOU, University of Southampton, Southampton, United Kingdom
- Audronė TELEŠIENĖ, Kaunas University of Technology, Kaunas, Lithuania
- Daphne GOLDMAN, Beit Berl Academic College, Kfar Saba, Israel
- José Jesús DELGADO PEÑA, Facultad de Filosofía y Letras, Dpto. Geografía. Facultad Filosofía y Letras. Universidad de Málaga, Málaga, Spain
- Nicole BAUER, Swiss Federal Institute for Forest, Snow and Landscape Research WSL, Birmensdorf, Switzerland
- Mirjana ZABIC, University of Banja Luka, Faculty of Agriculture, Banja Luka, Bosnia and Herzegovina

## 7. iREEC 2019 Session formats & Presentation instructions

iREEC 2019 Session formats:

- Oral presentation (15 min presentation and 5 min discussion)
- Poster in Interactive Poster Session
- Symposium with at least 3 papers. In the case of a symposium, a minimum of three different countries should be represented.

### Instructions for presentations

Interactive Poster Session:

The conference poster boards accept up to 120 (high) and 90 (wide) sizes, so a portrait layout would be preferable. A1 and A0 posters are acceptable. They are pin boards (pins will be provided).

Before the traditional walkaround poster presentation you will be asked to present your poster in 2 minutes (maximum) for the audience as a whole. There is no opportunity to present the poster with the aid of Power-point slides (a maximum of two slides). Only 2 minute oral presentation. After the authors' brief introduction, an in-depth discussion between them and the audience follows in the area of the poster displays. Poster session is scheduled for 60 minutes.

Oral presentations:

The oral presentations should be maximum 15 minutes long. In addition there will be time for 5 minutes of questions and/or discussions after each presentation. Computers and projectors are available in all rooms. The easiest way is to bring your presentation on a memory stick and upload your presentation before the session starts. There should be around 5 minutes at the end of the four (or five) presentations for general questions and discussion. The Chairperson of each Oral Presentation Session will be given three colored cards with 5 minutes (white), 2 minutes (yellow) and STOP (red) written on them so that the Chairperson can give the presenters a clear indication of the time left.



## Symposium Session:

Each presenter has 20 minutes and the Chairperson as the discussant have 5 minutes. This will leave 5 minutes for discussion after each presentation and 5 minutes for open discussion at the end. It is Chairperson's responsibility to facilitate time management. Chairperson will be given three colored cards with 5 minutes (white), 2 minutes (yellow) and STOP (red) written on them so that Chairperson can give the presenters a clear indication of the time left.

## 8. Guidance for Chairpersons

For all sessions, chairpersons are asked to do two key things:

- Act as the Master of Ceremonies for the session and maintain the scheduled timekeeping
- Act as enabler of interaction and discussion – this is one of the most important aspects of a research conference, so please foster active discussion.

Before the beginning of your session, please ensure that all the presentations are uploaded, introduce yourself to the group, and remind them of the timings. You will have three colored cards with 5 minutes (white), 2 minutes (yellow) and STOP (red) written on them so that you can give the presenters a clear indication of the time left.

### **Chairing an Invited Speaker Session**

Your role is to manage the smooth flow of the session. Introduce the presenter, your role as the discussant, and check everyone knows the timing. The presenter has 40 minutes and you as the discussant have 5 minutes. This will leave 15 minutes for discussion after the presentation for open discussion at the end. It is your responsibility to facilitate this. You will be given three colored cards with 5 minutes (white), 2 minutes (yellow) and STOP (red) written on them so that you can give the presenter a clear indication of the time left.

### **Chairing the Symposium**

Your role is to manage the smooth flow of the symposium. Introduce the presenters, your role as the discussant, and check everyone knows the timing. Each presenter has 20 minutes and you as the discussant have 5 minutes. This will leave 5 minutes for discussion after each presentation and 5 minutes for open discussion at the end. It is your responsibility to facilitate this. You will be given three coloured cards with 5 minutes (white), 2 minutes (yellow) and STOP (red) written on them so that you can give the presenters a clear indication of the time left.

### **Chairing Oral Presentations session**

Your role is to manage the timing of the presentations and check that all runs smoothly. Introduce yourself to the presenters and encourage them to upload their presentations before the session begins. Remind them of the timing: This format allows for 15 minutes of individual presentation time followed by a 5 minutes discussion for each paper. There should be around 5 minutes at the end of the four (or five) presentations for general questions and discussion. you will be given three colored





cards with 5 minutes (white), 2 minutes (yellow) and STOP (red) written on them so that you can give the presenters a clear indication of the time left.

### **Chairing Interactive Poster session**

Your role is to make the poster sessions a vibrant opportunity for exchanging research. If presenters have not already done so, encourage them to put up their posters on the boards. Each presenter has 2 minute to present him/herself and the topic of the poster in front of an audience gathered as a group. After the authors' brief introduction, an in-depth discussion between them and the audience follows in the area of the poster displays. Poster sessions are scheduled for 60 minutes. As chairperson, you will need to explain how the session runs as it may be unfamiliar to some delegates. You will also need to manage the timing and coordinate a fruitful discussion for each poster.

## 9. Invited Speakers

Professor C. P. Constantinou, University of Cyprus  
Opening Ceremony – Invited Speaker Session, Thursday, 7<sup>th</sup> of November 2019



Constantinos P. Constantinou is a Professor of Science Education and Director of the Learning in Science Group at the University of Cyprus. He has a PhD in Physics from the University of Cambridge and has worked as a Postdoctoral Research Associate at Washington State University and as a Visiting Professor at the University of Washington. He is a member of the editorial boards of the International Journal of Science Education, Educational Research Review and Learning, Culture and Social Interaction. He is serving as a reviewer in other international research journals including

Learning and Instruction and the Journal of Research in Science Teaching. His research interests focus on the learning and teaching of science as a process of inquiry and the use of educational technologies as a tool for promoting critical evidence-based thinking.

The Learning in Science Group uses the results of this research in the development of online and conventional learning environments, such as the STOCHASMOS platform, and research-based teaching-learning sequences to promote conceptual understanding and scientific thinking.

Dr. Constantinou has co-ordinated a number of projects funded by the European Commission and the Cyprus Research Promotion Foundation. He has participated in the High Level Working Group that authored the report Europe needs more Scientists! in 2004; he was the Rapporteur in a group of experts that carried out the mid-term evaluation of the EC Science in Society programme in FP6 and he participated in an expert panel reflecting on the educational outreach programme of the European Space Agency and its future evolution. Finally, he has served as a member of the Board of the European Association for Research on Learning and Instruction (EARLI) and of the European Association of Science Education Researchers (ESERA).

Dr. habil. Elisabeth Schmitt, Assistant Professor, University of Giessen, Germany. Invited Speaker Session, Friday, 8<sup>th</sup> of November 2019



Elisabeth Schmitt is an Assistant Professor at the Department of Geography of the Justus-Liebig-University and freelance scientific author and editor. Throughout her career, E. Schmitt's working lines have been: Landscape ecology, biogeography, nature conservation & landscape planning. Her main research areas have been the European and Canadian Arctic, Central Europe and since the year 2000 she has also been evolved in research projects in Mediterranean coastal areas of Spain (Mallorca, Andalucía). Research work led her inter alia to the North Pole,

China and Tibet. Her research activities focus on human impacts on Ecosystems (inclusive climate change) and ecosystem's regeneration capability, integrative Nature conservation planning and environmental management. An important personal concern of E. Schmitt is to transfer scientific results and findings of her work and travels to the public in order to improve environmental understanding and behaviour. She was e.g. Chair of the Editorial Committee of the International Permafrost Association. Since 2015 her special interest is dedicated to the environmental education of kindergarten kids and young grammar school pupils (class 5 and 6).

#### Degrees:

1998: Dr. habil (habilitation), Faculty of Geoscience, University of Giessen (Title of habilitation thesis: Studies on the regeneration capacity of arctic and subarctic ecosystems following natural and anthropogenic interferences. Case studies from Spitzbergen, the Selwyn/Mackenzie Mountains (West Canada) and Swedish Lapland)

1989: PhD, Department of Geography, University of Giessen (Title of thesis: Development of a biotope network concept for the Upper Middle Rhine Valley)

1985: Diploma, Department of Geography, University of Giessen (Title of Diploma Thesis: Management plan for the nature conservation area "Koppelstein". A contribution to the long-term maintenance of its ecological values).

## 10. Scientific programme

Thursday, 7<sup>th</sup> of November 2019, Eurostars Hotel Conference Center

Opening Ceremony, 9:00 – 9:30

Room RETIRO & CÓNsula

Chairperson: Dr José Jesús DELGADO PEÑA

- Welcome from the Chair of the Local Organizing Committee, Dr José Jesús Delgado Peña, Chair of the Local Organizer Committee of iREEC 2019
- Addressing the iREEC 2019, from the Chair of the International Scientific Committee, Dr Andreas Ch. Hadjichambis, Chair of the European Network for Environmental Citizenship.
- Addressing the iREEC 2019, from the University of Malaga, Dr Miriam Esther López Rodríguez, Vicerrectora Adjunta de Posgrado.
- Addressing the iREEC 2019, from the Málaga Municipality, Mrs. Gemma del Corral, Concejala Delegada del Área de Sostenibilidad Medioambiental.

Invited Speaker Session, 9:30 – 10:30

Room RETIRO & CÓNsula

*ENEC's Research Workshop 1 Session*

Chairperson: Prof Pedro REIS

- Title: Education for Responsible Citizenship
- Professor Constantinos P. Constantinou, University of Cyprus

Coffee Break, 10:30 – 11:00

Room RETIRO & CÓNsula

Thursday, 7<sup>th</sup> of November 2019, Eurostars Hotel Conference Center

Session 3, 11:00 - 12:30

Room LIMONAR

Environmental Citizenship in the context of Environmental Education & Education for Sustainability

*ENEC's Trans Working Group Session*

Chairperson: Prof Daphne Goldman

**R1-3-1 - A framework for connecting educational leadership to sustainability citizenship**

Ariel Sarid & Daphne Goldman

*Faculty of Education, Beit Berl College, Israel*

**R1-3-2 - Community garden - a tool to enhance environmental citizenship**

Zvi Weinstein

*Israel Smart Cities Institute*

**R1-3-3 - Primary school children's conceptions of water care and strategies for curbing pollution**

Anabel Vázquez Martín Doimeadiós & Juan Carlos Tójar Hurtado

*Universidad de Málaga, Spain*

**R1-3-4 - Pursuing social change within ecological activism: the work on individual consciousness, participatory creation and legislative transformation**

Joana Pereira de Magalhães Cruz<sup>1</sup>, Carla Malafaia<sup>1</sup>, José Eduardo Silva<sup>2</sup> & Isabel Menezes<sup>1</sup>

*1: CIIE – Faculdade de Psicologia e Ciências da Educação, University of Porto, Portugal*

*2: GIEP - Centre for Humanistic Studies, Institute of Arts and Humanities, University of Minho, Portugal*

Thursday, 7<sup>th</sup> of November 2019, Eurostars Hotel Conference Center

Sessions 4, 11:00 - 12:30

Room CALETA

Environmental Citizenship in different sectors

*ENEC's Trans Working Group Session*

Chairperson: Dr Andri Christodoulou

**R1-4-1 - Environmental citizenship and university students in Croatia**

Ivan Šulc & Slaven Gašparović

*University of Zagreb, Faculty of Science, Department of Geography, Croatia*

**R1-4-2 - Environmental impact of depopulation. The case of Aragon (Spain)**

Velilla Gil, Javier<sup>1</sup>, Carlos Guallart Moreno<sup>2</sup> & María Laguna Marín-Yaseli<sup>3</sup>

*1: IES "El Portillo" (Zaragoza, Spain)*

*2: Colegio Santa María del Pilar-Marianistas (Zaragoza, Spain)*

*3: Colegio del Salvador-Jesuitas (Zaragoza, Spain)*

**R1-4-3 - Cartography of controversies for an environmental citizenship**

Paloma España-Naveira<sup>1</sup> & Carlos Tapia-Martín<sup>2</sup>

*1: Fundación Metrópoli, Architect, Madrid, Spain*

*2: University of Sevilla, School of Architecture of Sevilla, Spain*

**R1-4-4 - Promoting young people's environmental citizenship through nature-based solutions in cities: Promises, realities and opportunities**

Kathrin Hörschelmann

*Institute of Geography, University of Jena (Germany), and Research Associate, Leibniz-Institut für Länderkunde Leipzig, Germany*

Thursday, 7<sup>th</sup> of November 2019, Eurostars Hotel Conference Center

Session 5a, 11:00 - 12:30

Room RETIRO & CÓNsula

Education for Environmental Citizenship in Formal Education

*ENEC's Working Groups 1 & 3 Session*

Chairperson: Dr Marta Romero Ariza

**R1-5a-1 - Applying the Education for Environmental Citizenship pedagogical approach: Insights from a Cyprus case study**

Andreas Ch. Hadjichambis<sup>1</sup> & Demetra Paraskeva-Hadjichambi<sup>2</sup>

1: *Cyprus Centre for Environmental Research and Education, CYCERE, Agiou Andreou 306, P.O. Box 56091, 3304, Lemesos, Cyprus*

2: *Ministry of Education and Culture, Nicosia, Cyprus*

**R1-5a-2 - Measuring environmental citizenship in a Nordic civic and citizenship education context**

Lihong Huang & Saiki Lucy Cheah

1: *NOVA Youth Research, Oslo Metropolitan University, Norway*

2: *Philosophy and Education Department, Teachers College, Columbia University, New York City, U.S.A.*

**R1-5a-3 - Ecological footprint calculators: a critical pedagogical analysis**

Benito Cao

*The University of Adelaide, Australia*

**R1-5a-4 - Climate change in the curricula of lower-secondary education of Greece: is there adequate preparation of the citizens of tomorrow to the great challenge of humankind?**

Themistoklis Sbarounis & George Farangitakis

*Argyroupolis Center for Environmental Education, Athens, Greece*

**R1-5a-5 - Citizenship competences regarding sustainability issues in lower secondary science education**

Michiel van Harskamp, Marie-Christine P.J. Knippels & Wouter R. van Joolingen

*Freudenthal Institute, Utrecht University, Utrecht, The Netherlands*

Free Time, 12:30-13:00

Lunch Break, 13:00 – 14:00

Eurostars Hotel Restaurant



Thursday, 7<sup>th</sup> of November 2019, Eurostars Hotel Conference Center

Session 1, 14:00 - 16:00

Room LIMONAR

Social, economic and political dimensions of Environmental Citizenship

*ENEC's Trans Working Group Session*

Chairperson: Dr Marie-Christine P.J. Knippels

**R2-1-1 - Political dimensions of environmental citizenship**

Ralph Levinson

*University College London – Institute of Education, London WC1H 0AL, United Kingdom*

**R2-1-2 - Environmental Citizenship: Or the production of green neoliberal citizens**

Benito Cao

*The University of Adelaide, Australia*

**R2-1-3 - Differences of environmental citizenship in EU**

Adrienne Csizmady<sup>1</sup>, Imre Kovách<sup>1,2</sup>, Boldizsár Megyesi<sup>1</sup>

*1: Institute for Sociology, Centre for Social Sciences, Hungarian Academy of Sciences,*

*2: University of Debrecen, Hungary*

**R2-1-4 - Choosing between democracy and the environment – the inconvenient predicament of educators and scientists**

Bjørn Bedsted

*Danish Board of Technology, Denmark*



Thursday, 7<sup>th</sup> of November 2019, Eurostars Hotel Conference Center

Sessions 2&3, 14:00-16:00

Room CALETA

Environmental Citizenship as a psychological construct

Environmental Citizenship in the context of Environmental Education & Education for Sustainability

*ENEC's Trans Working Group Session*

Chairperson: Dr Jelle Boeve-de Pauw

**R2-2&3-1 - Action Competence in Sustainable Development: a measurement instrument in development**

Wanda Sass, Jelle Boeve-de Pauw, Sven De Maeyer

*Research Unit Edubron, Faculty of Social Sciences, University of Antwerp, Belgium*

**R2-2&3-2 - Attitudes of university students towards global education topics**

Vladislav Kaputa<sup>1</sup> – Zuzana Gallayová<sup>2</sup> – Hana Maťová<sup>3</sup> – Igor Gallay<sup>4</sup>

*1,3: Technical University in Zvolen, Faculty of Wood Science and Technology, Department of Marketing, Trade and World Forestry, Slovakia*

*2,4: Technical University in Zvolen, Faculty of Ecology and Environmental Sciences, Department of Applied Ecology, Slovakia*

**R2-2&3-3 - Evaluating an educational intervention designed to foster values-thinking and foresighted thinking among undergraduate university students**

Audronė Telešienė

*"Civil Society and Sustainability" Research Group, Kaunas University of Technology, Lithuania*

**R2-2&3-4 - Analysis of conceptions and perceptions on the environmental impacts of consumerism with the environmental education program "cambio mi modelo de consumo"**

Leticia-Concepción Velasco-Martínez & Juan-Jesús Martín-Jaime

*Universidad de Málaga, España*

**R2-2&3-5 - Citizen actions to achieve the Sustainable Development Goal 6: Clean water and sanitation for all**

María Luisa de Lázaro Torres, Francisco José Morales Yago & Julio López-Davalillo Larrea

*Universidad Nacional de Educación a Distancia, Departamento de Geografía, España*

Thursday, 7<sup>th</sup> of November 2019, Eurostars Hotel Conference Center

Session 5b, 14:00 - 16:00

Room RETIRO & CÓNsula

Education for Environmental Citizenship in Formal Education

*ENEC's Working Groups 1 & 3 Session*

Chairperson: Prof Pedro Reis

**R2-5b-1** - The empowerment of future teachers as environmental citizens through the development of a scientific exhibition on climate geoengineering  
Elisabete Linhares<sup>1</sup> & Pedro Reis<sup>2</sup>

1: *Instituto Politécnico de Santarém, Escola Superior de Educação, Portugal*

2: *Universidade de Lisboa, Instituto de Educação, Portugal*

**R2-5b-2** - Civics studies as platform for developing environmental citizenship

Assaf Nabarro, Dapne Goldman, Daniel Mishori

*Tel-Aviv University, Israel*

**R2-5b-3** - Environmental education for sustainability in formal contexts: the role of children and young people in the promotion of environmental citizenship

Clementina Rios<sup>1</sup>, Alison Neilson<sup>2</sup>, Isabel Menezes<sup>1</sup>

1: *Centre for Research and Intervention in Education, Faculty of Psychology and Education Sciences, University of Porto, Portugal*

2: *Centre for Social Studies of the University of Coimbra, Portugal*

**R2-5b-4** - Pre-service elementary science teachers initiation to activism through the production of videos on local problems

Daniel Cebrián-Robles<sup>1</sup>, Enrique España-Ramos<sup>1</sup> and Pedro Reis<sup>2</sup>

1: *University of Málaga, Science Education Department, Málaga, Spain*

2: *Universidade de Lisboa, Instituto de Educação, Lisboa, Portugal*

**R2-5b-5** - Teaching practices of elementary and secondary teachers in education for sustainable development in Flanders

Eleni Sinakou, Vincent Donche & Peter Van Petegem

*Unit Edubron, Department of Training and Education Sciences, Faculty of Social Sciences, University of Antwerp, Belgium*



Thursday, 7<sup>th</sup> of November 2019, Eurostars Hotel Conference Center

Coffee Break & Interactive Poster Session, 16:00 - 17:00  
Room RETIRO & CÓNsula

*ENEC's Trans Working Group Session*  
Chairperson: Dr José Jesús Delgado Peña

**IPS01** - Enhancing environmental citizenship in education for sustainability using GIS tools

María Luisa de Lázaro Torres (Coord) et al.

*Geography Department\*. Universidad Nacional de Educación a Distancia, España*

**IPS02** - Exploring Adolescents' Environmental Citizenship-Relevant Behaviors via General and Behavior-Specific Approaches

Audra Balundė, Lina Jovarauskaitė & Mykolas Simas Poškus

*Mykolas Romeris University, Institute of Psychology, Environmental Psychology Research Center, Lithuania*

**IPS03** - Environmental values of Eastern European citizens

Rares Halbac-Cotoara-Zamfir & Cristina Halbac-Cotoara-Zamfir

*Politehnica University of Timisoara, Romania*

**IPS04** - The role of normative, habitual, intentional, and situational factors in understanding adolescents' bottled water use

Lina Jovarauskaite

*Environmental psychology research center, Mykolas Romeris University, Lithuania*

**IPS05** - Cryptic biodiversity as a means to nature conservation awareness for environmental citizenship

Gema Parra<sup>1</sup>, Francisco Guerrero<sup>1</sup>, Francisco Jiménez-Gómez<sup>1</sup>, Raquel Jiménez-Melero<sup>1</sup> and Marta Romero<sup>2</sup>

*1: Departamento de Biología Animal, Biología Vegetal y Ecología. Universidad de Jaén (Spain)*

*2: Departamento de Didáctica de las Ciencias. Universidad de Jaén (Spain)*

**IPS06** - Effect of contact with nature during childhood on environmental attitudes, ecological behavior and environmental citizenship behavior: comparing children's and adults' self-report

Ilka Dubernet<sup>1</sup>; Fabian Carlo<sup>2</sup> & Nicole Bauer<sup>1</sup>

*1: Social Sciences in Landscape Research, Economics and Social Sciences, Swiss Federal Research Institute WSL, Switzerland*

*2: Institute for Social Planning, Organisational Change and Urban Development, FHNW School of Social Work*

**IPS07** - The VALIES project: Towards Effective ESD in Formal Education in Flanders

Jelle Boeve-de Pauw<sup>1</sup>, Kirsten Bonte<sup>1,2</sup>, Wanda Sass<sup>1</sup>, Eleni Sinakou<sup>1</sup>, Dries Verhelst<sup>1</sup>, Els De Smet<sup>1,4</sup>, Brigitte Pycke<sup>2,5</sup>, Bea Merckx<sup>3</sup>, Miette Plessers<sup>1,4</sup>, Thomas Remerie<sup>1,3</sup>, Eef Thoen<sup>3</sup>, Ellen Claes<sup>2</sup>, Sven De Maeyer<sup>1</sup>, Vincent Donche<sup>1</sup>, Marc Hooghe<sup>2</sup>, Jan Vanhoof<sup>1</sup>, Wouter Schelfhout<sup>6</sup> & Peter Van Petegem<sup>1</sup>

*1: University of Antwerp, Faculty of Social Sciences, Department of Training and Education Sciences, Belgium*

*2: University of Leuven, Faculty of Social Sciences, Centre for Political Studies, Belgium*

*3: Artevelde University College, Teacher Training Department, Belgium*

*4: Catholic Education Flanders, Belgium*

*5: Provincial Education Flanders, Belgium*

*6: University of Antwerp, School of Education, Belgium*

**IPS08** - Connecting air pollution with the big picture of sustainability to promoting civic engagement

Daniela Conti & Luca Baglivo

*Centre for Environmental Research, Documentation and Education CREDA, Parco di Monza, Monza, Italy*

**IPS09** - Youth knowledge and awareness about status and the main threats which migratory fish species face during their long journey

Mirjana Lenhardt

*Institute for Biological Research University of Belgrade, Belgrade, Serbia*

**IPS10** - Garbage problems at Saharan Refugee camps: controversial issues to environmental citizenship teacher's training and social changes as a consequence

M<sup>a</sup> del Consuelo Díaz Bédmar & Antonia García Luque

*Universidad de Jaén, España*



**IPS11 - Experiences in citizen journalism and collaborative cartography for the education and the awareness for environmental citizenship**

María Purificación Subires-Mancera<sup>1</sup> & José Jesús Delgado-Peña<sup>2</sup>

1: *Department of Journalism. University of Málaga, Spain*

2: *Department of Geography. University of Málaga, Spain*

**IPS12 - From raising awareness to capacity building: turning business school students into environmental citizens**

Irina Martynova & Jekaterina Sadovskaya

*Department of International Business, School of Business of Belarusian State University, Minsk, Belarus*

**IPS13 - School effectiveness towards Education for sustainable development**

Dries Verhelst, Jan Vanhoof, Jelle Boeve-de Pauw & Peter Van Petegem

*Department of Training and Education Sciences, University of Antwerp, Belgium*

**IPS14 - Forest education as key element of environmental citizenship**

Janine Oettel<sup>1</sup>, Florian Leregger<sup>2</sup>, Johann Zöscher & Katharina Lapin<sup>1</sup>,

1: *Austrian Federal Research Centre for Forests, Vienna, Austria*

2: *Institute for Environment, Peace and Development (IUF), Vienna, Austria*

3: *Forest Training Centre, Ossiach, Austria*

**IPS15 - Education for Environmental Citizenship through civil society activities**

Cristina Halbac-Cotoara-Zamfir & Rares Halbac-Cotoara-Zamfir

*Politehnica University of Timisoara, Romania*

Thursday, 7<sup>th</sup> of November 2019, Eurostars Hotel Conference Center

Session 1,6&5, 17:00 - 18:30

Room LIMONAR

Education for Environmental Citizenship in Non-Formal Education

Social, economic and political dimensions of Environmental Citizenship

*ENEC's Working Groups 2 & 4 Session*

Chairperson: Dr Audrone **Telešienė**

**R3-1,6&5-1 - DOT TO DOT© The City is our Classroom**

Cristian Suau

*UK*

**R3-1,6&5-2 - Influence of a nuclear role-playing game on the environmental awareness of preservice teachers. A design-based research**

Isabel María Cruz Lorite, Daniel Cebrián-Robles, María del Carmen Acebal Expósito & Ángel Blanco López

*University of Málaga, Science Education Department, Málaga, Spain*

**R3-1,6&5-3 - Some examples of best practices to address the environmental citizenship gap in higher education**

Maša Kovič Dine & Željko Oset

*1: Faculty of Law, University of Ljubljana, Slovenia*

*2: University of Nova Gorica, Slovenia*

**R3-1,6&5-4 - Education for environmental citizenship: A case study from Turkey**

Çigdem Adem

*Ankara University, Turkey*

Thursday, 7<sup>th</sup> of November 2019, Eurostars Hotel Conference Center

Session 5c, 17:00 - 18:30

Room CALETA

Education for Environmental Citizenship in Formal Education

*ENEC's Working Groups 1 & 3 Session*

Chairperson: Dr Slaven **Gašparović**

**R3-5c-1** - Development of study materials to support implementation of education for environmental citizenship in formal education system

Maris Klavins

*University of Latvia, Department of Environmental Science*

**R3-5c-2** - Challenges of teaching environmental citizenship in Austrian secondary schools

Margaret Clark Carter & Katharine Lapin

*1: Mater Salvatoris Allgemeine Hochschule, Vienna, Austria*

*2: Austrian Research Centre for Forests, Department of Forest Growth and Silviculture, Vienna, Austria*

**R3-5c-3** - Role-playing game about Urban Solid Waste (USW) incineration as a methodological strategy to deal with socio environmental problems at secondary education

González-Sánchez, E.; Acebal, M. C. & Brero, V.

*University of Málaga, Spain*

Thursday, 7<sup>th</sup> of November 2019, Eurostars Hotel Conference Center

Symposium Session 17:00 - 18:30

Room RETIRO & CONSULA

Socio-Scientific Inquiry-Based Learning: a pedagogic model for Environmental Citizenship

*ENEC's Trans Working Group Session*

Chairperson: Prof Niklas Gericke

**SS-Intro - Socio-Scientific Inquiry-Based Learning: a pedagogic model for Environmental Citizenship**

Andri Christodoulou<sup>1</sup>, Marie-Christine Knippels<sup>2</sup>, Ralph Levinson<sup>3</sup> & Marta Romero-Ariza<sup>4</sup>

1: Southampton Education School, University of Southampton, UK

2: Freudenthal Institute, Utrecht University, The Netherlands

3: University College London Institute of Education, UK

4: Department of Didactics of Sciences, University of Jaén, Spain

Paper 1

**SS01 - Explicating the model of SSIBL**

Ralph Levinson

University College London Institute of Education, London, UK

Paper 2

**SS02 - Promoting responsible action for climate change through socio-scientific inquiry-based learning**

Andri Christodoulou

Southampton Education School, University of Southampton, UK

Paper 3

**SS03 - Opportunities for and challenges with SSIBL in science teacher education for citizenship**

Marie-Christine, P.J. Knippels & Michiel van Harskamp

Freudenthal Institute, Utrecht University, The Netherlands

Paper 4

**SS04 - Linking environmental citizenship with school curriculum and supporting responsive action**

Marta Romero Ariza, Antonio Quesada Armenteros, Ana María Abril Gallego

Department of Didactics of Sciences, University of Jaén, Spain





ENEC MC Meeting Session, 18:30 - 20:00  
Chairperson: Dr Andreas Hadjichambis

Room RETIRO & CÓNsula

Only for Members and Substitutes of the Management Committee of the European Network for Environmental Citizenship (ENEC) – Cost Action CA16229.

Friday, 8<sup>th</sup> of November 2019, Antequera

### Environmental Citizenship field trip to Antequera

- 8:30: Pick up from the entrance of Eurostars Hotel to go to Antequera.
- 9:30 - 10:45: Visit Paraje Natural El Torcal de Antequera (small walk and visit the Interpretation Center).

Forum for Young Researchers, 11:15 - 12:30

Salón de Plenos, Town hall of Antequera

Chairpersons: Dr Andri Christodoulou

Dr Slaven **Gašparović**

Visit to Antequera (People not attending the FYR, 11:15 - 12:30

Exit from Town hall of Antequera

Meeting with High School "Los Colegiales" to know and debate about their projects related Environmental Citizenship, 12:30 - 13:00

Salón de Plenos, Town hall of Antequera

Lunch in Hotel La Magdalena, 13:30 - 15:00

Room Iglesia

ENEC MC Meeting Session, 15:00 - 16:00

Room Iglesia, Hotel La Magdalena

Chairperson: Dr Andreas Hadjichambis

Only for Members and Substitutes of the Management Committee of the European Network for Environmental Citizenship (ENEC) – Cost Action CA16229.

Chairperson: Dr Andreas Ch. Hadjichambis, Chair of the European Network for Environmental Citizenship (ENEC)

**ENEC Working Groups Meeting Session, 16:00 - 17:00, Room Iglesia & Room Olivar, Hotel La Magdalena**

**Only for Members and Substitutes of the Management Committee of the European Network for Environmental Citizenship (ENEC) – Cost Action CA16229.**

**Chairpersons: Dr Marta Romero Ariza (WG1)  
Dr Jelle Boeve-de-Pauw (WG2)  
Dr Niklas Gericke (WG3)  
Dr Demetra Hadjichambi (WG4)**

**Closing invited Speaker Session, 17:00 - 18:00**

**Room Iglesia, Hotel la Magdalena**

**Chairperson: Dr José Jesús Delgado Peña**

- **Concept mapping: A new technique in Geography lessons at German schools in order to improve complex environmental education of young pupils, by Dr habil. Elisabeth Schmitt, Assistant Professor, University of Giessen, Germany.**

**Free time in Antequera, 18:30 - 19:00**

**Closing Ceremony, 19:00 - 19:30**

**Town Hall of Antequera**

**Chairperson: Dr José Jesús Delgado Peña**

- **Addressing the iREEC 2019, from the Chair of the International Scientific Committee, Dr Andreas Ch. Hadjichambis, Chair of the European Network for Environmental Citizenship.**
- **Addressing the iREEC 2019, from the Mayor President Municipality of Antequera, Mr Manuel Jesús Barón Ríos and Mrs Sara Ríos Soto, Delegada del Área de Familia, Equidad, Educación, Accesibilidad y Sanidad**

**Return to Malaga, 19:30**

**from Town Hall of Antequera**



## 11. General information

A tourist Infopoint will be available close the Registration Desk. Moreover, the Municipality of Málaga offers numerous discount vouchers to visit many city sights and museums in Málaga, as well as a lot of information that will make your visit easier by the app available in: <https://malagacongresscard.com/es/login>.

For login, click "Registro" and complete your personal information: Name, Family Name, e-mail and a password to use this app. Select in the Conference list "iREEC 2019" and finally click "Registrarse". After that, you will receive an email to activate your account and you are ready to use this App. You can use this App to organize your visit in Málaga before arriving.

## 12. Conference centre & City map



## 13. iREEC 2019 programme conference overview



### **iREEC 2019: 1st Conference of International Researchers of the Education for Environmental Citizenship 2019**

**INTERNATIONAL RESEARCHERS OF THE EDUCATION FOR ENVIRONMENTAL  
CITIZENSHIP**  
7-8 November 2019

iREEC2019

**Thursday, 7 November 2019 - Eurostars Hotel**

8:30	Registration at the Conference Center of Eurostars Hotel.
9:00 – 9:30	Official Opening. Room RETIRO & CÓNSULA
9:30 – 10:30	ENEC Research Workshop 1 - Opening speech by Professor C. P. Constantinou. Room RETIRO & CÓNSULA
10:30 - 11:00	Coffee Break. Room RETIRO & CÓNSULA
11:00 - 12:30	Round 1: S3 (Room LIMONAR), S4 (Room CALETA), S5a (Room RETIRO & CÓNSULA) ENEC's Trans Working Group Session

12:30 – 13:00	Free Time
13:00 - 14:00	Lunch at Eurostars Hotel
14:00 - 16:00	Round 2: S1 (Room LIMONAR), S2&3 (Room CALETA), S5b (Room RETIRO & CÓNsula) ENEC's Trans Working Group Session
16:00 - 17:00	Coffee Break + Interactive Posters Session
17:00 - 18:30	Round 3: S1,6&5 (Room LIMONAR), S5c (Room CALETA), Symposium (Room RETIRO & CÓNsula) ENEC's Trans Working Group Session
18:30 - 20:00	ENEC MC Meeting (only ENEC members). Room RETIRO & CÓNsula
20:00	Buses to the Town hall of Málaga from Eurostars Hotel
20:30 - 22:00	Welcome Reception in the Town hall of Málaga
22:00	Buses to Eurostars Hotel from the Town hall of Málaga

<b>Friday, 8 November 2019</b> <b>(ENEC Environmental Citizenship field trip to Antequera)</b>	
8:30	Pick up from the entrance of Eurostars Hotel to go to Antequera.
9:30 - 10:45	Visit Paraje Natural El Torcal de Antequera (small walk and visit the Interpretation Center). El Torcal.
11:15 - 12:30 11:15 - 12:30 12:30 - 13:00	ENEC Forum for Young Researchers. Town Hall Antequera. Visit to Antequera (People not attending the FYR) Meeting with High School "Los Colegiales" to know and debate about their projects related Environmental Citizenship. Salón de Plenos, Town Hall in Antequera.
13:30 - 15:00	Lunch in Hotel La Magdalena. Room Iglesia
15:00 - 16:00	ENEC MC Meeting (Only ENEC members). Hotel La Magdalena. Room Iglesia
16:00 - 17:00	ENEC WGs Meeting (Only ENEC members). Hotel La Magdalena. Room Iglesia & Room Olivar
17:00 - 18:00	ENEC Research Workshop2 - Closing Speech by Professor E. Schmitt. Hotel La Magdalena. Room Iglesia
18:30 - 19:00	Free time in Antequera
19:00 - 19:30	Closing Ceremony in the Town Hall of Antequera
19:30	Return to Málaga



## 14. Paper Abstracts

### R1-3-1 - A framework for connecting educational leadership to sustainability citizenship

Ariel Sarid<sup>1</sup> & Daphne Goldman<sup>2</sup>

- 1:** Ph.D., Head of the Master programme for management and organization of educational systems, Faculty of Education, Beit Berl College, Israel; [arielsarid@gmail.com](mailto:arielsarid@gmail.com)  
**2:** Assoc. Prof., Department of Environmental Science and Agriculture, Faculty of Education, Beit Berl College, Israel; [dafnag@netvision.net.il](mailto:dafnag@netvision.net.il)

**Keywords:** Motivational values; Sustainability citizenship; Transformative leadership; Pro-environmental behaviour; Environmental and sustainability education

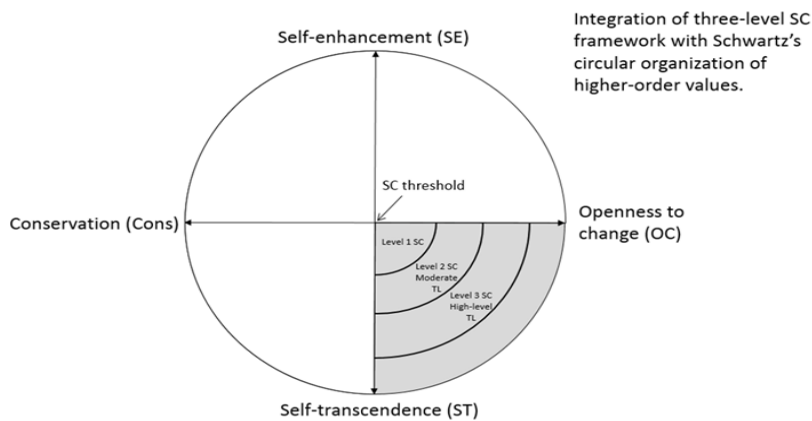
**Abstract:** The value-belief-norm theory posits that personal values are a strong leverage-point in changing environmental decisions (Dietz et al., 2005). Research stresses that leadership plays a central role in changing values and constructing appropriate strategies for promoting pro-environmental behaviour (PEB) and sustainability (Hargreaves and Fink, 2006; Quinn and Dalton, 2009). Specifically, transformative leadership (TL) centers on promoting democratic values, countering social injustices and supporting ongoing restructuring of power-relations in society (Shields, 2013). This study offers a methodological framework that links TL to sustainability citizenship (SC) using Schwartz's theory of motivational values (2012), and which contributes to understanding educational processes of change toward PEB.

The three-level framework (Figure 1) applies Schwartz's bi-dimensional organization of motivational values; each level is described in relation to Schwartz's higher-order values: Self-enhancement (SE) – Self-transcendence ((ST) and Conservation (Cons) – Openness-to-change (OC).

*Level One SC:* Individuals comprehend that decisions made in one's personal life connect to the 'common good' but the extent to which individuals are willing to act for others' benefit is limited to actions that do not entail taxing personal tradeoffs. At this SC-level TL is *minimal* or non-existent. *Level Two SC:* Focus broadens beyond the individual to encompass one's 'identity group'. This is reflected in greater propensity for enhancing and protecting the welfare of those belonging to one's in-group. This level reflects *moderate* TL. *Level Three SC:* The focus-of-concern is society-at-large, expanding beyond an intragenerational to intergenerational perspective. The person is willing to make more taxing tradeoffs towards promoting the welfare of humanity and the environment. Change is deep in the individual's mindset, who is not satisfied by only effecting change in others, but also changing the existing

norms, socioeconomic infrastructures and political decision-making processes. This SC-level reflects *high-level* TL.

The model promotes a dynamic educational curriculum that develops critical agents-of-change committed to active engagement and civic participation. It enables to adapt learning to the learners' SC-level in the aim of development along the SC-continuum and offers a gauge to evaluate different extents of individuals' PEB/SC, and thus the effectiveness of educational interventions. It provides an outline for adapting and developing environmental sustainability education contents and pedagogies, since the individual's position along the continuum has implications on teaching methods and choice of content. It offers an ethical and practical guide for cultivating educational leadership at all levels of educational decision-making, the ultimate goal of which is identifying and responding to the underlying structural causes of sustainability issues.



**Figure 1.** Integration of the three-level SC framework with Schwartz's circular organization of higher order values.

## References

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## R1-3-2 - Community garden - a tool to enhance environmental citizenship

**Zvi Weinstein**

Dr. and research at Israeli Smart Cities Institute, Israel; e-mail: zviw@nonstop.net.il

**Keywords:** Community garden; Ethiopian population; Traditional VS. modern agriculture; Patriarchic VS. Modernized society; Environmental citizenship values

**Abstract:** The paper examines and analyzes the community garden (CG) phenomenon among sites that are included in the Israeli National Project Renewal for Disadvantaged Neighborhoods (PR) where Ethiopian immigrants settled. It examines them as both social practice and spatial expression and its environmental citizenship implications.

The case study relates to the Ethiopian population arrived to Israel during the big immigration waves in the early 1990's. People who came from traditional agricultural society, surrounded by natural landscapes and who have no knowledge about what urban environmental- life looks like, found themselves with no suitable employment while housed in urban neighborhoods.

The Ethiopian belongs to a low-income stratum. While low socio-economic status and disadvantaged geographical locations is usually associated with a low level of political power of residents (Eisenberg, 2013), the production of CGs changed the status of these residents within the urban power structure.

Through their activities in the CGs they produced themselves as aware, involved and indissimilable urbanists (Eisenberg, 2018). Major part of their activity was invested to study how traditional agriculture values brought originally from Ethiopia could be adopted and dissimilated together with environmental citizenship values consist of education, competence, democracy and civic ecosystem of a modern era. CG programmes appear to facilitate collective efficacy, the creation of social networks and improved organizational capacity that are particularly important to marginalized urban population such as elderly, immigrants and the poor (Armstron,2000; Kingsley, 2006).

CGs among Ethiopian immigrants were established in order to assist their absorption process in the city (Rinat, 2009), to prevent their excluded social status and to lead a process of mixed old and new environment citizenship (Arjen E. Buijs et. al., 2016).

The initiative to occupy the elderly Ethiopians with CGs programme is part of attempts to engage immigrants in urban activities. The literature (Imas Agustina, 2011) argues that the gardens provide space for immigrants to meet other people and thus

foster social inclusion, while in the same time preserve their cultural identity. In the Israeli case, it came from teams of the social workers, Joint Israel Organization, local and central governments, connected to PR aiming to build, to empower and to create healthy communities with strong social capital.

Ethiopians have faced many significant cultural difficulties and obstacles to cope with the Israeli way of life in transforming from a patriarchic society to an equal and modern one. CG became accepted solution in periods of social crisis and social problems that needed urgent amendment.

The data were obtained and based on the author long work experiences with Project Renewal, site visits, personal interviews with few dozens of social workers, environmentalists, Ethiopians who worked in community gardens, Project Renewal managers, observing citizen participation meetings, literature reviewing and other stakeholders.

Findings show that CG enables dissemination of environment values in two ways: using traditional gardening values bottomed-up imported from Ethiopia and environmental citizenship from top-down while in Israel. Both have been met successfully in the Israeli CGs (Ina Filkobski, Yodan Rofo, Alon Tal, 2016).

Thus, community gardens are both a social tool and a vehicle to build new concept of sustainability and environmental citizenship.

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## R1-3-3 - Primary school children's conceptions of water care and strategies for curbing pollution

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**Keywords:** Water Quality, Misconceptions, Environmental Education, Nonschool Educational Programmes, Citizenship Education, Children

**Abstract:** The previous conceptions of the students of Elementary School Education from Málaga about water and its care are researched in this study. In the same way, the strategies that these children know to improve the quality of the planet's water are also studied. In order to carry out a correct education for environmental citizenship, it is essential to know the ideas that students have in order to be able to act accordingly and create more coherent and effective environmental education programs for the population (Havu-Nuutinen, Kärkkäinen & Keinonen, 2018). The main objective of this paper is to know the conceptions of the students and to make people aware of taking into account their models of thought. The instrument used is a Likert scale questionnaire. On the one hand, the results show that primary school students are not able to understand human responsibility for water conditions. On the other hand, children are able to think of solutions to improve water quality and quantity. This research also shows the importance of environmental awareness programmes in the education system to improve water quality (Schiller, Allerhand & Pelon, 2018; Liefländer et al., 2015). The results of this research will help to create environmental education programmes based on some real problems caused by conceptions of environmental citizenship, and to use care strategies to improve environmental quality, involving citizens in a conscious way in this process.

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## **R1-3-4 - Pursuing social change within ecological activism: the work on individual consciousness, participatory creation and legislative transformation**

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**Keywords:** Education; Ecology; Activism; Co-creation; Participation; Ethnography

**Abstract:** According to ENEC (2018), Environmental Citizenship entails the exercise of environmental rights and duties, with the understanding of the structural causes of environmental problems, together with the critical engagement on civic and political participation through democratic means, both individual and collective, in order to reach social change. With the institutionalization of environmental organizations during the 80s (Loureiro & Pacheco, 1995), highly educated activists were incorporated in the ecological movement transforming the “activist militancy” in an “expertise militancy” (Ollitrault, 1996; 2001). This process of *Onguization* (Lang, 2010) generated a “professionalized” offspring of social movement initiatives’ (2013, p. 385) prone to assume ‘expert voices’ in the interaction with both public and private institutions and organizations. Although this reason-based approach seems to dominate the ecological movement, the conceptualization of alter-activist culture (Pleyers, 2018) helps us to unify a double-possibility of engagement, including a “rational route” where the economic structure is technical and scientifically analysed, and a “subjectivity route” where citizens and activists elect creative and autonomous ways of experiencing life critically and consciously. Based on a 4-months ethnographic work with a group of four young ecological activists in the city of Porto, we aim to discuss the institutionalization process of the group and their educational practices, aiming to create ecological awareness. Tending to pursue non-hierarchical, pluralist, critical and alternative models of relationship, the group promotes a big municipal event in the city of Porto and creates a “warm-up-cycle” where participatory methodologies are inscribed in order to allow discussion, togetherness and collective creation. Although the group emphasizes a more individual attitude (personal interest in social and political subjects; self-voicing problems and concerns; expressive salience or individual option of consumerism), their proposal as an

“open” group is quite collective, embracing both latent (vegetarianism; sense of “community”; volunteerism, etc) and manifest (participation of Cidade+ network and member of co-creation processes) forms. Defined within three main aims: i) to raise environmental awareness; ii) to promote a network of civic, economic and political actors concerned with environmental action/ social responsibility; and iii) to make an effective change on politics, in Portugal and amongst its citizens, the group lies on its capacity to create and maintain good relationships. The education for sustainability in a democratic/participatory model, together with a “friendship network” that bring closer institutional politics, civil society and corporate sectors, are herein discussed as a possible way to engage in social transformation.

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**Keywords:** Environmental Citizenship, Education for Environmental Citizenship, geography, environmental science, transport, tourism

**Abstract:** Environmental Citizenship has been one of the leading concepts of pro-environmental actions and consciousness of ordinary people in their everyday lives, as well as at stakeholders responsible for bringing decisions that have a direct or indirect impact on the environment. It has emerged along with other adjectival citizenship since the resurgence of interest in citizenship theory (Bell, 2006) and the increasing preoccupation with environmental sustainability and the injection of green values into political analyses (Cao, 2015). The concepts of Environmental Citizenship and Education for Environmental Citizenship are quite new and underutilized in Croatia, although some postulates of it have been included in school and university courses, particularly related in geography, biology, environmental science etc. However, educational system in Croatia still lacks environmental literacy and concern on the environment. Therefore, this study aims to investigate if the Environmental Citizenship has been adopted amongst students of key scientific disciplines that in the future will bring environmental-related decisions on the local, regional and national level, as well as educate future generations of pupils and students as Environmental Citizens. Adoption of the Environmental Citizenship has been investigated using the longitudinal questionnaire survey on the majority of senior undergraduate and master students of Geography and Environmental Science at the University of Zagreb. These disciplines have been selected as most likely to have transferred the knowledge and principles of the Environmental Citizenship. These cohorts also represent future stakeholders in urban and regional planning, tourism development, environmental protection and related areas and will be able to act as drivers of change towards the environment. Some of them will also teach geography in schools and will be able to transfer the knowledge and values of the Environmental Citizenship to elementary pupils and high school students. The questionnaire survey included a set of open-ended and forced-choice answers (mostly multiple answers and the Likert scale) related to their knowledge on the Environmental Citizenship, their knowledge and perception of environmental rights and duties (focusing mostly on Croatia), as well as examples of positive and negative environmental practices. Be-





side general questions on Environmental Citizenship, the questionnaire survey investigated in more detail the students' perception and their practices related to Environmental Citizenship in some key fields related to environment, particularly sustainable transport, tourism and heritage use and protection.

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## R1-4-2 - Environmental impact of depopulation. The case of Aragon (Spain)

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**Keywords:** demography; depopulation; sustainability; environment; anthromes

**Abstract:** This investigation is part of the research done by a group of Secondary and High school teachers in Zaragoza (Spain). It deals with the use of Geographical Information Systems (GIS) to achieve skill learning (Image 1). At this moment, we are working on depopulation. Consequences of this depopulation process are quite evident at Aragon (Image 2). Depopulation process is the result of a resource reallocation, in this case, the redistribution of human resources, done by the market. This reallocation implies important environmental problems: depopulated places were inhabited and modified by human for centuries till they became “anthromes”: these “anthromes” are biomes whose survival essentially relies on human activity. The human activity disappearance may have led to environmental collapse, due to the inability of natural elements to rebuild themselves and also due to the risks linked to unpredictable evolution in them. This depopulation research is, therefore, orientated to the achievement of environmental citizenship and improves educational strategies to “sustainability”. Main objectives are: (a) didactical strategies development, oriented to enable people (now students at school in some years’ time citizens) to answer environmental problems; (b) the use of GIS in order to build knowledge based on inters –relationships in which ecosystems rely on; (c) the implementation of new pedagogical ways of active working that generate environmental commitment and identify behaviours which degrade the environment. The investigation design contents three components: (a) Teachers work making, in a collaborative manner resources and strategies in order to work with students; (b) students’ work at the school with these resources (An example in: <https://arcg.is/1Dj8HT>, where climate changes at ski resorts were analyzed. Results were shown by a collective Story Map) and evaluation (c). This evaluation will try to ask the following questions and is shown in the attached tables (tables 1A to 2B): What was learned by students? ; What is the quality of those learnings? ; What is the improvement of these didactical strategies? ; Which possibilities of service learning are raised? Our main conclusions, extracted from 3 years’ work as a collaborative Teacher group (on <http://aprendeconmapas.ftp.catedu.es/experiencias.html>), are: GIS are an efficient tool to build learning; the use of active and collaborative ways of learning leads to skills learning

(Image 3): conceptual, procedural and behaviour ones and these strategies generate inclusive and formative practices and this “climate” at school improves learning.

These resources can be found at <https://arcg.is/lvufeK> and belong to a wide website devoted to depopulation [http://bit.ly/Despo\\_HU](http://bit.ly/Despo_HU) All of them are offered to be use for any teacher or school (secondary and high school education).

**Table 1A: Assessment and Teaching of 21<sup>st</sup> Century Skills (whole group)**

Assessment and Teaching of 21st Century Skills				
Students with similar performance expected I			Before	In experimentation
			Results	
The student...				
<b>Ways of Thinking</b>				
	Creativity and innovation	Raises hypotheses	5	7
		Uses new ideas to face challenges	3	5
		Is interested in new technologies as tools to learn better	6	8
	Critical thinking	Understands a problem raised	5	6
		Identifies causes and consequences	4	6
		Seeks solutions to problems	4	5
	Learning to learn	Uses concepts and tool sof various subjects to solve geographic problems	3	5
		Solves problems by resorting to previous learning	4	5
<b>Ways of Working</b>				
	Communication	Uses different formats (oral, written, images, videos, etc.) to communicate	5	7
		When communicating, uses a sufficient amount of information	4	6

	Communicates in a logically ordered way	4	4
	Communicates using empathy strategies	2	4
Collaboration	Collaborates with his colleagues when works as a team	5	7
	Critically evaluate his approaches and those of his colleagues	4	5
	Understands his position in the group	3	6

**Table 1B: Assessment and Teaching of 21st Century Skills (whole group)**

Assessment and Teaching of 21st Century Skills				
Students with similar performance expected II			Before	In experimentation
			Results	
The student...				
Tools for Working				
Information literacy	Can identify sources of information		3	5
	Knows how to select objective and relevant information		3	5
	Knows how to treat information to represent way		3	5
	Knows different formats in which the information is presented		4	6
	Evaluates the advantages and disadvantages that each format has to present information		3	4
ICT literacy	Easily manages text, spreadsheets, image and video editors		6	6
	Uses ICT tools to solve problems		5	7

		Differences between communications networks and the information sources	3	5
Citizenship				
	Life and career	Does the entrusted works	4	6
		Accepts his mistakes and tries to correct them	5	7
	Personal & social responsibility	Evaluates objectively the social and environmental problems raised	3	5
		Poses solutions to the social and environmental problems raised	5	5
		Feels responsible for his behaviour	4	6

**Table 2A:** *Assessment and Teaching of 21st Century Skills (students who usually reach results below expectations)*

Assessment and Teaching of 21st Century Skills				
Students with performance below expectations I		Before	In experimentation	
		Results		
The student...				
Ways of Thinking				
	Creativity and innovation	Raises hypotheses	2	4
		Uses new ideas to face challenges	2	4
		Is interested in new technologies as tools to learn better	5	6
	Critical thinking	Understands a problem raised	3	5
		Identifies causes and consequences	2	4

		Seeks solutions to problems	4	5
	Learning to learn	Uses concepts and tools of various subjects to solve geographic problems	2	3
		Solves problems by resorting to previous learning	2	4
<b>Ways of Working</b>				
	Communication	Uses different formats (oral, written, images, videos, etc.) to communicate	5	6
		When communicating, uses a sufficient amount of information	2	4
		Communicates in a logically ordered way	2	3
		Communicates using empathy strategies	3	4
	Collaboration	Collaborates with his colleagues when works as a team	4	5
		Critically evaluate his approaches and those of his colleagues	2	3
		Understands his position in the group	2	3

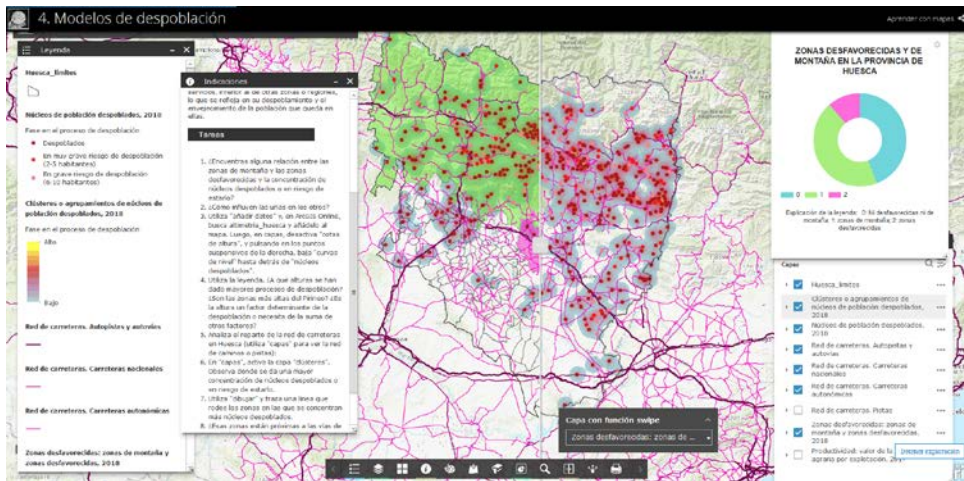
**Table 2B:** *Assessment and Teaching of 21st Century Skills ((students who usually reach results below expectations)*

Assessment and Teaching of 21st Century Skills				
Students with performance below expectations II			Before	In experi- mentation
			Results	
The student...				
Tools for Working				
	Information literacy	Can identify sources of information	2	4
		Knows how to select objective and relevant information	3	4
		Knows how to treat information to represent way	3	5
		Knows different formats in which the information is presented	4	5
		Evaluates the advantages and disadvantages that each format has to present information	1	3
	ICT literacy	Easily manages text, spreadsheets, image and video editors	4	5
		Uses ICT tools to solve problems	4	6
		Differences between communications networks and the information sources	2	4
Citizenship				
	Life and career	Does the entrusted works	1	5
		Accepts his mistakes and tries to correct them	3	5

	Personal & social responsibility	Evaluates objectively the social and environmental problems raised	3	4
		Poses solutions to the social and environmental problems raised	2	4
		Feels responsible for his behaviour	4	5

Made from BINKLEY, M, et al. (2012) *Assessment and Teaching of 21st Century Skills*, Springer, pp. 17-66)

*Image 1: Depopulation\_GIS tools*

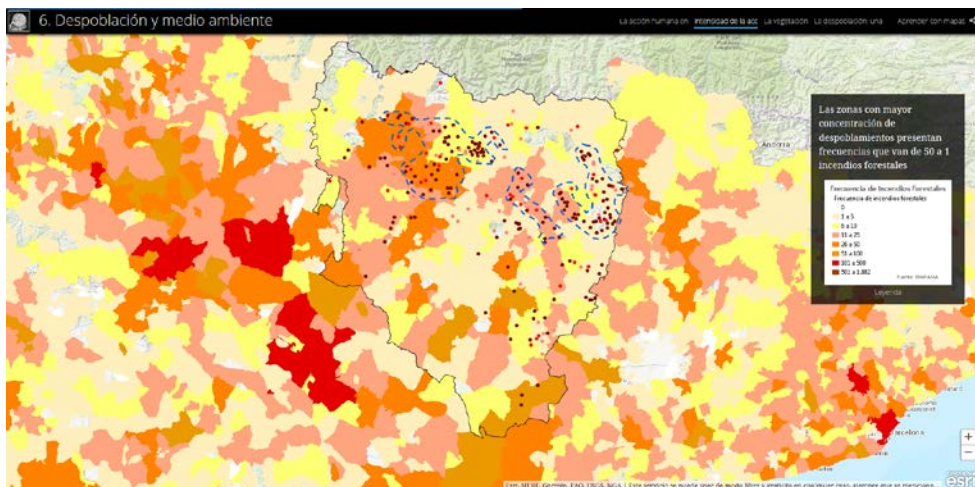




*Image 2: Depopulation\_layers*



*Image 3: Depopulation\_inmersivewindow*



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**Keywords:** Activism; Cartography of controversies; Environmental Citizenship; Socio-Environmental Issues

**Abstract:** We live in a process of continuous change, of crisis cycles, that directly affect and modify our day to day. The disproportionate and uncontrolled growth that has occurred in recent decades has deteriorated and destroyed the territory in large areas, putting excessive pressure on the ecosystems that constitute it and with the threat of the effects of climate change (Klein, 2015). The consequences of the planet deterioration are no more than "disturbances" of much deeper problems related to our form of living and being in society, so we must reflect critically and take action (Carter, 2008 and ENEC, 2018). In this situation arise the necessity of social practices that could reinvent our form of life. And for this reason, a response to the ecological crisis will have to be political, social and cultural, through an ethical-political articulation that leads to a recomposition of social and individual practices. (Guattari (2017 [1st 1990])). In this work a first approach is made from the area of Vélez-Málaga (Yus-Ramos, 2005), through the realization of critical cartographies (Kim, 2015 and Venturini, 2010), with the aim of contributing to the education and participation of citizens in making responsible decisions in relation to the current environmental situation. The methodology consists of starting from the controversies identified in the study area in a first analysis to select the different layers of the cartographies, in a complex process of conflict between the interdependent parts. This procedure also takes into account the use of news from the media related to controversies (Latour, 2012). The vision from the media is a breeding ground for the analyzes that are carried out, highlighting the participation of different actors with different interests. As a result, four cartographies of the study area in Vélez-Málaga have been obtained:

1. Movements of beach sand and population movements.
2. Bubble of mango cultivation
3. Unsustainability of water management
4. Virtual information networks.

As a result of the cartographies, it seems that we are facing a real estate, demographic, ecological, hydraulic and economic crisis, in which the social substratum is increasingly deteriorated so these cartographies can be a way to involve citizens in the necessary change processes.

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## R1-4-4 - Promoting young people's environmental citizenship through nature-based solutions in cities: Promises, realities and opportunities

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**Keywords:** nature-based solutions, cities, planning, active citizenship, stewardship, Leipzig

**Abstract:** Awareness of the importance of enhanced citizen participation in governance for sustainable cities has increased markedly amongst policy makers and municipal planners over the last 20 years. It is also a core aspect of the EU's promotion of nature-based solutions (NBS) for urban sustainability, as reflected in numerous research and demonstration projects that have been funded within HORIZON2020 since 2016. Based on findings from one such research project (NATURVATION, 2016-2020) and on stakeholder interviews conducted as part of an ENEC survey, this paper considers what nature-based solutions can deliver for including young people as a core group traditionally marginalised in urban governance. It asks to what extent NBS offer opportunities for environmental citizenship and what some of the factors are that prevent the full benefits of NBS for young people's environmental citizenship are. As has been widely recognised, children and youth are amongst the most marginalised constituencies in planning processes (cf. Chawla and Driskell 2006, Hörschelmann and van Blerk 2011, Karsten and van Viet 2006, Malone 2001, Matthews et al 1999). Researchers and practitioners in this field have also warned consistently against the dangers of tokenism, which can lead to decreasing rather than enhancing young people's motivation to actively participate in democratic processes (cf. Chawla and Kjerholt 1996, Hart 2013.). At the same time, nature-based solutions offer opportunities for hands-on engagement with and through urban nature, including active participation in nature conservation projects and as participants in environmental learning programmes that are all too often foreclosed to children and youth in disadvantaged urban communities (cf. Chawla 2015, Hart 1986, Spencer 2006). The paper examines findings from NATURVATION case studies conducted in Leipzig (Germany) and other international cities alongside expert opinions in order to identify ways of reaping those benefits. The central argument of the paper is that sensory encounters with urban nature, taking on stewardship roles for nature and participating in environmental learning programmes that allow for hands-on engagement as well as for the articulation of dissent offer excellent opportunities to enhance young people's environmental citizenship (cf. Bridgman 2006). However, for these opportunities to materialise, children and youth need to

be included as equal partners and their voices translated into actions. This also requires an intersectional (Crenshaw 1990) and agonistic (Mouffe 2013, Ruitenberg 2009) approach, which recognises and makes room for the articulation of differences in young people's positionings, identities, values and opinions.

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## **R1-5a-1 - Applying the Education for Environmental Citizenship pedagogical approach: Insights from a Cyprus case study**

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**Keywords:** Education for Environmental Citizenship, Environmental Citizenship, Environmental Citizenship Questionnaire (ECQ)

**Abstract:** Education for Environmental Citizenship, as was defined by ENEC (2018), has a lot to contribute to the education of the future environmental citizens. The Education for Environmental Citizenship pedagogical approach (Hadjichambis & Paraskeva-Hadjichambi, 2020) is an integrated and comprehensive tool which includes stages and steps designed to promote Education for Environmental Citizenship (EEC). This study examines the impact of a learning intervention on 10<sup>th</sup> grade biology students (15–16 years old) based on the Education for Environmental Citizenship pedagogical approach. The learning intervention was implemented as a project embedded in Biology lessons with duration 4 months. A sample of 50 students participated comprised of 29 girls (58%) and 21 boys (42%), from 2 classrooms. Students were of mixed academic ability according to the national educational practices. Each classroom included students whose cognitive abilities ranged from high-average to low-average, as well as some highly-gifted students. The Environmental Citizenship Questionnaire (ECQ) (Hadjichambis & Paraskeva-Hadjichambi, 2019) was employed for data collection and applied before (pre-) and after (post-) the learning intervention. The ECQ was composed by nine (9) closed-ended questions including 76 items. More information regarding the 9 questions included in the ECQ can be found in Table 1. According to the results of the pre-test the majority of the students were scarcely been involved in activities with environmental organizations or groups outside school, while at school were not given many opportunities to get familiar with ways of preventing or solving environmental problems, practicing environmental rights and duties or actively participate in society. Furthermore, inside schools only to a small extent have learned how to act and networking in a

national (country) level and a global level. Those parameters were considerably improved in the post-test, as was revealed by the statistical analysis. In addition, after their involvement in the learning intervention, students were statistically proved to develop many skills as environmental citizens such as discussing a newspaper article about environmental conflicts, arguing about controversial environmental issues as well as speaking in front of their class about environmental topics. Worth noticing outcomes were arise after the EEC pedagogical approach intervention, regarding their intention to act in the future as students as well as agents of change. As future citizens there was a statistically significant increase in their intention to talk to others about environmental issues, contribute to online discussion forums about environmental issues as well as take part in peaceful march.

**Table 1:** Description of ECQ's questions

Question	Number of items	Scale of Items	Aim of the Question
<b>Part A. Actions as Environmental Citizen –Past and Present</b>			
1	6	1 to 3	Actions as environmental citizen past and present
<b>Part B: Competencies of an environmental citizen</b>			
2	11	1 to 4	Knowledge, 8 outputs of EEC model, spheres, scales
3	12	1 to 4	Conceptions for environmental citizen
4	6	1 to 4	Skills of environmental citizen
5	8	1 to 4	Attitudes of environmental citizen
6	15	1 to 4	Values of environmental citizen
<b>Part C: Actions as Environmental Citizen - Future</b>			
7	4	1 to 4	Actions as a student inside school
8	11	1 to 4	Actions as a student outside school
9	3	1 to 4	Environmental citizens as agents of change

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## R1-5a-2 - Measuring environmental citizenship in a Nordic civic and citizenship education context

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**Keywords:** Education for environmental citizenship; ICCS 2016; Pragmatism; Experiential learning; Habit formation

**Abstract:** The objective of this paper is to identify the extent to which the school environment and these three activities are efficacious in fostering environmental citizenship attitudes and behaviours in students. We use data from the 2016 International Civic and Citizenship Education Study (ICCS) that took place in four Nordic countries: Denmark, Finland, Norway and Sweden (students N=18,962, teachers N=6,119, school principals N=630). We look at students' attitudes, awareness and behaviour in relation to the educational goals and pedagogical means of teachers and school leaders working towards environmental citizenship. Drawing on the pragmatic framework of John Dewey and the contemporary experiential learning model, we identify some key school conditions and pedagogical approaches towards education for environmental citizenship education. We first categorize responses to questions in the ICCS study concerning the activities that promote environmental citizenship through (i) habit formation, (ii) awareness raising and (iii) a combination of habit and awareness. Second, we create a composite score (Nardo et al. 2005) on environmental citizenship education at the school level by summing all the habit-forming and awareness-forming initiatives and activities as reported by the principals, teachers and students. The two steps analyses enable us to present an overview of environmental citizenship education in the Nordic schools (Table 1). Finally, we test if there is an effect of school environmental citizenship education practice on student environmental citizenship measured by their knowledge, attitudes, behaviour and future intended actions (Table 2). The main findings are 1) Nordic teachers and principals differ considerably from each other between the four countries when it comes to their responses on if or not they consider 'promoting respect for and safeguard the environment' as one the most important aims of civic and citizenship education. However, 2) environmental citizenship education practices at Nordic schools appear to very similar and 3) Nordic students are also similar with each other across the four countries. Nevertheless, 4) we find that school environmental practice has a weak positive and significant effect on student environmental citizenship while student achievement in civic knowledge has stronger effect on their environmental citizenship than school practice does. However, 5) rather limited variance of student

environmental citizenship is explained by individual and school factors included in the analyses (Table 2). We recommend future research taken into consideration factors beyond the classroom and the schoolyard that could have significant influence on student environmental citizenship.

*Table 1: An overview of environmental citizenship education in Nordic schools*

	*One of the most important aims of CCE is 'promoting respect for and safeguard of the environment'		Average student civic knowledge achievement	Average composite score of environmental citizenship education practices taken place in schools	Average composite score of student environmental citizenship
	School leaders	Teachers			
Denmark	10.4 (2.4)	21.4 (1.7)	586 (3.0)	21.7 (0.6)	7.8 (0.1)
Finland	51.8 (4.1)	55.8 (1.8)	577 (2.3)	27.4 (0.2)	8.7 (0.1)
Norway	24.2 (3.6)	39.0 (1.8)	564 (2.2)	23.5 (0.4)	8.3 (0.1)
Sweden	30.3 (4.5)	43.8 (1.3)	579 (2.8)	23.4 (0.4)	8.7 (0.1)

*Table 2: Regression of the school and student variables on student environmental citizenship (standardised coefficients)*

	Denmark	Finland	Norway	Sweden
Composite score of school environmental citizenship education practices	0.05	<b>0.05*</b>	<b>0.09*</b>	<b>0.05*</b>
Student civic knowledge achievement (PV1-5)	<b>0.09*</b>	<b>0.23*</b>	<b>0.17*</b>	<b>0.30*</b>
Student gender (boy=0, girl=1)	<b>0.17*</b>	<b>0.28*</b>	<b>0.16*</b>	<b>0.14*</b>
Parents' highest educational attainment (lower than university education=0, university and higher education with degrees=1)	<b>0.10*</b>	0.02	<b>0.04*</b>	0.01
Student migration status (native=0, 1=2nd generation or 1st generation)	0.02	0.02	<b>0.06*</b>	<b>0.10*</b>
<i>Variance explained in percentage</i>	<i>5.4%</i>	<i>16.3%</i>	<i>7.8%</i>	<i>12.6%</i>

Note: Numbers in bold and with \* denote coefficients significant at the 0.05 level.

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**Keywords:** Environment; Citizenship; Ecological Footprint; Neoliberalism; Consumption

**Abstract:** The ecological footprint is used widely in environmental education and awareness campaigns, with millions of people accessing online ecological footprint calculators each year. These calculators ask questions about housing, transportation, consumption and waste, and then calculate the area of land required to support individual lifestyles. The calculator typically produces two scores: the size of your ecological footprint on global hectares (gha); and the number of planets required if everyone lived like you. The current allocation of land per person is 1.8 gha, which means that if your ecological footprint exceeds 1.8 gha your current lifestyle is unsustainable. This paper explores the usefulness and limitations of ecological footprint calculators as pedagogical tools to promote environmental citizenship. The author draws on existing studies and his own use of ecological footprint calculators in formal educational settings. The paper shows how ecological footprint calculators are excellent tools for learning and teaching sustainability, particularly the sustainability of individual lifestyles and the contribution of different lifestyle aspects to individual ecological footprints. The paper also shows how this approach to measuring the impact of our actions on the environment obscures the significance of contextual and structural constraints, and ignores actions that are not captured by consumer habits. In particular, this pedagogical tool sidelines the political dimension of citizenship, effectively reducing environmental citizenship to sustainable consumption, and contributing to produce green neoliberal citizens. The author concludes that these issues should not discourage the use of ecological footprint calculators, especially in formal educational settings. The key is to engage in a critical analysis of the results that takes into account contextual and structural issues, and helps illuminate different articulations of environmental citizenship.

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**R1-5a-4** - Climate change in the curricula of lower-secondary education of Greece: is there adequate preparation of the citizens of tomorrow to the great challenge of humankind?

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**Keywords:** Climate change; Lower-secondary; Science curricula; Greece; Formal education

**Abstract:** Compulsory education in Greece is extended in 10 school years: 1 pre-school education, 6 years/grades of Primary School and 3 years/grades of Secondary School (Lower Secondary). So, pupils finishing successfully Grade C of High School are considered to have acquired the basic knowledge and skills and be prepared for active and responsible citizenship. In the current work the curricula and textbooks were examined thoroughly in order to identify the extent in which Climate Change is taught in Lower Secondary. Climate Change is one of the biggest challenges that humankind is facing and adequate education on this complex phenomenon is a prerequisite in order to cope with it. However, Climate Change does not constitute a separate or integrated unity in the curriculum of Lower High School: Grade A (age 12-13), Grade B (age 13-14), and Grade C (age 14-15) and in fact it is rarely mentioned as such in the students' textbooks. However, the phenomenon of the Greenhouse Effect, which is the base of the climate mechanism (and climate change), is mentioned and explained in a variety of different subjects, mostly in Science subjects (Biology, Chemistry, Physics) and also in Geography and Home Economics with Chemistry being the most thorough. However, the curricula of these subjects have been formulated 16 years ago (Ministry of Education, 2003) and the textbooks remain the same since 2007. Studies have revealed that the teaching of climate change is not effectively taught in High Schools of Greece (Liarakou et al 2011) in addition to the numerous misconceptions that are recorded amongst pupils regarding environmental issues (Kotsis & Pырpylis, 2008). Some efforts and proposals have been made in order to improve this situation such as: participation in Environmental Education extracurricular programmes, applying innovative teaching scenarios (Sbarounis, 2009) and efforts for the greening of curricula (I.E.P., 2014) but these remain rather marginal. Depending on the view of each subject/discipline and the extent that the phenomenon is explained, the consequences of climate change and other implications are in most cases very limited and not sufficiently explained. Apart from the global warming and the more obvious melting of ice or the sea level rise and the

extreme weather conditions, there are a few more negative effects that are mentioned in the textbooks. Furthermore, special reference to the impacts in Greece or other Mediterranean countries is very scarce. On the other hand the anthropogenic causes of the intensification of the Greenhouse Effect and the subsequent climate change are mostly correlated only to the burning of fossil fuels neglecting other issues. It is worth noticing that in some textbooks are used expressions which show likelihood and not certainty regarding not only some of the impacts of climate change but the climate change itself!

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**R1-5a-5 -** Citizenship competences regarding sustainability issues in lower secondary science education

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**Keywords:** Citizenship Education; Socio-Scientific Issues; Inquiry-Based Learning; Lesson Study; Lower Secondary Science Education.

**Abstract:** Issues related to sustainability have a big impact on our society. This raises the need for citizenship education aiming for informed opinion-forming. Students need to be able to evaluate different perspectives, explore solution strategies, and reflect on the social side of a dilemma (Westheimer, 2008). However, even though opinion forming related to Socio-Scientific Issues (SSIs) is a curricular aim of science education, many secondary school science teachers feel the need to improve their competence regarding fostering this form of scientific citizenship. A promising way to promote citizenship is through Socio-Scientific Inquiry-Based Learning (SSIBL; Levinson et al., 2017), which integrates SSIs and Inquiry-Based Learning with Citizenship Education. Whilst teachers see SSIBL as of added value to their teaching repertoire (Knippels & Van Harskamp, 2018), the approach has not yet been extensively tested in classroom practice. The aim of this study is to strengthen teacher competence regarding citizenship concerning sustainability issues. The effectiveness of the SSIBL approach to reach this aim will be tested in lower secondary education. The main research question is: How to support development of science teachers' competence in citizenship education on sustainability issues? Interviews – First, the Dutch context was explored, and current teaching practice was analysed. 40 biology and/or chemistry teachers and 40 lower secondary school students were interviewed to gain insight in current views, attitudes, knowledge and questions regarding sustainability and citizenship education. Outcomes from the first study inform study two. Lesson Study – The second study consists of a full Lesson Study cycle. During study two, SSIBL based science education on sustainability issues was developed and tested for its potential to promote students' citizenship competence, whilst creating an opportunity to research teacher



competence regarding scientific citizenship. Student citizenship competence regarding sustainability issues was measured by a validated questionnaire, which was developed before the second study. It was validated with  $n=730$  students. The interview data provided further insight in the current state of sustainability and citizenship education in The Netherlands. Teachers incorporate sustainability SSIs in their classroom, but they feel the need to expand the citizenship components of these activities. The Lesson Study cycle provided a deeper understanding of the mechanisms of how to promote citizenship on sustainability issues. Results from these two studies will inform subsequent Lesson Study cycles.

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## R2-1-1 - Political dimensions of environmental citizenship

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**Keywords:** Citizenship; Ecocentrism; Anthropocentrism; Liberalism; Communitarianism; Green republicanism

**Abstract:** Political aspects of Environmental Citizenship presuppose foundational metaphysical and ontological concepts underpinning relationships between humans and Nature. At one end of the spectrum is the Mind-Nature Duality where cognition and the human psyche are conceived as separate from Nature; at the other end is a systemic holistic view in which Mind is subsumed into natural systems. These views can be conceptualised as anthropocentrism and ecocentrism respectively. Anthropocentrism can broadly be seen as privileging human needs and concerns over Nature. One form of anthropocentrism is instrumental but sees human's as Nature's stewards or conservators so there is a sustainable supply of goods and materials for human well-being. Another form is manifested as an extreme form of contemporary capitalism where Nature's goods are exploited for human profit minimising any regard for environmental spoilage. Ecocentrism is broadly holistic but there are also implications of controversial political ideologies such as eco-fascism. Overall there are broad issues covering libertarianism (Kymlicka, 1990), green republicanism (Barry 2008), communitarianism and multiculturalism (Kymlicka, 1995).

#### Key objectives

- a. To map the main philosophical and political positions associated with Environmental Citizenship
- b. To draw on these positions to justify pedagogic approaches towards Education for Environmental Citizenship.
- c. To create a coherent European and Global approach towards inquiry in Environmental Citizenship.

#### Approach

This is a theoretical paper so I will only draw on empirical data only through secondary sources. Based on the above broad political ideologies in relation to an education for sustainability I draw on three conceptions of the citizen (Johnson & Morris, 2010) – socially responsible, participative, personally responsible – in which I draw out the skills and knowledge which presupposes a critical pedagogy (see table 1 below). In so doing I will exemplify the dimensions of a critical pedagogy for Environmental Citizenship with operational constructs for secondary education both in teaching and research. These include:

- Expressing reflective perspectives about human beings in relation to the biotic and non-biotic spheres
- Critical and informed views of Nature as a system
- Understanding and expressing the perspectives of others towards natural resources across space and time – contemporaneity
- Knowledge of political, social and economic structures which explain possibilities of sustainability
- Understanding of values which inform a sustainable approach
- Appreciating what can be achieved through political action
- Willingness to specify realisable aims, to implement strategies and, if necessary non-violent action.

**Table 1:** *Dimensions of Critical Environmental Citizenship*

	Politics (ideology)	Social (collective)	Self (subjectivity)	Praxis (engagement)
Knowledge	Knowledge and understanding of political systems and power structures.	Knowledge of interconnections between culture, power and transformations;	Sense of identity	Knowledge of how to collectively effect change for social justice.

Skills	Critical political analysis.	Capacity to engage in dialogue and deliberation.	Reflect on own status in society.	Imagining a better world; active participation in acting collectively to change status quo.
Values	Commitment to values opposing injustice and oppression.	Inclusive dialogical relationship with others.	Consideration of self-worth.	Informed responsible, reflective ethical action.
Dispositions	Actively questioning social injustice and oppression.	Responsible towards self and others.	Autonomous and critical	Commitment and motivation to change society responsibly.

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## R2-1-2 - Environmental Citizenship: Or the production of green neoliberal citizens

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**Keywords:** Environment; Citizenship; Neoliberalism; Subjectivity; Governmentality; Consumption

**Abstract:** Environmental citizenship is an idea whose time has come. In recent years, environmental activists, governments and corporations have embraced the language of citizenship to articulate their claims, policies and positions regarding the environment. Conversely, environmental concerns and ecological values are inspiring new formulations of citizenship which could transform what it means to be a citizen in the twenty-first century. However, this convergence between environment and citizenship is taking place in a historical context shaped by neoliberal forces, values and discourses that are also having a major impact on the meaning and practice of citizenship. This paper explores the neoliberalisation of environmental citizenship through the production of green neoliberal citizens. The paper begins with an account of how citizenship, as a form of political subjectivity, is being reshaped by the expansionary logic of neoliberalism. This is followed by a brief outline of three pedagogical instruments currently used to promote environmental citizenship: governmental campaigns, ecological footprint calculators, and children's animation films. Special attention is paid to governmental campaigns designed to stimulate environmental citizenship in the European Union. The analysis reveals that, in the current context, these instruments consume the concept of environmental citizenship, that is, they subject the concept to an economic rationality that reduces environmental citizenship to acts of sustainable consumption. In addition, the analysis reveals that these pedagogical instruments promote the governing of the environment through citizens (as green consumers), at the expense of government regulation and structural reforms, making green neoliberal citizens both subjects and agents of neoliberal environmental policies. The production of green neoliberal citizens effectively reduces environmental citizenship to a subset of neoliberal citizenship—a form of citizenship that might best be termed environmental citizenship.

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**Keywords:** cross-country comparison, environmental attitudes, values, socio-demographic characteristics,

**Abstract:** In our presentation we aim at analysing the social and political dimensions of Environmental Citizenship using the European Social Survey (ESS) database and the results of a survey conducted in four European countries (Italy, The Netherlands, Switzerland and Hungary) to compare environmental attitudes and values, climate change perception and civic attitudes in order to better understand the possibilities of Education for Environmental Citizenship (EEC).

Our paper aims at identifying the structural holes of implementing environmental citizenship by analysing the socio-demographic factors influencing civic attitudes and values together with environmental attitudes and values. By analyzing empirical data, the study attempts to answer the question of what the correlations between social inequalities, social attitudes and values are. According to our hypothesis, civil attitudes and values strongly influenced environmental consciousness. We attribute a prominent role to formal and non-formal educational inequalities in the prevalence of environmental values and attitudes. Our concern is to explore the factors that help to understand interference between social status, civil and environmental values and norms, educational inequalities which impact environmental behaviours and exploration and comparison of varied social components, social status (income level, age, education, gender) which influence the chances of active participation in environmental education and the effectiveness of education. The most important finding of the research is the international comparison of the factors affecting environmental education.

## R2-1-4 - Choosing between democracy and the environment – the inconvenient predicament of educators and scientists

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**Keywords:** Citizen participation; democracy; environment; education; governance; politics

**Abstract:** Educators and scientists alike increasingly find themselves in the predicament of having to choose between advocating and supporting democratic decision making about environmental governance and policy making on the one hand – and supporting efficient solutions to the climate and biodiversity crises on the other. As time passes, more radical solutions are required to reach the 1,5 degree target and stopping the decline of biodiversity, but such solutions may well have costs for parts of the population that find them unfair. At the same time as we are seeing renewed support for strong climate action (especially among young people) we are also seeing signs of a “sustainability backlash” with the election of Trump and the yellow vest movement in France. How should one position oneself as an educator and scientist when addressing pupils and publics and giving advice to policymakers? This presentation will argue that democracy is a prerequisite for a sustainable development and that educators and scientists should see themselves as facilitators of a societal dialogue rather than environmentalists and activists. The presentation will build on *practical* experiences with engaging citizens in environmental governance.



## R2-2&3-1 - Action Competence in Sustainable Development: a measurement instrument in development

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**Keywords:** Action competence; Sustainable development; Environmental citizenship; Measurement scale; Action; Democratic education for sustainable development

**Abstract:** Sustainable development (SD) is defined as a process of mutually interacting socio-cultural, environmental, and socio-economic perspectives (United Nations, 2015). Education for sustainable development (ESD) aims at empowering students to become active, critical citizens in a sustainable democratic society (Hasslöf & Malmberg, 2015). Action concerning SD issues requires relevant knowledge, competence, and empowerment (Baptista, Reis, & de Andrade, 2018). The concept of ‘action competence’ (AC; Breiting & Mogensen, 1999) captures such ESD learning outcomes, but its operationalization is still called for. Conceptualizing and operationalizing AC in SD (ACiSD) are challenging tasks, since both are wickedly complex concepts (Berglund, Gericke, & Rundgren, 2014). Jensen (2000) defined AC as commitment, willingness, and ability to act. Ability comprises knowledge of action possibilities and self-efficacy (Jensen, 2000). The challenge increases when the objective is to develop instruments for quantifying early adolescents’ (aged 10 to 14) ACiSD. The current study aims at developing an ACiSD measurement scale for early adolescents, applying a four-step mixed-method approach. First, we did an extensive literature review of ACiSD and measurement instruments of related (sub)concepts. Secondly, in a qualitative pre-study, 75 students, aged 10 to 14 (four groups, three schools) envisaged an ideal sustainable society. They suggested individual or collective viable actions towards such a society. From the students’ suggestions, 11 actions were selected as items of a questionnaire, covering different (interrelated) dimensions of SD in a third step. Experts (teachers, ESD specialists, researchers) gave feedback on content, age appropriateness of content and phrasing of the items. Four questions were asked tapping into the students’ knowledge, willingness (5-point Likert scales with neutral center), and self-efficacy (yes-no questions) concerning the resulting items. In a pre-test, two 10-year-old children were interviewed while filling the questionnaire and thinking aloud. The resulting information allowed adaptation

of the questionnaire that was administered in a pilot study (n = 403). Quality of items was analyzed applying robust CFA analyses. Fit indices of this pilot version approached values indicating good fit (CFI=0.829, TLI=0.819, RMSEA=0.05) for models in which error covariances were allowed for problematic items. Based on these results the questionnaire is now being fine-tuned in a fourth step. The revised questionnaire has been administered to over 900 students. Results of analyses will be available timely for presentation at the iREEC. This will result in a valid and reliable ACiSD instrument, developed with and for early adolescents, fit for assessing ESD and EEC initiatives.

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## R2-2&3-2 - Attitudes of university students towards global education topics

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**Keywords:** global education; global issues; university study; citizens; Slovakia

**Abstract:** Global Education is understood to encompass Development Education, Human Rights Education, Education for Sustainability, Education for Peace and Conflict Prevention and Intercultural Education; being the global dimensions of Education for Citizenship (MGED, 2002). The problems of the current globalised world are complex and their solutions need cooperation of experts from different fields (e.g. economists, sociologists, ecologists etc.). Consequently, there is a need for more interdisciplinary cooperation in different forms within the higher education (e.g. discussions, innovation of curriculums with the global topics, solving problems in interdisciplinary teams). Slovakia is the signatory of the Agenda 2030. Pursuing global education is one of the crucial steps in fulfilling international obligations (GENE, 2017). Global Education emphasizes global context in learning, leading to increased awareness about global issues on individual level, developing individual critical thinking and deeper understanding of global problems (Slovak National Strategy, 2012). Within tertiary education institutions has been initiated mostly by the NGO sector and in some cases by institutions themselves. At present the courses dealing with global education issues are taught as compulsory and optional courses at several Slovak universities.

The key objective of the study is the assessment of attitudes towards selected global issues between the students of the different university study fields – economics and ecology. The students of economics and ecology were surveyed through the online questionnaire to see how relevant they find the global issues to their studies and how they differ in their assessment of these topics based on their study fields. We have verified the following hypotheses between the responses of students of two study fields: Economics (n = 121) and Ecology (n = 150) using the Mann-Whitney U test: H01: There is no difference in the perceived relevance of the global issues to their studies between economics and ecology students.

Some global topics are perceived as more relevant by students of economics (economic growth, trade barriers), other more by students of ecology (climate change, waste of resources, over-consumption). Moreover, students of ecology significantly

more value learning how their lifestyle relates to global problems and interestingly, majority of them see themselves as global citizens.

The university study should prepare experts in specific fields. However, it is not sufficient to see the issues of global world only from one perspective and specialization. Graduates should master the skills of a critical and constructive discussion, team work, and mutual understanding among others. The findings serve as a material for discussions about the more multidisciplinary content of teaching today and an impulse to innovate the curriculums.

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## R2-2&3-3 - Evaluating an educational intervention designed to foster values-thinking and foresighted thinking among undergraduate university students

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**Keywords:** Education for sustainable development; Values; Foresighted thinking; Tertiary education; Educational intervention; Content analysis

**Abstract:** Taking its primary interest in developing active environmental citizenship, this presentation aims at evaluating a case of an educational intervention designed to foster values-thinking and foresighted thinking among undergraduate students of a technological university. Research question: How did the educational intervention result in transforming sustainability related competences of foresight and values thinking among students? The results of this evaluation would give support or disapproval to a uniquely developed educational instrument. The instrument includes didactic guidelines and assessment method. It might be further transferred to other settings of tertiary education, or, after major adaptation, to school environments. The presentation builds on a case study from Kaunas University of Technology, Lithuania. Following the T-shape model (Barile et al, 2015; Saviano et al, 2016) of education-for-sustainable-development (Sterling, 2001; McKeown, 2002; Vare & Scott, 2007), the University has redesigned the student assessment methods in an undergraduate general electives course “Sustainable Human Development” so that it would foster the development of foresighted thinking and values-thinking of students (following Barth, 2007). The intervention took place twice, during 2017-2018 and 2018-2019 academic years, with over 500 students participating. Intervention adopted a WeQ approach (of active change agents). This presentation would discuss the results obtained through quantitative and qualitative content analysis of students’ written assignments (a random sample of 100 texts). The texts are available, because the author is also a lecturer of the course and works directly with the students. The texts, written by students after the course, contain linguistic proof of values and future tenses used while thinking about one’s current active citizenship and future professional career. Preliminary results show, that values like “public welfare” and “environmental integrity” have been extensively adopted by students while thinking about their future professional careers. Some have reflected on higher intentions of active citizenship. Content analysis also gives proof for deepening of the foresight thinking competence.

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**R2-2&3-4** - Analysis of conceptions and perceptions on the environmental impacts of consumerism with the environmental education program “cambio mi modelo de consumo”

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**Keywords:** Consumption; Questionnaire; Environmental education; Non-formal education; Perceptions; Programme.

**Abstract:** The current consumption model relates both quality of life and well-being with the mass procurement of products and services, without considering the serious socio-environmental consequences of their impact on the environment. Environmental citizenship needs adopting responsible and sustainable lifestyles. A new culture that promotes reflection on the importance of transforming citizens' consumption habits in order to be an active part of change is required (OCUO & NESI Forum, 2018). Environmental education is a fundamental pillar for facing these changes and moving towards more respectful ways of life committed to the protection and conservation of the environment (Fernández-Morilla, Fernández-Ramos, Raméntol & Tiana, 2019). This paper analyzes the effects of the Environmental Education Program "Cambio mi Modelo de Consumo" in relation to the young people' conceptions and perceptions about the environmental problems derived from their consumption habits and their impact on the natural environment. For this purpose, a survey type study was used that involved the design, validation and application of a questionnaire to primary school students ( $n = 658$ ), from different educational centres in the province of Malaga. The questionnaire was designed based on the objectives of the environmental education programme and was organised on a Likert scale with 10 elements and two open questions (qualitative). The results of this study show a greater awareness and knowledge of the effects produced with respect to the reduction of waste, the adoption of more sustainable lifestyles and the care of the natural environment. The conclusions highlight the importance of investing efforts in developing environmental education programmes that promote the acquisition of behaviours, attitudes and values more consistent with new and alternative patterns of production and consumption needed in our society.

*Table 1: Means and standard deviations of the elements*

Elements	Means	Standard deviations
Have you learned things about climate change in your classes?	3.19	1.05
Have you learned things about climate change in other activities outside of class (excursions, ...)?	2.81	1.12
Have you learned things about climate change in your home?	2.78	1.17
Did you think that climate change was a serious problem?	3.72	1.30
Have you thought that what you consume at home can affect changes in the weather?	3.30	1.26
Do you think climate change problems have a solution?	3.98	0.98
Do you think it's important to turn off lights and unplug electronic devices when you don't use them?	4.47	0.88
Do you think it's important to use the bicycle, or collective transport, to reduce climate change?	4.37	0.85
Do you think not to use disposable plastic bags, or reduce the consumption of overpacked products?	3.88	1.10
Do you think it's important to use solar and wind energy to produce electricity?	4.36	0.89

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## R2-2&3-5 - Citizen actions to achieve the Sustainable Development Goal 6: Clean water and sanitation for all

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**Keywords:** Geography, Water supply, training teachers, Sustainable Development Goals, Education for Environmental Citizenship

**Abstract:** The objective of this paper is to contribute to the Sustainable Development Goals (SDGs). This is one of the most ambitious UN programmes. However, the success of Agenda 2030 depends on the Education for Environmental Citizenship” (EEC) and on the responsible actions of individuals and collectives. Water is not only at the centre of sustainable development, but it is also indispensable for human development (eg. health, wellbeing and eradication of poverty and hunger). Without water, there would be no life.

The unequal distribution of rainfall on Earth means that some areas lack this property while in others there is a surplus, thus, around 40% of the world population is suffering from problems regarding water supply. The aim of objective 6 of the SDGs is to try and guarantee the supply of potable and safe water for all humanity by 2030. It means, large investments in infrastructure to provide sanitary and hygiene guarantee for the population and efficiency in the use of water (agriculture, livestock, aquaculture, industry, energy and households). For the moment, the SDG6 goal is slowly improving (United Nations, 2014). What's more, the United Nations have declared the International Decade for Action: Water for Sustainable Development (2018-2028) that promotes the annual celebration of World Water Day (22 March) and World Toilet Day (19 November).

Despite the data revolution (United Nations, 2014), there was a lack of data and funding in the sector (Ortigara, Kay & Uhlenbrook, 2018: 2). Surveys methods allow a scientifically rigorous visual approach on SDG6. This intends to show evidence of the main water problems on different scales, from local to global. Thus, a mixed methodology will be used, indicators of evidence (inventory of relevant data sources and quantitative data) and perception of use of water by the population (problems detected and qualitative information). The perceived problems will be contrasted

with real problems in order to support and strengthen participation of local communities in the improvement of water management and sanitation (Breuer et al., 2019) to trigger the change of attitudes. Our research will conclude with a list of recommendations on how those involved in education, training and research can contribute to bringing about SDG 6. What is necessary is to raise awareness of education for sustainability and environmental citizenship to lead to more responsible behaviour. We propose better education for the training of teachers on the topic and to implement initiatives such as the Spanish School 21Agenda.

### **Funding:**

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**R2-5b-1** - The empowerment of future teachers as environmental citizens through the development of a scientific exhibition on climate geoengineering

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**Keywords:** Activism; Environmental citizenship; Initial teacher training; Scientific exhibition; Socio-environmental issue

**Abstract:** In the IRRESISTIBLE project (Apotheker et al, 2017), the development by students of interactive scientific expositions on socio-environmental problems was used as an activism strategy (Linhares & Reis, in press; Reis & Marques, 2016). The activity "Geoengineering: climate control?" sought to make future teachers more knowledgeable and critical about the problem of global warming and its possible technological control, through the development of a scientific exhibition, creating opportunities of collaborative work and sociopolitical action for a better environment and society. Through this initiative, future teachers were challenged to have a more active and responsible involvement in society and to act as agents of change. These aims were in line with an Education for Environmental Citizenship through learning experiences that promote active citizenship skills and are oriented towards social and environmental change (ENEC, 2018). This kind of community action presupposes that young people are able to reflect critically on the society and its values in order to fight for more sustainable lifestyles (Hodson, 2014; Sperling & Bencze, 2010). The empowerment of citizens with the knowledge, the skills and the values required for a more sustainable and participatory society is a priority of the European Union (EEA, 2015). The present qualitative case study had the participation of 19 students, future teachers of Basic Education, who attended the discipline of Ecology in a Portuguese higher education institution. The objective was to study the potentialities and limitations of interactive exhibitions' development in the promotion of the knowledge, the skills and the values necessary for environmental citizenship. The analysis of data obtained through interviews and participant observation suggests positive impacts connected with the scientific knowledge on global warming and geoengineering and the skills for exhibitions' development and sociopolitical action. The exhibitions served as a context for informing and sensitizing the community and the future teachers themselves about the importance of an active and critical involvement of citizens in the fight against excessive global warming. The main difficulties were focused on time and group work management. The participants also considered it necessary to experience more educational experiences of this nature, in order to

feel completely apt to promote collective actions in the community. This pedagogical approach has proved to be a promoter of Environmental Citizenship, enabling future teachers for democratic and critical participation in society.

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## R2-5b-2 - Civics studies as platform for developing environmental citizenship

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**Keywords:** Education for environmental citizenship; Curriculum, civics teachers

**Abstract:** Environmental issues are currently not being taught as part of the curricula of mandatory subjects in Israeli high schools (10th to 12th grades), therefore, most students are not exposed to these subjects. This research examines the option to include environmental issues in one mandatory subject: civics. This proposal is based on the notion that environmental challenges are related to democracy, rights and duties, political participation and the 'common good'. In addition, it is widely held that environmental education is an important part of the students' development in order to become active citizens in a democratic, humanistic and sustainable society. Civics is one of the core subjects and the same curriculum is taught in all educational divisions in the official Israeli educational system. Hence, integrating environmental issues in the existing civics curriculum would enhance the environmental education in the official educational system. The aim of this research was to point out the theoretical-ideological interface between civics and environment, and to examine the views of high school civics teachers regarding the relevance of environmental issues to their classes. It is important to understand teachers' perspectives, as they are key to integrating environmental issues into the civics curriculum. This is a pioneering research. In the theoretical section, a survey has been conducted to establish which environmental topics are correlated to civics, and which topics and concepts from the curriculum could address environmental issues. The empiric research, conducted among active civics teachers from all Israeli educational divisions, was based on a questionnaire distributed through social networks. 194 teachers, approximately a third of the active civics teachers in high schools, replied. The questionnaire included 23 statements concerning perspectives of environmental issues and their relation to citizenship, civics and willingness to bring that into class. The teachers were asked to rate their approval of the statements in a 1-5 Likert scale. Exploratory factor analysis of these ratings formulated three new variables: 'Recognition of environmental issues as part of citizen education' ( $4.05 \pm 0.78$ ;  $\alpha=0.91$ ); 'Recognition of environmental issues as part of citizenship' ( $4.41 \pm 0.45$ ;  $\alpha=0.82$ ), and 'Willingness to change behavior' ( $3.5 \pm 1.05$ ;  $\alpha=0.79$ ). The relationship of these variables to the educational divisions, national and religious identities, gender, seniority and other

factors was examined. The data shows significant differences between teachers of different educational divisions, different identities, seniority and between women and men. 82% of the teachers designated civics as a subject in which it is possible to integrate environmental issues. 60.8% reported their students had written assignments in civics that dealt with environmental issues as part of the requirements for graduation. These teachers gave the highest ratings for the first and second new variables. A majority of the teachers of all divisions view environmental issues as related to the core of civics, and are willing to integrate them in their teaching. The analysis of the answers given to an open question ("Do you think that sustainability is related to democracy, please explain") shows that most teachers acknowledge the interface and suggest various explanations. The thematic analysis points out the relevance of the topics and concepts that are currently taught in civics concerning environmental conservation. The thematic and empiric research suggest that it is possible and plausible to integrate environmental issues when teaching civics in high school, and that most of the teachers are willing to take part in this process. The integration of environmental issues in the curriculum of civics would be a consensus amongst all the educational divisions and could contribute significantly to raising environmental awareness and responsibility.

## **R2-5b-3 - Environmental education for sustainability in formal contexts: the role of children and young people in the promotion of environmental citizenship**

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**Keywords:** Environmental Education for Sustainability (EES); participation; formal education; environmental citizenship; nature.

**Abstract:** This paper focuses on Environmental Education for Sustainability (EES) in formal education. The participation of children and young people in nature has been decreasing (Furedi, 2002; Malone, 2007), which imposes constraints in their learning about nature (Adams & Savahl, 2015; Duhn, 2012), the development of their environmental citizenship (Dobson, 2007; Mackey, 2012), and their critical thinking about the connection between society and nature (Krasny & Tidball, 2009; Hedefalk, Almqvist e Östman, 2015). In fact, positive outdoor experiences (Wilson, 1996) can foster the engagement of citizens in government agencies and NGOs through local community projects (Hinchliffe & Whatmore, 2006; Jagger, Sperling & Inwood, 2016). These experiences of participation are also essential for the promotion of children and youth empowerment, through citizenship as practice and democratic living (Menezes, 2003). EES encompasses the critical and active engagement, as well as the civic and political participation (Dobson, 2007), of children and youngsters, recognizing them as environmental actors who have the right to participate in decision-making processes which affect them in the present and in the future (Hacking, Scott & Barratt, 2007, p. 532). Therefore, EES aims at educating young people to engage with and preserve nature, which is one of the most crucial elements for the sustainability of the planet (Rios & Menezes, 2017). Our study aims to better know and understand the theoretical underpinnings and practices of EES educators. In other words, what are their conceptions (anthropocentric or non-anthropocentric) about nature and main theoretical frameworks? How do they promote the engagement of children and youngsters with nature, and how do foster action about lo-

cal/global environmental issues? Our study involves a series of semi-structured interviews with 12 EES educators working in traditional schools (developing an eco-school programme promoted by the Ministry of Education) and alternative schools (forest schools, Waldorf schools, Krishnamurti). A thematic analysis shows that, for all these educators, citizenship is a fundamental part of EES, even if this not always implies a political reading of sustainability. The main differences are related to EES approaches: alternative schools promote active participation in local and daily environmental issues and greater concern with global issues; traditional schools tend to restrict their EES practices to the annual plan of activities. Finally, educators' different conceptions about nature – anthropocentric and ecocentric – also result in very diverse daily practices, such as those more focused on the human and/or non-human nature, and the local and/or global sensitive issues.

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## R2-5b-4 - Pre-service elementary science teachers initiation to activism through the production of videos on local problems

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**Keywords:** Initial Teacher Education; Activism; Environmental Citizenship; Socio-Environmental Issues; Video production and dissemination

**Abstract:** In an increasingly globalized society, it is necessary to encourage reflection and criticism on the frequent and important changes in scientific, technological, social, economic, political and cultural fields (Carter, 2008). For this reason, educational projects such as 'We Act' (Reis, 2014a) that seek to create a framework for training environmental citizens (ENEC, 2018) through collective activism based on scientific research are of great importance. Projects like this one pursue the development of methodologies and educational materials that allow supporting both the teachers and students in the realization of science-based actions on social problems, but that have a close relationship with the science and the environment (socio-scientific and socio-environmental problems). Activism contributes to the promotion of inquiry-based learning by focusing on real controversial contexts and stimulates student participation in democratic and collective problem solving (Bencze, 2017; Reis, 2014b). Approaches based on the production and dissemination of videos can be quite powerful for the implementation of collective activism on socio-scientific and socio-environmental problems (Marques & Reis, 2017). YouTube is one of the most visited platforms because of the number of videos it contains, so it can be useful to democratize and transform pedagogy and be used as an activist medium (Kellner & Kim, 2010).

This paper presents the implementation and assessment of a science-based activism training programme centred on video production and dissemination by pre-service elementary science teachers (PESTs) at the University of Malaga (Spain). Data was gathered through a semi structured assessment questionnaire and the analysis of the produced videos and students' reports. The programme consists of three phases: I) Presentation of a video on illegal mining in Venezuela as an example of awareness-raising; II) Investigation of a local problem; III) Creation and projection of activist videos. This work showed positive impacts of the training programme in improving

students' reflection and knowledge about local problems and empowering them as environmental citizens. All the students indicated the importance of applying this activity in primary schools, in order to empower citizens for socio-political activism about the complex issues of today's society. In addition, PESTs present other reasons such as competence development and/or increased motivation. The students find it interesting and relevant to work with nearby problems, to inquire about them and to produce videos to sensitize the population about their causes and possible solutions. The greatest difficulties were related with time restrictions and lack of specific training for video editing.

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## R2-5b-5 - Teaching practices of elementary and secondary teachers in education for sustainable development in Flanders

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**Keywords:** teaching beliefs and practices, Education for Sustainable Development

**Abstract:** ESD aims at developing skilled and active citizens, informed and motivated to live sustainably and act towards a more sustainable society (e.g. Carban & Fisher, 2017). The teaching approaches, which teachers apply in class, are closely related to successful learning in ESD (Olsson, Gericke, & Chang Rundgren, 2016). Holism and pluralism are integrated parts of an ESD approach (Boeve, Gericke, Olsson & Berglund, 2015). Social, economic and environmental aspects of SD issues are seen through pluralistic lenses (Sterling, 2010). At the same time, action-orientation in ESD is thought to be highly significant when it comes to the cultivation of action competence (e.g. Jensen & Schanck, 1997; Varela-Losada, Vega-Marcote, Pérez-Rodríguez & Álvarez-Lires (2016). Even though there is now an increasing amount of work on ESD implementation, the teaching approaches applied in ESD are still not well understood (e.g. Fraser, Gupta, & Krasny, 2015; Kimaryo, 2011; Olsson et al., 2016; Sund, 2016). This makes it necessary to do more empirical research on ESD implementation in order to reveal this diversity. Thus, the aim of this study is to investigate teachers' practices in ESD teaching in elementary and secondary school. We have developed a questionnaire for teachers to report their beliefs and self-perceptions of their practices. The instrument consists of three subscales: one subscale about holism, one subscale about pluralism and one about action-oriented ESD. The items of each subscale are sorted into three categories to reveal variations in ESD teaching beliefs and practices. The instrument will be piloted to 40 teachers at primary and secondary schools. Then, in September 2019, the questionnaire will be administered to 300 teachers at primary and secondary schools in order to check its construct validity and reliability. We will apply factor analysis to optimize the items of each subscale. Last but not least, Cronbach's alpha will be calculated to assess the internal consistency of the subscales. At the iREEC conference,

we will be able to present our results. We expect to find a measuring scale consisting of three dimensions: holism, pluralism, and action-oriented education in ESD. We are confident that our instrument will measure teaching beliefs and practices which promote students' action competence in the framework of ESD in a reliable and valid way. This questionnaire will be then used to measure ESD teaching practices of teachers before and after their participation in a training programme in the context VALIES project taking place in Flanders during the school year 2019-2020, Belgium.

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## **IPS01 - Enhancing environmental citizenship in education for sustainability using GIS tools**

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2: All members are participating on the project (see below the names)

**Keywords:** Geographical Information Systems (GIS), sustainability, TPACK, training teachers, Sustainable Development Goals, Education for Environmental Citizenship

**Abstract:** The objective of this poster is to enhance Geographic Information Systems (GIS) and sustainability for teaching and learning aims. GIS is known to be difficult to use and learn (Rickle, Ellul & Haklay, 2017), but it improves the preparation of students and makes it possible to implement a sustainability approach to territorial problems (Hwang, 2013; Scott & Rajabifard, 2017). GIS allows one to deal with territory through global and local approaches to climate change, biodiversity loss, risk of natural hazards, sustainability in agriculture, tourism, water supply or energy, economic globalization, urban sprawl, crime, and many other topics of global interest. Thus, we are going to teach about sustainability using GIS and at the same time we are going to enhance education for environmental citizenship. To achieve these aims we have created a MOOC to help teachers. Some actions have been necessary:

a) In relation to the teaching staff, a selection of good practices of university teachers that integrate GIS or other geoICT tools (online viewers or virtual globes) in their teaching related to the SDGs or sustainability approach in territorial sciences collected in doctoral thesis and other references (articles or book chapters), and direct testimonies on how to use GIS or geotechnologies in lectures.

b) Regarding the teaching method, a pedagogical design which contains activities that combine the contents of science itself and a sustainability approach (Álvarez y Lázaro, 2018) with technology and pedagogy, the TPACK model (Technological Pedagogical Content Knowledge, Mishra and Koehler, 2006) suitable for university teaching (Tømte et al., 2015) and which can answer:

- What to say? Contents, search for the most relevant content in their own science and skills based on a sustainable approach.
- How to say it? Pedagogy, teaching techniques. Search for good practices of university professors.

- What tools are most appropriate to use? Geotechnology such as GIS or Copernicus Program (remote sensing) materials.

The aim of the project will join these three perspectives in order to explain geography concepts with a sustainable approach using GIS.

c) In relation to teachers and students: it is advisable to get feedback. Thus, several rounds of discussion groups of teachers and students have been organised regarding which technologies to use and how to use them.

As a result a MOOC syllabus has been prepared for teachers following the TPACK model. All modules integrate a GIS tool, a suitable pedagogic method and a geographical topic such as physical environment, sustainable cultural landscape, environmental impact evaluation or local development with a sustainable approach.

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## **IPS02 - Exploring Adolescents' Environmental Citizenship-Relevant Behaviors via General and Behavior-Specific Approaches**

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**Keywords:** VIP; CADM; Consumption; Adolescents; Biospheric values; Habit

**Abstract:** The study tackles the problem of unsustainable consumption that reflects a specific aspect of environmental citizenship. We argue, that in order to achieve effectiveness in policies aimed at lowering adolescents' consumption rates, it is worthwhile to address key psychological factors that have been established to be related to various environmental actions and, therefore, could potentially determine consumption behaviours. We explored to what extent two theoretical approaches, general (i.e., the Values-Identity-Personal norms model (van der Werff & Steg, 2016)) and behaviour-specific (i.e., Comprehensive Action Determination model (Klößner & Blöbaum, 2010)), can explain different consumption behaviours, such as refraining from bottled water use, shopping with reusable bags, buying unpackaged groceries, and selling or donating personal stuff that is no longer in use. We conducted two studies in convenient and representative samples of adolescents. In both studies we employed path analytical approach and tested two predictive models of various consumption behaviours that approach the issue through differing perspectives. The results of Study 1 and Study 2 indicated that the VIP model and the CADM can account for lower adolescents' consumption. Among other factors, biospheric values, environmental self-identity, personal norms, and habits were found to be the most prominent contributors for their models. We propose that both general and behaviour-specific approaches have value in informing policies for lowering adolescents' consumption and can be used together in order to achieve lasting changes in environmental citizenship education.

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**Keywords:** Values; Environment; Eastern Europe; Citizens

**Abstract:** Eastern European countries have experienced a series of political and social transformations over the past 30 years. The exit from the former communist bloc, the accession to the European Union, the civil wars, all influenced the attitude of the citizens of these countries regarding environmental values.

This article presents an analysis of Eastern European citizens environmental values based on the results of several European Values studies developed between 1999 and 2008. The European Values Study (EVS) is a large-scale, cross-national, repeated cross-sectional survey research programme on basic human values. It provides insights into the ideas, beliefs, preferences, attitudes, values and opinions of citizens all over Europe (EVS, 2011a).

The authors focused on Romania and surrounding countries given the diversity of political and social transformations they passed over the last 3 decades. Thus, the analyzed countries belonged to former communist bloc, acceded to EU structures in different stages (some of them are still not part of EU), had to confront the difficulties of civil wars and/ or are still under strong influence from Russia.

The analysis is based on 2 questionnaires, each of them consisting in 3 questions on environmental values. It very interesting to observe that the citizens which acceded earlier in EU and had access to EU funds are less interested to contribute, from their own income, to environmental protection in comparison with the citizens which acceded later. However, the citizens present the high interest to contribute with funds to environmental aspects come from former Soviet states (e.g. Ukraine). On the other side, citizens from countries like Romania and Bulgaria consider that human interference is not so negative for environment. We need to emphasize here the position of citizens from countries which faced the damages and destructions from civil wars (e.g. Republic of Serbia and Republic of Moldova). These citizens are willing to giving part of income to support environmental activities and three quarters of them believe that humans interference produce disastrous consequence over nature (EVS, 2011a; EVS, 2011b; EVS, 2016).

Environmental citizenship is a concept which can be strongly influenced by political and social disruptions and/ or by critical political changes (e.g. accession to EU structures and funds, civil wars etc.). In addition, anthropogenic events with severe impact on the environment can be a major turning point in terms of attitude towards the environment (see the case of Ukraine).

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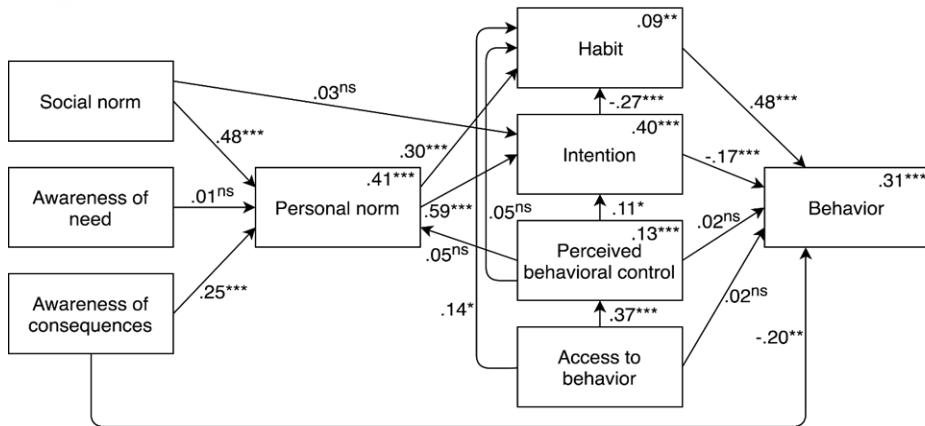
**IPS04** - The role of normative, habitual, intentional, and situational factors in understanding adolescents' bottled water use

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**Keywords:** Adolescents; CADM; Bottled water; Habit

**Abstract:** Pro-environmental behaviour is an important part of environmental citizenship (Dobson, 2010). The current research focuses on adolescents' bottled water use, since bottled water generate plastic waste, thus, deepening the current environmental issues (EC, 2018). The study aims to explore adolescents' bottled water use in the context of the Comprehensive Action Determination Model suggested by Klöckner and Blöbaum (2010). CADM enables to investigate a comprehensive picture of pro-environmental behaviour (e.g., Klöckner, 2013; Ofstad et al., 2017) by capturing normative, habitual, intentional, and situational factors. The current study was conducted in a representative sample of Lithuanian adolescents, whose age varied from 13 to 17 years ( $M_{age} = 15.10$ ,  $SD_{age} = 1.40$ ) The sample consisted of 508 adolescents (49 % were female). The vast majority of the participants attended junior high school or high school (97 %), 2.8 % attended occupational schools and 1 adolescent (0.2 %) was in the job market. The questionnaire covered the key elements of CADM: normative factors (awareness of need, awareness of consequences, social norm, personal norm), habit, intention, and situational factors (perceived behavioural control, access to behaviour), self-reported bottled water use. The questionnaire battery was tested in a pilot study with the aim to ascertain whether the items are understandable for the adolescents. Path analysis using Mplus (Muthén & Muthén, 1998–2015) was performed in order to address the research question. The results of the path analysis (Fig. 1) indicated an acceptable model fit of CADM, ( $\chi^2(13) = 30.42$ , CFI = .96, TLI = .90, RMSEA = .05 [.03, .08]). Research findings suggest that normative factors are significant antecedents of adolescents' pro-environmental behaviour. However, habit was found to be the strongest predictor of adolescents' bottled water use, indicating that aforementioned behaviour is likely to be automatic. Situational factors were not found to be significant direct predictors of adolescents' bottled water use. Theoretical framework of CADM explains adolescents' bottled water use significantly. To foster adolescents' pro-environmental behaviour, namely, to reduce bottled water use, policy makers should address normative and habitual factors. These factors have a great potential to be addressed via education system, thus, increasing adolescents' environmental citizenship.



**Fig 1.** Standardized regression coefficients of the CADM paths in the sample of adolescents (N = 505). \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ . ns - non-significant.

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**IPS05** - Cryptic biodiversity as a means to nature conservation awareness for environmental citizenship

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**Keywords:** Cryptic biodiversity, wetlands, field research, environmental citizen

**Abstract:** The ecology and biodiversity of aquatic ecosystems research group (ECOBISA) at the University of Jaén has been working on aquatic systems' protection and conservation since 1998. The province of Jaén has more than 100 wetlands. Most of these aquatic ecosystems are temporary and are mainly affected by the agricultural activities developed in its drainage basin, especially those related to the use of agrochemical products and the loss of habitat. These impacts negatively affect the biodiversity of these ecosystems. But part of their diversity is hidden (due to its small size mainly) for the majority of the society, being more difficult its protection. Although its role is key for the ecosystem functioning and resistance. The International Wetland day is celebrated every 2nd of February and during this day, a special activity is carried out by the ECOBISA group members. During the planned activity people from different groups (primary and secondary education students, senior programme of the University students...) visit a wetland and working groups are organized to perform limnological sampling. In these samplings scientific instruments are used, such as plankton net, multiparametric probes, chemical analysis kits, and the microscopic organisms that are captured are observed under magnifying glass. These organisms that are not visible to the naked eye, constitute the cryptic biodiversity. During the activity the role of these small organism in the ecosystem functioning is explained. This proposal successfully engages different age groups in citizen science, allowing their active participation in cryptic biodiversity research. By doing so, it increases participants' knowledge and understanding of the key role of tiny organisms, raising their awareness of negative impacts and actively engaging them in the protection and conservation of their neighborhood biodiversity. Field research and scientific instruments are used as didactic tools. At the end of the activity participants are asked to act as speakers with the rest of society to protect the wetlands and all the biodiversity they harbor. We ask them to act as environmental citizens, using their actions at different spheres (individual and collective) to move to wetland conservation and protection.

**IPS06 - Effect of contact with nature during childhood on environmental attitudes, ecological behavior and environmental citizenship behavior: comparing children's and adults' self-report**

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**Keywords:** nature contact, environmental citizenship behavior, settings, research with children

**Abstract:** Societies face major environmental problems, and education has been shown to be a fundamental instrument that contributes to behavioural changes, and children are an especially important target group for education for Environmental Citizenship (EC). The definition of EC stresses the importance of environmental attitudes (EA), environmental behaviour (EB) and personal skills and competences such as empowerment and self-efficacy as important aspects of the concept of Environmental Citizenship.

Based on the review of literature we would like to present a new project that started in July 2019. The project has the aim to assess the impact of a multitude of different settings on EA and EB/Environmental Citizenship Behavior (ECB).

The main research questions are:

1. What is the influence of positive and negative nature contacts on EA and EB/ECB of children aged 8 to 12 years as reported during childhood and as reported retrospectively by adults?
2. How are different settings valued and experienced during childhood and retrospectively during adulthood (e.g. concerning the feeling of self-efficacy and restorativeness; what is the impact of perceived setting interdependencies on restoration)?
3. What are the characteristics of the settings and experiences that might be relevant for the formation of EA and EB/ECB and how do they vary during the life course?

As a longitudinal design is not possible, we will combine two studies. The first study will be focusing on children's settings. Important criteria for the selection of the setting types are: (1) long-term/regular contact, (2) diversity in the frequency/duration



of contact and (3) the difference in the amount of greenery within one type of setting, leading to the selection of e.g. forest schools vs. indoor schools with comparable pedagogical concept; green vs. grey school yards; outdoor leisure groups vs. indoor leisure groups etc.

The second study has a retrospective focus and will ask adults to give account of their childhood experiences (between the age 8 to 12 years approximately).

For the data collection we will do stated choice experiments and use standardized questionnaires administered as: video choice experiment and online questionnaire. In study 1 we will interview the children directly in the schools whereas in study 2 we will make use of a commercial internet panel.

The synthesis of the results of both studies will contribute to a better understanding of different natural areas and their role for EA and EB/ECB formation.

We hope to get feedback to our research at the IREEC 2019.



## **IPS07 - The VALIES project: Towards Effective ESD in Formal Education in Flanders**

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**Keywords:** Education for Sustainable Development; Action competence; ESD effective schools; Teacher professional development; Peers; Parents.

**Abstract:** Sustainable development cannot be achieved through political agreements, financial incentives or technological innovations alone (UNESCO, 2015). In essence, SD deals with people, and requires changes in the ways citizens think and act (e.g. ENEC, 2018). Education is one of main players in building these competences (e.g. Biesta, 2015). *VALIES* is a large scale longitudinal research and development project that aims to bridge critical gaps in the successful implementation of ESD into formal education. The VALIES team collaborates extensively with the Flemish educational organizations and NGOs that offer schools ESD support. The central goals are to (a) study the critical success factors and barriers for bringing integrated and action-oriented ESD into schools, (b) operationalize action competence (Mogensen & Schnack, 2010), and (c) develop the effectiveness of tools to build action competence through education. The implementation and effects of ESD in the schools participating in VALIES, are studied longitudinally during two consecutive school years. We follow about 40 schools and their teachers, students and parents through a mixed methods design, focusing on learning outcomes as well as on the processes that shape them. The design draws from Desimone's (2009) framework for evaluation of teacher professional development (TPD). We propose an eagle eye presentation and discussion of our five interconnected research lines: (1) Action competence. We further conceptualize and operationalize action competence; (2) Impacts of TPD. We study the impacts on teachers' conceptual understanding of (E)SD, their willingness and competences to teach ESD; (3) Impacts of ESD on students. We study the impacts of diverse ESD practices (developed by teachers), on the action competence of students; (4) School contexts. We study the school culture surrounding (E)SD in our participating schools, through lenses of school policy-making and educational innovations; (5) Social contexts. We study students' action competence in relation to their parents and peers. For each of the research lines we will briefly present preliminary and intended results, and highlight how these contribute to the goal of VALIES to develop deliverables that can act as accelerators for ESD in formal education: (1) empirically validated quality criteria for ESD, (2) effective teacher professional development, (3) effective ESD practices in schools, (4) self-evaluation tools for schools, teachers and students, (5) a roadmap towards successful ESD implementation. For each of the research lines and deliverables we will discuss and explore potential connections with the ENEC concepts.

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## **IPS08** - Connecting air pollution with the big picture of sustainability to promoting civic engagement

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**Keywords:** Education for environmental education; Action for a change; IBSE; Place based science and sustainability inquire learning

**Abstract:** This poster describes how air pollution issue has been developed as part of an Erasmus + project (Urban Science, [www.urbanscience.eu](http://www.urbanscience.eu)) on education for sustainability with the aim to develop both science and sustainability competences to actively contribute to creating sustainable cities (table 1 and 2). A learning module (LM) on air pollution has been developed with a team of teachers and trialled with 52 students of a secondary school of the north area of Milan whose Air Quality Index (Akimoto H. et al, 2003) is exceeding standard values for a noticeable number of days/year. The LM has been developed with an inquiry-based learning approach where the urban area near the school has been used as a living-laboratory to allow students to explore environmental issues and their scientific understanding in a real context. The LM was based in the conceptual framework and resources developed by the Urban Science project which expounds an Inquire based Science Education (IBSE) approach (Bybee, R. et al., 2006, European Commission, 2007, Minner, D.D. et al., 2010), adopting the Enquiring Minds model (Morgan, J. et al, 2015). During the trialling it was found that students can research and elaborate information for debating on air pollution issue. What was relevant is that students were also able to relate findings to their everyday life with call to actions for themselves, school-mates and families. The role of enquiring on questions students want to explore, on misunderstandings and misconceptions as keys for turning on curiosity and will to know is discussed. Assessment rubrics were developed (table 3) and tested to monitor students' conceptual understanding (Smith C. et al., 2011). The IBSE approach applied in the context of education for sustainability enabled learners to deepen understanding on environmental issues through progressive engagement and to develop relevant actions since these measures responded to data students examined and to findings that they came across. The link to a real problem of the community where students live (Smith G., 2002) and the use of urban environment for hands-on inquire-based approach to science is evaluated as an important prerogative for students' engagement for sustainability and for environmental citizenship development.

**Table 1 and 2:** Contributing to creating sustainable cities requires pupils to develop a broad range of competences for inquiry-based science and sustainability. Table 1 and 2 list two sets of competencies and highlight those critical. The lists should not be viewed as separate; rather they are seen as complementary competences developed through each other: IBSE provides the approach and sustainability the context.

	<b>IBSE Competences</b>
1. Develop knowledge and understanding of key Urban Science issues	1.a. State observable features
	1.b. State or use a classification system
	1.c. State a relationship between variables
	1.d. Show understanding of scientific theory
2. Learn how to	2.a. Identify equipment
	2.b. Use equipment
	2.c. Describe a standard procedure
	2.d. Carry out a standard procedure
3. Develop an understanding of scientific Inquiry	3.a. Propose a question
	3.b. Plan a strategy
	3.c. Evaluate risk
	3.d. Collect relevant data
	3.e. Present data effectively
	3.f. Process data
	3.g. Interpret data
	3.h. State a conclusion
	3.i. Evaluate a conclusion

	<b>Sustainability Competences</b>
1. The ability to understand systems and apply systems thinking (inputs, outputs, connections, loops, feedback)	1.a. Able to connect different elements within an urban environment; 1.b. Seeing how they relate to each other; 1.c. Recognising that all actions are part of a system; and 1.d. Often have multiple consequences positive or negative.
2. An understanding of how natural systems function, ecological limits and resource constraints	2.a. Understanding how natural systems work within limits and use a range of strategies to adapt, optimise and flourish; 2.b. To understand how human activity that exceeds ecological limits or capacity has negative effects; and 2.c. Sustainable systems balance resource use within a fixed carrying capacity.
3. The ability to think in time - to forecast, to think ahead, and to plan.	3.a. Develop ideas for alternative futures 3.b. Understand alternative futures 3.c. Evaluate alternative futures; and 3.d. Able to predict the consequences of actions today on future choices and their ability to act.
4. The ability to think critically about value issues.	4.a. Identify behaviours and values that reinforce a sustainable future; and 4.b. Able to apply a values perspective to decision-making; integrating scientific knowledge with personal and societal values in making choices.
5. The ability to separate number, quantity, quality, and value.	5.a. Being able to distinguish between actions which improve or quality of life versus quantitative changes in material standards.
6. The capacity to move from awareness to knowledge to action.	6.a. Able to take responsibility to develop and implement plans; and 6.b. Evaluate their success.
7. The capacity to develop an aesthetic and compassionate response to the environment	7.a. Having a sense of connection beyond self, 7.b. See the needs of others; and 7.c. Demonstrate compassion and sympathy for others and the natural world.
8. The capacity to use these processes: knowing, inquiring, acting, judging, imagining, connecting, valuing, and choosing.	8.a. Being able to integrate a range of technical and emotional capacities; and 8.b. Know which capacities to apply to a given situation.

**Table 3:** Assessment rubric used during trialling. This rubric intends to merge science and sustainability competences monitoring in one single tool.

Competence area	Novice	Beginner	Practicing	Advanced
Develop knowledge and understanding of key Urban Science issues (including understanding basic characteristics of scientific thinking and urban environment)	Need to develop understanding of scientific thinking in the context of urban environment	Able to identify elements of scientific thinking and to identify urban challenges	Apply some elements of scientific thinking to understand challenges in an urban environment	Able to apply scientific thinking to understand challenges in an urban environment
Able to use scientific methods for inquiry in urban science	Need to learn methods of science inquiry	Need to practice methods of science inquiry in urban context	With support use scientific methods in urban context	Able to use scientific methods in urban context
Carry out inquiry science activities (including posing a question, developing a strategy, proposing a method, collecting and interpreting data, drawing a conclusion) in urban context	Need to acquire inquiry activities in urban context	With scaffolding able to complete an inquiry activity in urban context	With (some) support able to use science inquiry in urban context	Able to apply science inquiry autonomously in urban context
Apply systems thinking to evaluate consequences of human activities in urban environments	Needs to know more about consequences of human activities and cities as systems	Understands consequences of human activities in urban environments also with a systems perspective	With support apply elements of systems thinking to evaluate consequences of human activities in urban environments	Able to apply systems thinking to evaluate consequences of human activities in urban environments
Understand natural systems in the context of a city, using science knowledge	Need to learn more about the main characteristics of natural systems	Able to recognise some system characteristics of natural systems in the context of a city, using science knowledge	Able to understand some characteristics of natural systems in the context of a city, using science knowledge	Generally understand natural systems in the context of a city, using science knowledge

Understand the basic features of sustainable urban systems, using science knowledge	Need to know more about the basic features of sustainable urban systems	Able to identify some basic features of sustainable urban systems, using science knowledge	Able to distinguish between sustainable and unsustainable urban systems, using science knowledge	Using science knowledge, understand the basic features of sustainable urban systems
Understand alternative futures in urban environments, using science knowledge	Need to develop time-related thinking in urban context	Able to understand the basics of forecast and predict alternative scenarios using scientific thinking	Able to develop ideas about alternative futures and with support understands them using scientific thinking	Develop ideas and understand alternative futures in urban context, based on scientific thinking
Identify behaviours and values that reinforce a sustainable future	Need to learn more about values in a sustainability context	Able to identify some behaviours and values in a sustainability context	Able to identify some behaviours and values that act towards a sustainable future	Able to distinguish between behaviours and values that act towards a sustainable and an unsustainable future
Able to apply a values perspective to decision-making; integrating scientific knowledge with personal and societal values in making choices.	Need to understand the role of scientific knowledge and values in decision-making	Understand the role of scientific knowledge and values in decision-making	With support apply a values-perspective in decision-making	Able to apply a values-perspective in decision-making
Apply scientific evidence to distinguish between sustainable and unsustainable actions in urban environments	Needs to know more about sustainable and unsustainable actions in urban environments	Able to understand the difference between sustainable and unsustainable actions in urban environments	In some cases or with support, able to distinguish between a sustainable and an unsustainable actions using scientific evidence	Able to distinguish between sustainable and unsustainable actions using scientific evidence



Agency and responsibility supported by scientific thinking	Need to develop responsibility and ownership for actions	Understands evidence supporting responsibility for actions in urban environment	Need to develop agency but express responsibility for actions in urban environment	Ready to practice evidence-based responsibility for actions in urban environment
Evaluate success of (proposed) interventions in cities based on scientific thinking	Need to practice how to evaluate consequences of actions in systems such as cities	Possess skills to evaluate actions in systems	Able to apply scientific thinking to evaluate success of interventions in urban environment	Able to evaluate success of (proposed) interventions in cities based on scientific thinking

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## **IPS09** - Youth knowledge and awareness about status and the main threats which migratory fish species face during their long journey

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**Keywords:** Environmental education; Anthropogenic activity; Formal education; High school; Pro-environmental behavior

**Abstract:** There is a great need to inform young people about anthropogenic impact on the environment which could make possible them to better protect it in future. It is important to involve intellectual and motivational aptitudes for a pro-environmental competence (Roczen et al. 2013). The main objective in this work was to analyse knowledge of pupils in two high schools in Serbia about status of migratory fish species (sturgeons) in Serbian part of the Danube River (Lenhardt et al. 2005) where one high school is located close to region which was famous for sturgeons catch for caviar in past (till 2006) and the other in capital city of Serbia which is remote from particular region. Altogether 118 pupils interviewed and they answered on 14 questions of which 4 related to personal data, 4 related to their knowledge about different sturgeon species and 5 to different ways of non-formal education, while the last was related to their comments. Pupils from school close to the sturgeons famous region had more positive answers concerning knowledge of the most valuable sturgeon species for caviar, beluga sturgeon, then pupils in capital city, 94% and 64%, respectively. Concerning Russian sturgeon and stellate sturgeon regional school had slightly better score 40% and 57 % in comparison with 33% and 44% for school in capital city, respectively. Equal results obtained for ship sturgeon (14% of positive answers) which is on edge of extinction in Serbian part of the Danube River and sterlet which is potamodromous and till 2019 was commercial fish species in Serbia (96% of positive answers). As the main reasons while sturgeons become endangered pupils in both schools quoted pollution and overfishing while only five pupils from regional school quoted dam building and river modification as endangering factor. Questionnaire offers four possibility for non-formal learning about sturgeons: multifunctional pond fish farms, sport fisheries, aquarium and museum. Pupils from both schools mainly chose aquarium (38% and 60% for regional and school in capital city) and only few pupils chose option museum (10% and 6% for regional and school in capital city). More pupils from regional school choose option multifunctional pond fish farms and sport fisheries than pupils from capital city. As knowledge from formal education is equal for all schools in Serbia, in this case local knowledge play important role in competence of pupils. Interest in non-formal learning showed difference in preference of pupils in two investigated schools.



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**IPS10** - Garbage problems at Saharan Refugee camps: controversial issues to environmental citizenship teacher's training and social changes as a consequence

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**Keywords:** Garbage landscape; higher education teachers training; teachers' innovation; controversial issues; responsibility; Education for Sustainability.

**Abstract:** Training innovative teachers to train primary and secondary school teachers is the main request that University of Tifariti (RASD) has done to the university of Jaén in the cooperation project we are working at (2017DEC002). In order to respond to this request a postgraduate degree ("Training for teachers of subjects of the Degree in Primary Education of the University of Tifariti - Saharawi Refugee Camps (CRS)") is being developed by the University of Jaén since 2018. Within the subject "Research and Innovation in Primary Education", through the relevant or controversial social problem methodology and how students learn through this approach, a relevant environment problem has been worked with the students: why there is so much garbage in the landscape of the Sahara?. Using critical thinking the main objective for our students was to analyze the relationships between the local and the global problems, using the subjects of the primary and secondary schools curriculum in an interdisciplinary way to try to answer this question. We seek to get three goals with it: Develop a problem-based learning methodology, to promote a learning space in which each curricular subject could offer answers that will help to solve the problem from a competence point of view and to make them aware and co-responsible about the education for sustainability. Once worked and thought in groups among them in our subject (Picture 1), they were invited to act in their own classrooms (Primary teacher's degree and secondary schools students) (Picture 2). As a result, students have become aware that they had a problem with the garbage (which they had not observed before), they have looked for solutions, and they have decided to act as a consequence, involving their communities. In fact, a Service-Learning (SL) methodology has been developed as a consequence of that cascade training method. In this presentation we show how the sustainable development objectives 4, 5, 6, 10, 11, 17 have been worked, and how these actions can transform the perception and the life of a community to become more sustainable.



**Picture 1:** Explaining the problem-based learning methodology; **Picture 2:** Presenting the works done at schools



**Pictures 3 and 4:** Become aware of the garbage in the surroundings of the schools and the importance of differentiating it for recycling



*Pictures 5 y 6: A recycling point has been built*



*Pictures 7 and 8: A new perception about the garbage at primary school.*



*Picture 9: Explaining for the TV news the actions done by the community.*

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## **IPS11 - Experiences in citizen journalism and collaborative cartography for the education and the awareness for environmental citizenship**

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**Keywords:** Social web; Citizen journalism; Collaborative cartography; Education for environmental citizenship; Environmental awareness

**Abstract:** The basis for environmental awareness is the knowledge. Anyone who does not know, does not value, and who does not value, does not protect. In this proposal, we consider the role that the citizen journalism and the collaborative cartography can play as in-formal education tools, suitable for people of all ages and different educational levels. Citizen journalism and collaborative mapping are two siblings concepts that share the same philosophy relating the web 2.0 or social web: that the users generate contents and share it on the web, to contribute in this way to the collaborative construction of knowledge and to the dialogue and discussion about issues that are of special relevance for citizens, as it is the case of environmental protection. Citizen journalism and collaborative mapping –where citizens have the leading role- can act as means of detection, visibility, knowledge, information, awareness and action against environmental problems. These actions can be channeled in two ways: that the citizens themselves promote them, or that the prime mover of the initiative are entities or institutions that seek and involve the citizen participation and collaboration. The main objective of this proposal is to analyse how citizen journalism and collaborative cartography can assist in environmental education and awareness of citizenship, using the case study as methodology. The elements analysed are the subject, the spatial and temporal scope, the promoters, the objectives, the format of the contents and in which way it contributes to the awareness and the Education for Environmental Citizenship. The cases analysed are the following: What is missing? “Creating a global memorial to the planet”; Environmental Justice Atlas; InfoAmazonia and InfoCongo; Pon un tendido en tu punto de mira (Put a power lines in your spotlight); Mapa colaborativo de los conflictos del agua en Andalucía (Collaborative map of water conflicts in Andalusia); and eBird. All these initiatives respond to the purpose of educating through the active participation of citizens, which contributes to society's involvement and more actively engaged citizenship in the defence of the environment.

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**IPS12** - From raising awareness to capacity building: turning business school students into environmental citizens

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**Keywords:** Education for environmental citizenship; sustainability; sustainable development; environmentally-friendly; capacity formation

**Abstract:** Education plays a crucial role in shaping the future globally and locally. According to its mission statement, the School of Business of Belarusian State University seeks to train leaders of the future by responding to challenges of the present. Measuring the ecological footprint of an average Belarusian citizen indicates that 2.06 Earths are necessary to meet our needs [1], which is one of the challenges requiring urgent action. Environmental citizenship will provide the concepts and the means to address the existing problems, but it is not obvious that environmental citizenship has become fully embedded into formal educational settings. The objective of this paper is to evaluate the business school students' understanding of environmental citizenship and to discover if the ideas and principles are translated into relevant capacities and put into practice. Of significance is also assessing the effectiveness of projects/courses with environmental citizenship themes, already incorporated into the curriculum, in encouraging environmental citizenship behaviours in students. The empirical data collection was carried out by spreading Google Forms questionnaires (focusing on awareness of environmental citizenship, sustainability, environmental friendliness, life-style assessment), and ecological footprint measurement. The first-year and the third-year bachelor students' papers, assignments and projects were also under analysis. The number of students surveyed is 100. The results of the surveys reveal total awareness of global environmental challenges. The term "environmental citizenship" is not widely used in academic settings or everyday activities, and understanding of environmental citizenship slightly varies; but the concept itself is clearly understood. Environmental citizenship is considered by almost 100% of students to be an individual contribution or a joint effort (community work) towards protecting the environment, improving living conditions on the planet, mitigating negative impacts of human activity on the environment. The students use the terms "sustainable development" or "environmental protection" rather

than “environmental citizenship”. Measures or steps relevant to environmental citizenship have been listed with decrease in occurrence in the students’ projects and responses. Students associate environmental citizenship with the following types of activities: (a) planting trees (100% of students); (b) saving energy (100% of students); (c) recycling plastic, glass, aluminum cans, scrap metal (60% of students); (d) appropriate disposal of batteries and mobile phones (60% of students); (e) minimizing the use of water at home (no leaking pipes and faucets, low-flow shower heads, low-volume toilets) (56% of students); (f) leaving no litter in woods and on river banks (40% of students); (g) carpooling and riding a bike (40% of students); (h) using environmentally-friendly cleaning products and techniques (20% of students); (i) protecting wildlife and livestock (15% of students); (j) limiting bottled water consumption, no plastic bottles (15% of students); (k) sorting rubbish and eliminating waste (20% of students); (l) growing your own vegetables and greens (15% of students); (m) mitigating negative impacts of industrial enterprises (15% of students); (n) electric cars and more walking (15% of students); (o) buying products made of recycled materials (10% of students); (p) no disposable coffee cups (20% of students); (q) composting (3% of students); (r) book crossing (3% of students). Despite considering these activities practical and beneficial, already in use or having potential, half the students (49%) admitted that they didn’t transform many of the listed measures into their daily practice. Moreover, some issues such as overconsumption or negative aspects of certain products production and usage totally lack attention. Most students believe that they adhere to major principles of sustainability, but are not yet ready to sacrifice some comforts and small pleasures. About 55% can be considered environmental citizens. The courses evaluation is currently in progress, but such courses as Corporate Social Responsibility, Safety & Well-being, Management and Organizational Behaviour focus on case studies and students’ projects which are practically-oriented, change opinions and encourage conscious behaviour towards environment. The topics of interest are sustainability, sustainable development goals, environmental protection, energy efficiency, alternative energy, ethical business. The implemented projects include Green Classroom; Sustainable University; Plastic, Know Your Place!; CoffeeCupoMania; School of Business’ CSR Strategy; Alternative Energy Prospects for Belarus. To sum up, business school students are fully aware of environmental citizenship concepts, principles and environmental problems, but further research and changes in course syllabi are needed to incorporate activities for practical applications and to build strong capacities for safeguarding a sustainable future.

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## IPS13 – Measuring school effectiveness towards Education for sustainable development

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**Keywords:** Education for Sustainable Development; School Organisation; Educational Effectiveness; School Characteristics

**Abstract:** The publication of the Brundtland-report by the World Commission on Environment and development in 1987 is seen as the onset of sustainable development as a concept. Education plays a key role in this as it can empower the citizens of today and tomorrow with the necessary competences to act for a sustainable future. Education for sustainable development (ESD) aims to do exactly that. Although ESD has links with educational areas such as environmental education (EE) and citizenship education (CE), ESD takes a different approach when it comes to sustainability issues. ESD builds on three integrated principles: holism, pluralism and action (Boeve-de Pauw, Gericke, Olsson, & Berglund, 2015; Öhman, 2008). So far, however, very little attention has been paid to the influence of the school as an organisation connected with the effectiveness of ESD (Boeve-de Pauw & Van Petegem, 2017; Scott, 2009). This is remarkable as there is extensive research in the field of educational effectiveness on the important catalyst function of the school organization in the matter (Creemers & Kyriakides, 2008; Scheerens, 1990; Teddlie & Reynolds, 2006). A previous study identified the key characteristics of the ESD effective school on a contextual and on a central level. The two contextual characteristics are sustainable leadership and school resources. On the central level we identified pluralistic communication, supportive relations, collective efficacy, adaptability, democratic decision making and shared vision.

Educational effectiveness research has a long tradition of looking at the characteristics of a school to say something about school effectiveness (Teddlie & Reynolds, 2006). The purpose of the present investigation is to explore this relationship between school characteristics and students outcomes related to ESD. An interesting concept to operationalise student outcomes, is the concept of Action Competence

(Mogensen & Schnack, 2010). Via the development of a quantitative instrument we aim to measure the previously identified school characteristics. The idea that the effects and outcomes of ESD should be measured, both at the student level and at the school organization level, is steadily making its entrance in the field of ESD (Bormann & Nickel, 2017).

With this poster presentation we want to present and discuss how we aim to develop a tool to measure the effectiveness of ESD in relation to the school as an organisation. In addition to the opportunities to the field of ESD, we hope to connect ESD-effectiveness research on a school level to the field of Education for Environmental Citizenship.

The development of the described measurement tool will benefit from the participation in the conference as there will be plenty of opportunities to obtain critical feedback from peers in the field of Environmental Citizenship. I argue that it is of great importance to connect with related research areas. Therefore I do believe that the symbiosis between the field of Education for Sustainable Development and the field of Education for Environmental Citizenship will provide my research considerable added value.

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**Keywords:** Forest Education; non-formal education; environmental education; Education for Sustainable Development, Environmental Citizenship

**Abstract:** In Austria, Environmental Education (EE) is an important part of formal education. It has been anchored in schools as a teaching principle for decades. Besides that, EE can be found in non-formal education, for example in Forest Education (FE). The FE focuses on the dialogue between humans and nature. It represents EE in the context of forest diversity, forest management and forest functions, but also to some extent Education for Sustainable Development (ESD) (Dobler & Vogl, 2008). Schmechel (2011) considers the transfer of knowledge as well as the sensitisation and the appeal to people's responsibility to be very important in the FE. In this study we aim to analyse the current and future role of forests with regard to Environmental Citizenship (EC) in Austria. In particular, we want to give an overview of the strengths and weaknesses of Education for Environmental Citizenship (EEC) on the base of the case study on FE. The study is based on a SWOT analysis to discuss major challenges and changes for the key elements of the EC concept: active engagement in accordance with legal regulations and land ownership, civic participation as well as individual and community actions. The stakeholders interviewed include not only experts from research, policy and education, but also experts in FE. The strength of the EC concept lies in an increased understanding of environmental and social consequences of the own actions, empowerment and the development of social and sustainable responsibilities. With special regard to FE, this includes the acceptance of a system of sustainable land use and forest management. At present, the EE system has not yet been reflected under the concept of EC in Austria. Nevertheless, elements of EC can be found well established in forest education. Forests have to fulfil various functions; besides the economic function, protective and welfare functions, the demands for nature conservation and environmental protection are increasing, especially in times of climate change. Non-formal education, as established within the framework of FE, can contribute to the development of an appropriate level of knowledge and to raising awareness. Further efforts are needed to ensure knowledge





transfer from the interdisciplinary field of forest sciences to the public, to equip citizens with relevant skills to act as an agent of change in environmental and social decision-making, within the system of a sustainable forest management, balanced between ecological, social and economic aspects. EC substantially contributes in achieving sustainability on local, national and global scale. FE can be highlighted as an example of best practice. Understanding the need for sustainability is very important as further resource conflicts and intersections are expected in future with regard to climate change and urbanization.

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**Keywords:** Education; Civil Society; Environmental Citizenship; Romania

**Abstract:** The organization of civil society in pro-environmental groups plays an important role in encouraging the sustainable implementation of environmental citizenship concept and a positive attitude towards education for environmental citizenship (EEC). But how effective are these NGOs and which kind of actions proved to be the most promising?

This article makes an analysis of Romanian NGOs, focusing on studying the impact of their pro-environmental activities and the relation with EEC. Our research, based on a first phase of bibliographic studies, show that, in Romania, at the end of 2015, more than 48500 non-governmental organizations were active. Surprisingly, although some of the most active and visible, environmental organizations represent only 3% of the total. These NGOs carry out activities in the field of environment / ecology, accounting for 3% of total non-government sector revenue, 3% of employees and 2% of total fixed assets (Kivu et al., 2015; NIS, 2019).

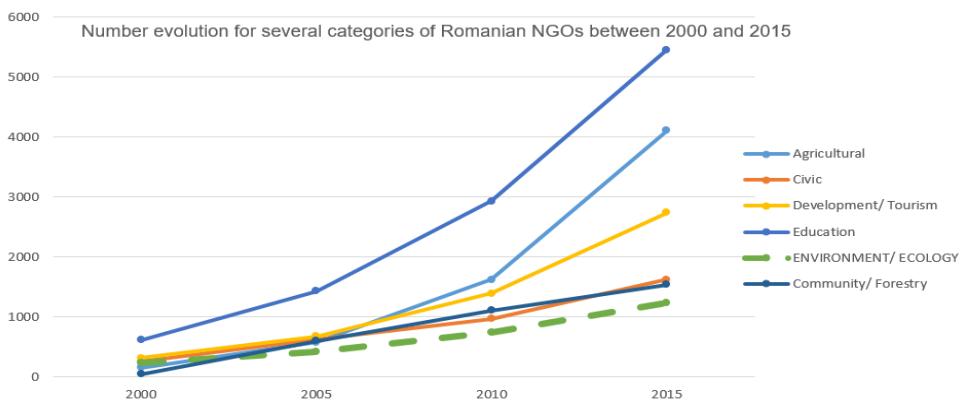


Figure 1. Number evolution for several categories of Romanian NGOs between 2000 and 2015 (Kivu et al., 2015; NIS, 2019).

Even the number of environmental NGOs seems to be quite reduced at national level, the impact of these organizations can be very significant and can play an important



role as opinion-maker, promoter of the concept of ecological citizenship, supporter of non-formal and informal EEC. There is also a strong relation between NGOs and schools.

Among the most popular education projects for environmental citizenship initiated by NGOs in Romania, we mention:

- The Recycling Patrol (about 100,000 students and teachers have been involved, they informed over 4500000 Romanians and contributed to the responsible collection of 2.5 million kilograms of electrical and electronic waste equipment) (Green Report, 2019)
- Green schools Platform) (Green Report, 2019; [www.scoliverzi.ro](http://www.scoliverzi.ro))
- Schubz (in Rasnov) - a sustainable development education center that brings in Romania interactive and experiential education (in 2018 involved 12000 children, 150 educators, 25 schools, an international network.) ([schubz.ro](http://schubz.ro), 2019)
- “Let’s do it, Romania!” (in last 10 years over 1800000 volunteers and 1900 municipalities involved, 21500 tons of waste and 2142700 garbage bags collected) ([letsdoitromania.ro](http://letsdoitromania.ro), 2019)
- “Guerilla Verde”- an ecological movie caravan. - involved 27000 students from 516 schools, high schools and faculties from over 28 cities have enriched their knowledge of the environment. (Green Report, 2019; [www.guerillaverde.ro](http://www.guerillaverde.ro), 2019)
- “Zero waste School” – national competition between schools (Green Report, 2019; [ecostuff.ro/scoala-zero-waste](http://ecostuff.ro/scoala-zero-waste), 2019)
- “Planting good deeds” (235 ha of forests in 27 counties, 35000 volunteers, 763000 trees) ([www.plantamfaptebune.ro](http://www.plantamfaptebune.ro), 2019)

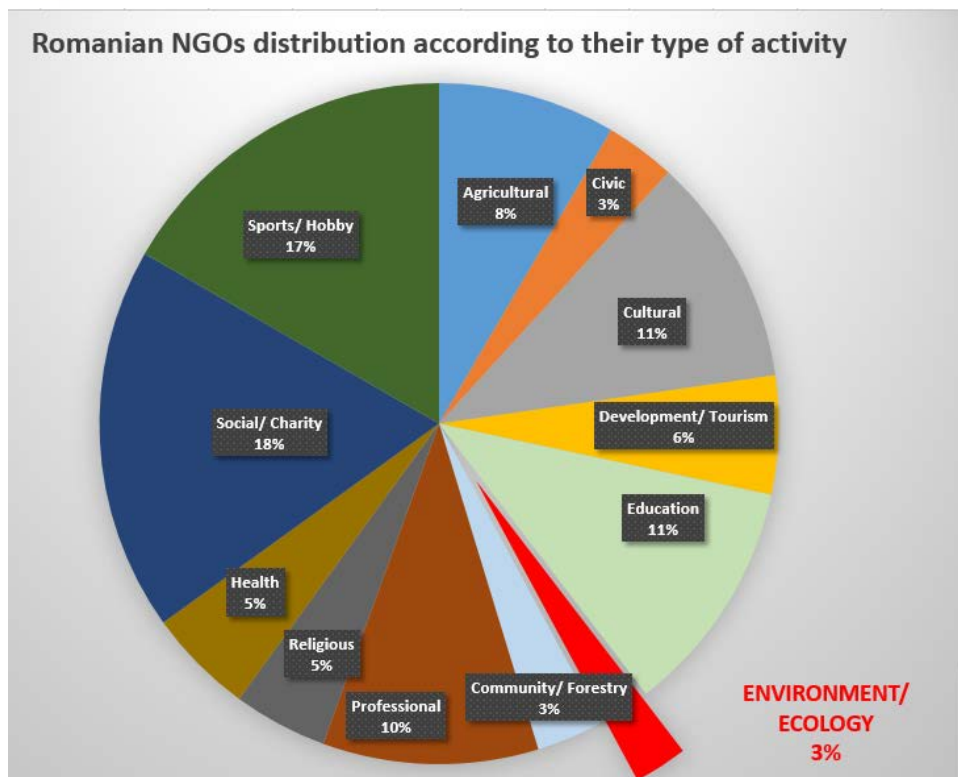


Figure 2. Romanian NGOs distribution by type of activity (Kivu et al., 2015; NIS, 2019).

Thus, NGOs can have a strong impact on developing a strong interest for EEC, impact given by the involvement of many volunteers (millions), creation of large-scale actions and events with visible results.

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**Keywords:** Education for environmental citizenship; non-formal education; citizen science; participatory design; creative waste reuse; somatic learning; sensory gardens

**Abstract:** In order to retrieve carbonised urban cultures, what should we (re)make instead? Worldwide there is a strong demand for cities to become circular in order to transform urban consumption patterns and value chains, and to stimulate co-design, social innovation and creative business at all levels.

**[a] The Power of Remake in Education for Environmental Citizens.** Our habitats are rapidly being urbanised, refurbished and restructured. In this process, our industrial landscape has been radically altered (Secchi, 2013). Our cities became as archipelago of voids, a territory for open labs. Stalled spaces demand innovative ways of thinking, playing and remaking waste as social value. DOT TO DOT© is a citizen science method created by Studio Pop that enables intergenerational groups from creative local community - social entrepreneurs, researchers, educators and youth-to restore and regenerate vacant lands in deprived areas by connecting waste to design for society through eco-design, nature-based solutions and live projects. It is aligned to socio-economic sectors prioritised by the EU Economic Strategy and linked with Creative Industries (eco-design), Environment (waste reuse) and ITC (social technologies). This community garden project is taking place in a gap site at Forth and Clyde Canal in Maryhill area, Glasgow. It interweaves environmental education with science and technology in a creative and multidisciplinary manner.

**[b] DOT TO DOT© live learning project** (Suau, 2019). There are physical and digital dimensions. The physical is sensorial transforming the site into a portable community touchpoint. The experimental site is planned in three distinctive areas: the community garden (current pilot phase) and the remake station (development phase). The digital dimension is a mobile-friendly portal which allows experimenters to upload ideas and start their own community-led projects, build capacities, exchange knowledge, and share resources in ongoing or new projects. This circular design provides both free eco-design and educational services supported by various grants, in-kind donations and community time-banking. Community contributes with free materials and volunteering time. An interactive map allows users to find, select and upload projects and refill gap sites. Rewards are free training activities such as garden or remake workshops, eco-design fairs and clinics to test/pilot future

community services. DOT TO DOT© began as a local community consortium made by two social enterprises and one primary school: Studio Pop (lead), Clyde Electronics and Dunard Primary School, obtaining several awards and grants: Year of Innovation Architecture and Design, Young Social Innovation Award; European Young Award (funded by the International Centre for New Media & Europe for Citizens Programme); Maryhill Pedal Power (funded by the National Lottery Awards for All Scotland and Creative Scotland); Stalled Spaces Awards; and the Aspiring Community Fund (funded by the European Social Fund and the Scottish Government).

**[c] Regenerative action plan.** It offers great opportunities to reuse ecologically empty sites on a temporary basis and to improve life of disadvantaged communities by remaking with waste, connecting local young graduates, university students, immigrants, low-income families, primary schools, social enterprises, community gardens, municipality and stakeholders jointly to co-design and self-manage live projects and to transform abandoned open spaces creatively. In order to transform the chosen derelict site, a portable civic station and garden areas are set to accommodate weekend outdoor activities such as gardening, open demonstrations, consultations, design charrettes and self-build projects onsite, mainly addressing the UN's Sustainable Development Goals (SDGs) and the New Urban Agenda Habitat III focused on community-led place-making; place-learning; and remake. Currently the experimental site is fully designed with edible gardens and temporary structures made entirely from reclaimed materials to create a distinctive sense of appropriation (Suau, 2018).

**[d] Methodology.** DOT TO DOT© transcends traditional techniques deploying innovative urban planning approaches and instruments such as dynamic and semantic geo-spatial data mapping and planning tools for innovative urban codes enabling sustainable practices, eco-design approaches and circular business models to support local decision-makers and stakeholders to work more closely with innovators and guide the transition towards adaptive greenspaces, public spaces and land use. It employs grassroot techniques based on community-based participatory research including research by doing (analytics and project-based), somatic learning tools, experimentation with waste reuse and collaborative nature-based solutions (NBS).

**[e] Design principles.** DOT TO DOT© is also aligned with UNICEF design principles. It envisages the integration of live and civic actions to augment sensory citizen experiences allowing communities to create, play with and make “*placeness*” locally (Suau, Petruskeviciute & Til, 2018). The main objectives are to enable social innovation and co-production between local organisations, schools, creative industry and experimenters through social entrepreneurship, reskill development, and regenerative eco-design; to connect waste with local communities creatively to reactivate urban voids and boost social inclusion in vulnerable groups, youth and children; and to educate environmental citizens to reuse waste by testing/piloting live experiments locally.



**Figure 1.**

*Views illustrates the first outdoor environmental event, a clean-up day where school volunteers, experimenters and community gathered to remove junk from plot to landmark the DOT TO DOT© garden (May, 2017). Source: Studio Pop archive, 2018.*





**Figure 2.**  
*DOT TO DOT©, outdoor learning and community-led research activities about remake with waste (2017-19). Source: Studio Pop archive, 2019.*



**Figure 3.**  
*DOT TO DOT© workshop on creative self-build with eco-learners & teachers (2018). Source: Studio Pop archive, 2019.*

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**R3-1,6&5-2** - Influence of a nuclear role-playing game on the environmental awareness of preservice teachers. A design-based research.

**Isabel María Cruz Lorite<sup>1</sup>, Daniel Cebrián Robles<sup>2</sup>, María del Carmen Acebal Expósito<sup>3</sup> & Ángel Blanco López<sup>4</sup>**

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**Keywords:** Role-playing game; Nuclear energy; Environmental awareness; Scientific knowledge; Pre-service elementary teachers

**Abstract:** This paper presents a methodological improvement of a role-playing game on nuclear energy based on previous experiences (Cebrián, España y Blanco, 2018), which was analysed from the point of view of new knowledge learning regarding this energy and other aspects concerning environmental awareness. This study was carry out with 32 (2015/16 academic year), 78 (2017/18 academic year) and 93 (2018/19 academic year) pre-service elementary science teachers, in the third year of the Grade in Primary Education of the University of Malaga. Based on the results of two previous experiences, a methodological modification was proposed in the 3<sup>rd</sup> academic year to extend the scope of the game beyond the learning of scientific knowledge, proving its performance in other aspects that characterize the awareness of environmental issues surrounding the use of nuclear energy. Before and after the experience, a questionnaire was used as instrument for collecting data, with which the aim was to analyse the possible change in the dimensions that make up environmental awareness. The results show an improvement in the learning of certain scientific contents, such as the process of obtaining heat carried out at the nuclear power plants, increasing the percentage of adequate responses in each academic year, being 3%, 26% and 37% in 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> academic years, respectively (figure 1). On the other hand, analyzing the results of questions about other aspects related to environmental awareness (figure 2), it can be seen a sample of information concerning affective, attitudinal and active dimensions, respectively. The results obtained in them are similar to a recurrent inconsistency in the attitude-behaviour re-

lationship (van den Eynde, 2011): the existence of affective and pro-environmental attitudinal dispositions does not in all cases maintain a directly proportional relationship with the existence of pro-environmental behaviours. No significant differences were found between pre-test and post-test for these questions. Assuming that the relationship between environmental attitudes and behaviour is stronger the greater the knowledge about the environment (Meinhold and Malkus, 2005), it can be said that the role-playing game has contributed to developing the cognitive dimension of the environmental awareness of pre-service elementary science teachers, although the same cannot be said with respect to the rest of the dimensions that compose it. Most of the students' decisions about nuclear power were based on ecological and economic justifications such as the work of Ozturk & Yilmaz-Tuzun (2017).

*Figure 1: Percentage of response obtained for the question about the process of obtaining heat in nuclear power plants in each academic year.*

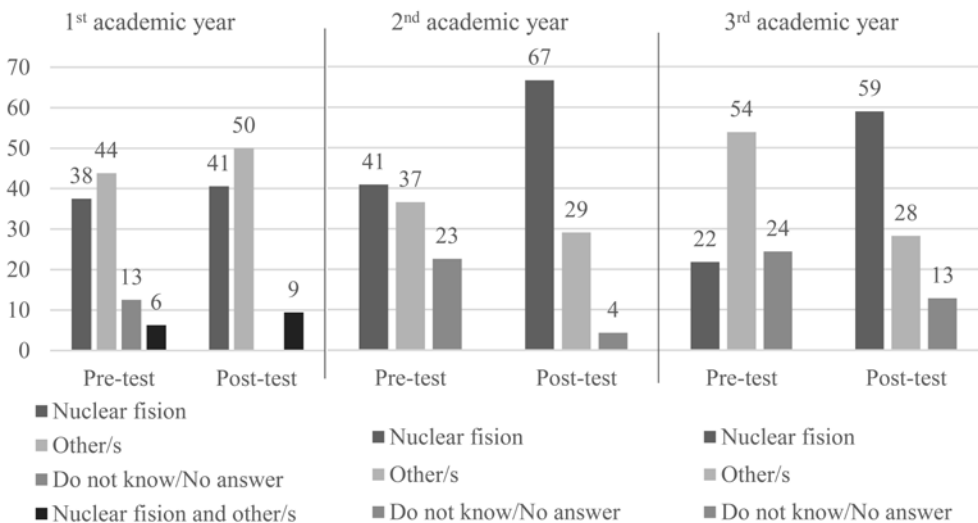
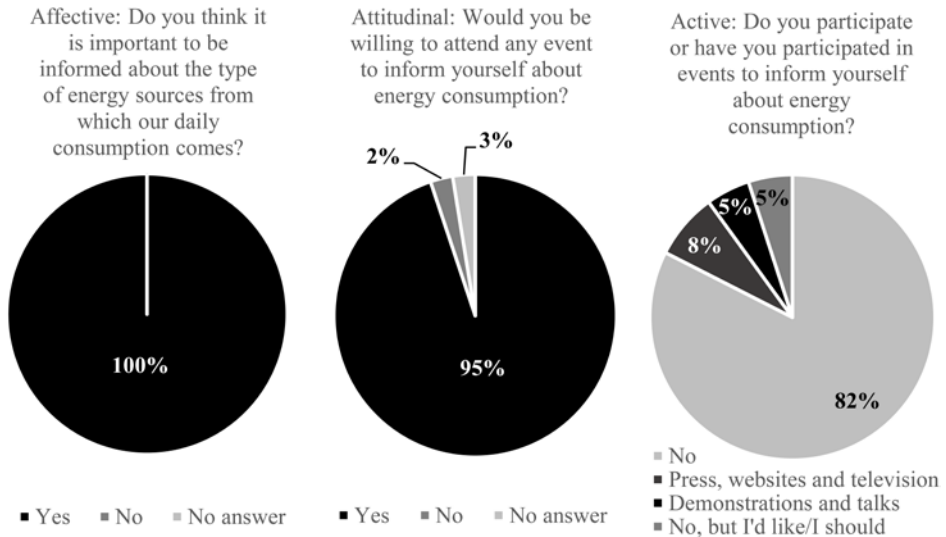


Figure 2: Percentage or response obtained for the question about other aspects (affective, attitudinal and active) concerning environmental awareness in pre-test of 3<sup>rd</sup> academic year.



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**R3-1,6&5-3** - Some examples of best practices to address the environmental citizenship gap in higher education

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**Keywords:** Best practices; Extracurricular activities; Higher education; Cooperation; Stakeholders

**Abstract:** The presentation will present two examples of extracurricular activities to address the environmental citizenship gap in higher education. Previous research work of the authors has indicated that there exists an environmental citizenship education gap among students and young professionals. While there is much focus on environmental citizenship education in the formal primary and secondary education, less of it is available at the formal higher education stage. Hence, the non-formal environmental citizenship education is crucial for the continuation of such education and for the development of environmentally aware and conscious young professionals and adults. The presentation will be based on personal experiences of the authors running two different extracurricular activities educating students about environmental citizenship in Slovenia: the Environmental law clinic and the projects Creative path to knowledge. Through the environmental law clinics law students solve real environmental problems at the municipal, European and international level by engaging in practical legal work and providing solutions in the form of regulation amendment suggests or preparation of law suits for clients. The Creative path to knowledge is a type of projects funded by the European Social Fund that connects students' academic research work with the needs of real businesses. In cooperation with individual businesses students use their gained formal education in the field of various sciences and implement it in solving a real-time challenge of a business enterprise related to environmental concerns. Both forms of extracurricular activities provide a forum for educating about environmental citizenship at the higher education level and for creating environmentally aware young professionals and hence a form of best practices in this field. The aim of the presentation is thus to present these extracurricular activities as a pedagogical method at the higher education level and a possible suggestion in the preparation of the European model of environmental citizenship education.

## R3-1,6&5-4 - Education for environmental citizenship: A case study from Turkey

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**Keywords:** Environmental citizenship, post-cosmopolitan citizenship, sustainability, education for environmental citizenship, Turkey, Turkish constitution.

**Abstract:** Environmental citizenship contributes to the debates on the ways to attain sustainable society and it is considered as improving the possibilities of democracy to produce sustainable outcomes. It brings a new challenge to four features of the general architecture of citizenship: the debate over rights and responsibilities, the issue of membership, what counts as ‘citizenly activity’ and the determination of the political space within which citizenship takes place. It frames the argument from a critical standing point to globalisation while discussing ecological footprints and virtues. This paper will discuss post-cosmopolitan citizenship comparatively with liberal, civic republican, feminist and cosmopolitan citizenship theories and it will explore environmental citizenship which is an interpretation and example of post-cosmopolitan citizenship. The criticisms against environmental citizenship will also be analysed as well. The criticisms can be grouped into three as feminist approach, environmental justice and the transfer of the duties of the states to the citizens to reach targets determined by international treaties. Furthermore, the paper will evaluate Turkish Constitution and climate change debates in Turkey from an environmental citizenship perspective. Environmental citizenship focuses on rights rather than responsibilities. Within this context, the paper analyses articles related with the environmental rights and duties of the State and the citizens of the 1982 Constitution of Turkey. Further, the study evaluates the role and importance of these articles in trials against environmental degradation and destruction. Taking environmental cases to the court is one of the most frequent used tools of the Turkish environmental movement. For Andrew Dobson (2003), one of the institutions that derive sustainability is schools. Hence, it is significant to analyse how environment is dealt with in the citizenship curriculum. The textbook of Citizenship and Human Rights Education taught at secondary schools in Turkey will be analysed accordingly.

## **R3-5c-1 - Development of study materials to support implementation of education for environmental citizenship in formal education system**

**Maris Klavins**

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**Abstract:** Implementation of Education for Environmental Citizenship (EEC) in the formal education system is one of major challenges to achieve progress and a wider dissemination of the ideas and concepts of EEC. The actuality of positioning of EEC in formal education is determined by 2 factors: 1) to achieve the recognition and actuality of the EEC; 2) to support permanently ongoing process of the transformation of educational system with new ideas and strengthen formation of civil society with active participation in social process to achieve sustainable development goals and improvement of quality of education. Another factor supporting the implementation of EEC in formal education is an evident need to further develop Education for Sustainable Development and Environmental Education concepts. Of course, a significant segment of EEC will remain “outside” of the formal education; still as much of as possible, the integration of EEC in formal education is needed. An important tool in this respect are development of study materials. However, it is very important to move outside of the “textbook” approach and consider a need to develop study materials using innovative, up-to-day approaches, adequate to challenges faced to education system nowadays. At first the need of movement from the learning to active participation is of importance. In Latvia presently the radical change of the education system is going on – transformation towards “competence-based education”. However, from many aspects the suggested approaches have several major weaknesses as environmental education aspects are weakly integrated in the offered study concepts, but Education for Sustainable Development is neglected at all. Therefore, the EEC can bring “fresh air” offering highly integrated value-based approaches, at the same time based in knowledge developed during learning process, but supported with a knowledge on the development processes, human contribution and a need to achieve balanced approach. From this perspective the classical study material concept is failing and a need to develop fully new approach is needed. From this perspective internet based, individually oriented approaches are prospective and several concepts can be offered addressing both research based problem solutions, both considering challenges actual from perspective of development of civil society.





## R3-5c-2 - Challenges of teaching environmental citizenship in Austrian secondary schools

**Margaret Clark Carter<sup>1</sup> & Katharine Lapin<sup>2</sup>**

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**Keywords:** Interdisciplinary; Creative Solutions; Secondary formal education

**Abstract:** In Austria, incorporating environmental citizenship in formal education can be challenging. As for the legal aspect, the Ministry of Education and various provincial Boards of Education forbade school participation in the 15 March 2019 global demonstrations for climate justice. The Vienna Board of Education stated: "absence from instruction for the purpose of attending a demonstration is not a justified impediment." Concern was expressed that this could set a precedent for other topics. Also, the topic is not directly related to schools. In several provinces, school autonomous days were used to circumvent this. "We have great understanding for all students who demonstrate for their future" when our students stand up for their basic democratic rights, as every student has the right to demonstrate as declared in the European Convention on Human Rights". Teilnahme an Klima-Demo kein Entschuldigungsgrund für Wiener Schüler (2019). As for the educational aspects, if the Board of Education states that this is not directly related to the curriculum, then where in the curriculum should it be? When? Which subject? How is it taught? Responsible environmental citizenship touches every aspect of our lives. An interdisciplinary approach is needed using both online and hands-on resources, coordinating with colleagues in all subjects. This includes, but is not limited to biology, physics, math, shop, geography and economics, history, and in the case of my school, even religion. Regarding the social aspect, as the human population becomes more urbanized, children mean a lesser access to nature casually. Simply playing outdoors in woods, fields, streams or even back yards is replaced by electronic games, social media, and organized cultural and/or sporting activities. Placing focus on the extent of the destruction of the environment can be depressing, resulting in despair, being overwhelmed and feeling hopeless. It doesn't have to be this way, though. Dr. Jane Goodall offers four things for hope for the future: the power and creativity of the human brain to solve problems; the resiliency of nature once we approach it from a position of respect; the strength and vitality of young people around the world; and the indomitable human spirit. Hudson (2001). If the purpose of education is to teach values, stimulate the intellect, understand tolerance for disagreeable belief systems, and dig out opportunities to question what exists, teaching environmental citizenship



in schools, can help secure a better future for the next generations. And maybe even garnish some international recognition.

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## R3-5c-3 - Role-playing game about Urban Solid Waste (USW) incineration as a methodological strategy to deal with socio environmental problems at secondary education

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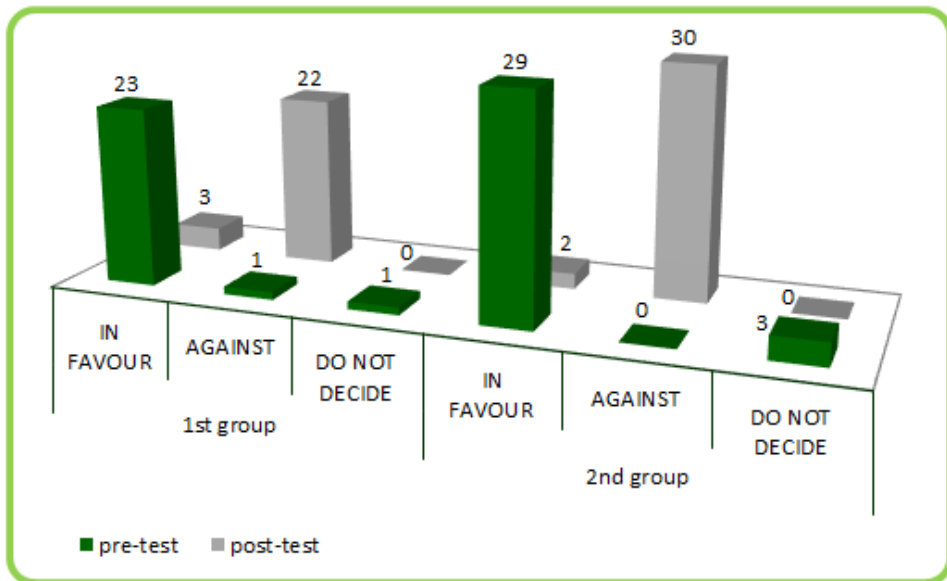
**3:** Ph.D research at Research Group in Science Education and Competences and research professor at the Teaching Experimental Science Area, University of Málaga, Spain; e-mail: [vbrero@uma.es](mailto:vbrero@uma.es)

**Keywords:** environmental education, role-playing, secondary education

**Abstract:** Nowadays, the main socio environmental problems, which are key topics in the development of Environmental Education (EE) programmes, are tackled from a transversal perspective in formal education. Pre-adolescents and adolescents do not perceive these difficulties as part of their reality and they neither feel responsible for the current environmental crisis. On this matter, the EE constitutes the key to develop a conscience, a knowledge, attitudes and responsible behaviours towards the environment. Therefore, methodological strategies should be developed in order to integrate the EE into the official curricula through activities which arouse students' curiosity, encourage their inquisitiveness for the investigation, promote critical thought and reflexion, and generate positive environmental behaviours. This work presents the role-playing game as a strategy to the EE in formal education, which is capable of answering to the methodological necessities that appear nowadays when dealing with socio-environmental problems in class at secondary education. The key objective of this paper is evaluate the contribution of the role-playing game, as a methodological strategy at secondary education, to reach the objectives for the EE defined by the Belgrade International Seminary and related to: awareness-raising, understanding of the environment and development of favourable attitudes and aptitudes towards it. Firstly, it describes the design and implementation of a role-playing game about USW incineration with 57 students of two class-groups from A level (1st grade), made as an activity from a didactic unit about sustainable development, within the subject of Sciences for Contemporary World. The didactic proposal was developed through 3 sessions: the first was about the introduction to the topic, the presentation of the activity and the distribution of roles; the second was the development of the game (the dramatisation); and the third was about the reflection and the activity assessment. The role-playing consisted on a dramatization of an assembly, in which the participants had to decide if a project for the construction of an urban solid waste incinerator in its city is approved or rejected. Secondly, it gathers the

students' perceptions about the topic discussed before and after the implementation of the role-playing game. This Pre-Post-Test allows to analyse the impact of the role-playing game to the students' opinions and attitudes (Grafic 1). The results obtained support the premise that the role-playing game constitutes a strategy to the EE in formal education, capable of promoting positive attitudes and values in a context close to the students, which can be translated into potentially favourable behaviours towards the environment.

*Grafic 1: Pre-Post Test analysis: students' opinions before and after the role-playing game*



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## SS-Intro. Socio-Scientific Inquiry-Based Learning: a pedagogic model for Environmental Citizenship

**Andri Christodoulou<sup>1</sup>, Marie-Christine Knippels<sup>2</sup>, Ralph Levinson<sup>3</sup> & Marta Romero-Ariza<sup>4</sup>**

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**Keywords:** Inquiry-based learning; pedagogy; sustainability; scientific knowledge

There will be four papers consisting of one theoretical paper explicating the model of SSIBL (Socio-Scientific Inquiry-Based Learning) and three papers which draw on lessons from classroom practise through a research-based approach from the UK, Netherlands and Spain.



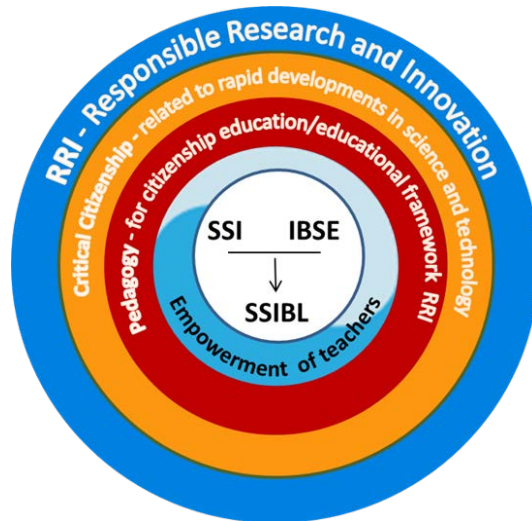
## SS01- Explicating the model of SSIBL

**Ralph Levinson**

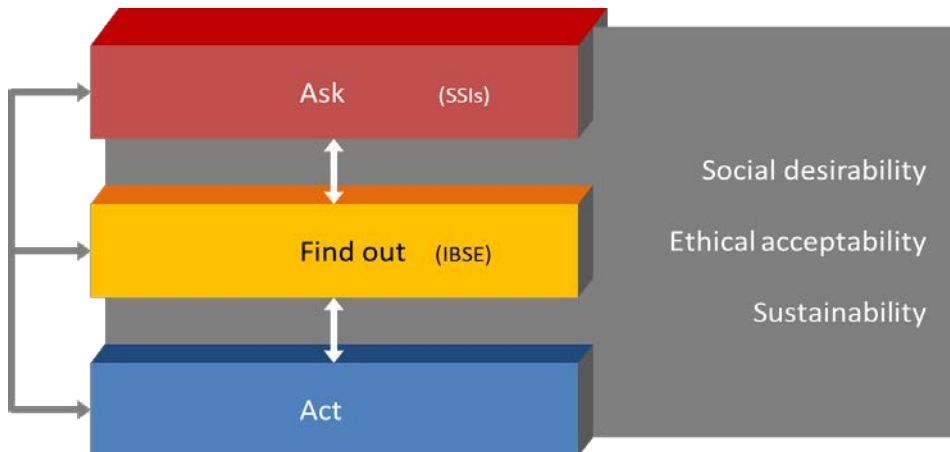
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**Keywords:** Inquiry-based learning; pedagogy; sustainability; scientific knowledge

**Abstract:** This paper will elaborate the pedagogic model for SSIBL (Levinson et al., 2017) with particular reference to environmental citizenship. SSIBL draws on a base of scientific knowledge to enable political action, in this case in the context of sustainability, in which science acts both for and with people. SSIBL combines with three approaches – Inquiry-based Science Education (IBSE), Socio-Scientific Issues (SSI) and Citizenship Education (CE). However these three approaches operate within the umbrella of Responsible Research and Innovation (RRI) which aims at bringing together various societal actors (consumers, various interest groups, scientists, policy-makers, business) to bring realistic, balanced, just and ethically-based outcomes to the innovation process covering the entire R&D process from its inception to distribution of social goods. The relationship between RRI and the three approaches is shown in Figure 1. The aim of SSIBL is to operationalise knowledge for the purpose of social justice so that the aim of inquiry is to use and/or construct knowledge to enact change. This can be simplified to a schema comprising Ask, Inquire Act as shown on Figure 2.



**Figure 1:** Diagram showing relationship between the different components of SSIBL (from Levinson et al, 2017)



**Figure 2:** Pedagogic model of SSIBL (from Levinson et al, 2017)

**Reference:**

Levinson, R., Knippels, M.C., van Dam, F., Kyza, E. et al. (2017). *Science and society in education. Socio-Scientific Inquiry-Based Learning: connecting formal and informal science education with society.* (<https://www.parrise.eu/wp-content/uploads/2018/03/parrise-en-rgb.pdf>)



## SS02- Promoting responsible action for climate change through socio-scientific inquiry-based learning

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**Keywords:** socio-scientific inquiry-based learning; responsible action; climate change; pre-service teacher education; environmental citizenship

**Abstract:** SSIBL requires teachers and students to raise authentic questions and carry out investigations that can lead to taking action to address the SSIs explored. SSIs can be explored from a personal, local or global dimension, but if students are to take responsible action then personal relevance is essential. One such issue is that of climate change. The aim of this study is to present and discuss a case study of a pre-service teacher (PST), who took part in a professional development programme for SSIBL and who chose to focus on teaching SSIBL using the context of climate change, which is one of the most important SSIs related to environmental citizenship, and has been shown to pose challenges for citizens attempting to act as agents of change (Barr, Gilg & Shaw, 2011). This study adopted a case study design using qualitative methods collecting data from lesson observations, interviews and the lesson plans designed by the PST. The analysis of the qualitative data collected indicated that the PST (male, mid-20s) was able to address climate change at a global, local and personal level. For instance during a lesson observation with 14-15 year olds, he asked students to compare how climate change affects various countries, what their communities could do to address it, and in this way he used effective strategies for teaching about climate change (Busch & Osborne, 2014). However, the lesson observation and the interview revealed that addressing climate change at a personal relevance level was a challenge, as there was an over-emphasis on the global dimension of climate change. This suggests that when teaching about climate change personal relevance needs to be a starting point for investigations so as to allow students to relate to the issue, and consider explicitly how to take responsible action.



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## SS03- Opportunities for and challenges with SSIBL in science teacher education for citizenship

**Marie-Christine, P.J. Knippels<sup>1</sup> & Michiel van Harskamp<sup>2</sup>**

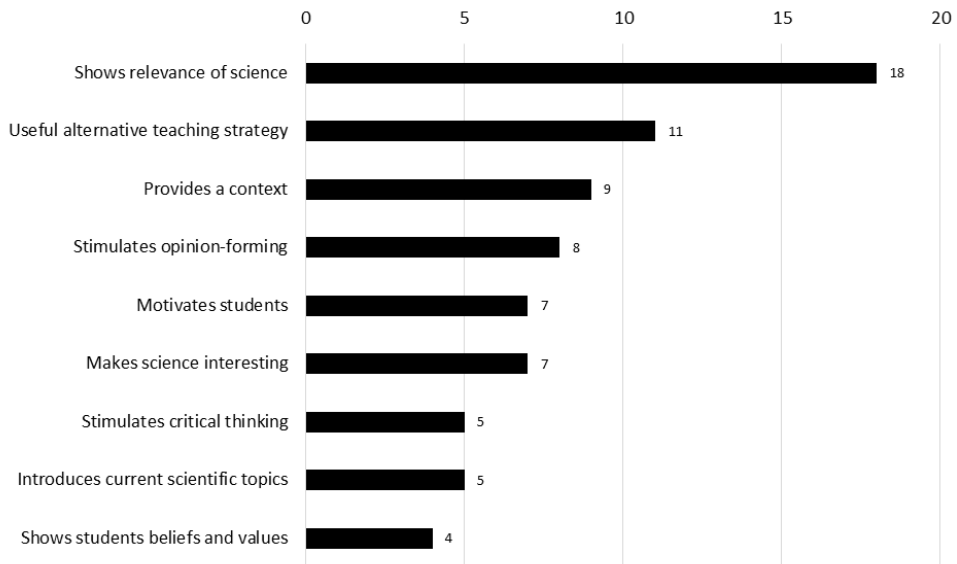
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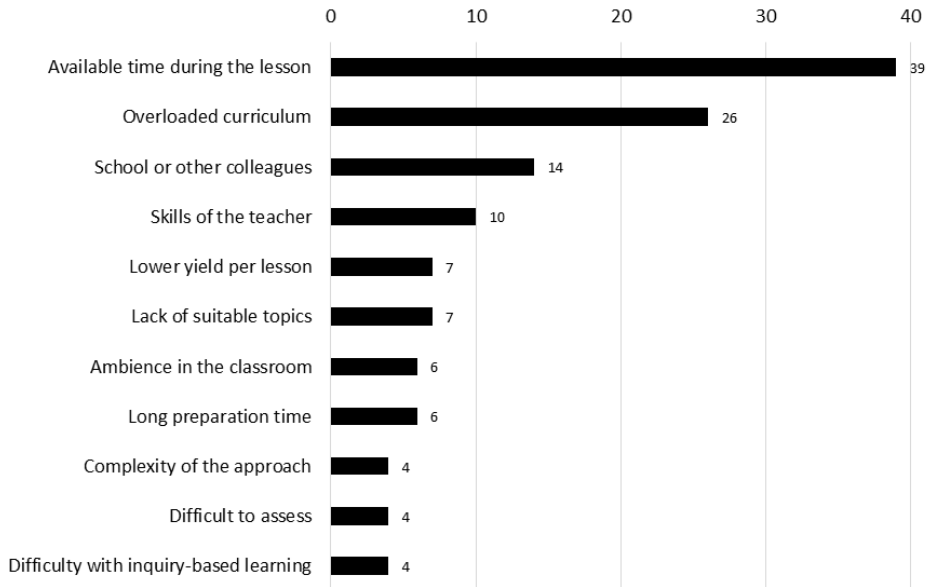
**Keywords:** Socio-scientific inquiry-based learning, citizenship education, science education, teacher professional development

**Abstract:** To make responsible decisions regarding SSIs, such as increased carbon dioxide emissions, deployment of resources, citizens need to consider both scientific knowledge and personal and social values and beliefs. Fostering these aspects of democratic citizenship is an important aim of science education (European Commission, 2015). SSIBL aims to foster responsible research and innovation through science education, by connecting SSIs with inquiry-based learning and citizenship education (Levinson et al., 2017). This study aimed to evaluate the educational potential of SSIBL in PST programmes by answering the research question: How do pre-service teachers (PSTs) value SSIBL pedagogy? SSIBL training sessions were designed and implemented in 9 cohorts of PSTs (n=79, 38 female; specialisms: 37 chemistry, 36 biology, 4 mathematics, 1 physics and 1 information technology; average age: 30.5) at Utrecht University. Training consisted of (at least) two 1.5 hour face-to-face meetings, and the development of a SSIBL lesson in small groups. The sessions focused on several stages for enacting SSIBL: a) introducing a dilemma and creating a need to know, d) inquiry, e) dialogue, f) decision making, and g) reflection. In each stage examples showing how to introduce this in classrooms were discussed and PSTs could practice specific stages (Knippels et al., 2018). Next PSTs designed SSIBL lessons (n=30), which were presented and discussed in the second session. Training sessions were observed and video-taped, PSTs lesson designs were analysed, and a questionnaire consisting of five open-ended questions was administered afterwards, asking PSTs what opportunities and challenges they foresee for SSIBL in practice. Answers were categorised by means of the constant comparative method (Kolb, 2012). Of the 30 SSIBL designs 20 were topics related to environmental issues, such as biofuels, (bio)plastics, global warming, water pollution, and biodiversity loss. The questionnaire shows that 76 PSTs label SSIBL as of added value to

their teaching repertoire, mainly because it connects school science to their student’s daily lives, underscoring the relevance of science (Figure 1). All PSTs could indicate at least one challenge concerning SSIBL education, they most often mention time constraints (Figure 2). The results indicate the training activities are promising, they stimulated PSTs thinking about opportunities for social and ethical student inquiry into these topics, and most PSTs voluntarily chose environmental issue for their lesson-design. SSIBL seems a fruitful approach for Education for Environmental Citizenship. As a next step we are developing and testing SSIBL-based lessons for environmental citizenship in secondary school in close collaboration with science teachers.



**Figure 1\*.** Added value of SSIBL indicated by the pre-service teachers (n=79) in the questionnaire



**Figure 2\***. Challenges mentioned by pre-service teachers (n=79) when implementing SSIBL

\*Note: Only topics that were mentioned by four or more teachers are displayed

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## SS04- Linking environmental citizenship with school curriculum and supporting responsive action

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**Keywords:** Socio-scientific inquiry-based learning, environmental citizenship, science education, teacher professional development

**Abstract:** To increase opportunities to successfully address current societal and environmental challenges we need to act personally and collectively, questioning lifestyles and production and consumption habits in the search of a more sustainable world. Education plays a crucial role in this endeavour and teachers are considered key players (Romero-Ariza et al., 2017a). SSIBL has been developed as an educational model that encourages students to inquiry about contemporary socio-scientific issues in the search of informed-decision making and responsible action (Levinson et al., 2017; 2018) and offering interesting opportunities to educate environmental citizens. The main goal of this study is to evaluate an intervention in teacher initial education aimed at supporting teachers to enact the SSIBL model at school, with an emphasis on the development of designing skills to produce SSIBL-based teaching materials. The design was guided by the discussion of quality criteria related to authenticity, links to curriculum and opportunities for students' decision-making and action-taking in relation to contemporary socio-scientific issues. The study was carried out with pre-service teachers (N = 121, 65 female), taking part in a 60 hours undergraduate course on science education. The classroom activities designed by participants were analysed using a qualitative approach with a previously validated instrument (Romero-Ariza et al., 2017b). Results showed that 64.3% made excellent connections with school curriculum, with references to content knowledge, the development of key competences and the definition of learning outcomes related to science, environmental education and responsible citizenship. This result is quite relevant considering that teaching is heavily curriculum-driven and an innovative ped-

agogy that cannot be aligned with existing curricula will be hardly sustainable. Additionally, 60.7% of classroom activities encouraged students' actions, including on the production of videos and brochures to disseminate environmental problems among their local community, writing letters to organisations or making concrete proposals about how to improve an aspect of their lives or neighbourhood. These results provide evidence of the value of the intervention to support teachers in the education of environmental citizens.

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## 15. Closing Key Speaker abstract.

Concept mapping: A new technique in Geography lessons at German schools in order to improve complex environmental education of young pupils

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**Keywords:** Concept Mapping, Environmental Education Standards, Geography lessons in Germany, Tourism in the Mediterranean, Mallorca

**Abstract:** In 1970, the Club of Rome published „Limits of growth“. The aggravating environmental problems could no longer be overlooked. It has been recognized that environmental education is one of the most important tools for getting people to act environmentally aware. Already in the 1970s and 1980s, there were important national and international activities to advance environmental education. In Germany, since the 1970s, attempts have been made to integrate environmental aspects into school education. Above all, geography, but also biology and chemistry emerged as the central subjects of environmental education at school. Over the years, various approaches have evolved in environmental education. However, empirical studies (see Langeheine and Lehmann 1986) clearly showed that extensive knowledge does not automatically lead to eco-friendly action. Psychological research shows that environmental awareness has three dimensions: a cognitive, an emotional and an action / conative component. For environmental education in school, this implies the consequence of addressing all three dimensions – this means: to convey information, to anchor it emotionally and to transform it into real behaviour situations. At the same time, the ever-growing wealth of (environmental) information requires modern information management that enables students to mentally process the explosion of information and structure the gain in knowledge over the long term. An efficient way to transfer environmental information into structured knowledge is the technique of concept mapping. There are several possible variations for their use in school lessons: they can be open-ended and student-centered and then used in class with advanced pupils. However, they can also be in parts pre-structured and taught by the teacher (see Jahn et al. 2015), then they are suitable for teaching with young pupils. The lecture sheds light on the developments in environmental education in geography at school from the beginning to the present day. It introduces in theory and practice the technique of Concept Mapping as the most re-



cent method. The practical application of the Concept Mapping technique is demonstrated at geography lessons with young pupils (class 5/6) using the example of the "Tourism in the Mediterranean - the example of Mallorca" as a significant environmental issue.

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## 17. Notes



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