A World Leading SFI Research Centre

Science Foundation Ireland For what's next

SSPC

EDUCATION & PUBLIC ENGAGEMENT AT SSPC

SSPC's Education and Public Engagement has a global reach of >5.6M people. Informed by research & in partnership with public stakeholders, the programme supports perception, understanding and trust in (bio)pharma research.

HOST INSTITUTION

UNIVERSITY OF LIMERICK
OLLSCOIL LUIMNIGH

PARTNER INSTITUTIONS

DCU · Maynooth University National University of Ireland Maynooth · Ollscoil na Gaillimhe University of Galway · RCSI · SETU · Trinity College Dublin, The University of Dublin · UCC University College Cork, Ireland · University College Dublin, An Coláiste Ollscoile, Baile Átha Cliath

A message from **SSPC Director**

SSPC is **a world-leading hub of Irish research expertise** developing innovative technologies to address key challenges facing the pharmaceutical and biopharmaceutical industry.

In tandem, we work with the public to co-create knowledge and understanding of science, the role of scientists, the pharmaceutical industry and how these intersect with broader society.

The ethos of and approach to SSPC's education and public engagement (EPE) programme is grounded in the significant success of SSPC's culture of research informed EPE. Over the past 10 years SSPC has taken a leading role through the robust approach to utilisation of appropriate theoretical frameworks, research methodologies and evaluation. SSPC EPE draws on the domains of science education, public perception of science, and intersectionality. Partnerships have been the cornerstone of this approach, and this brochure details our strong track record with our diverse range of stakeholders and partners.

The potential of EPE lies in its ability to empower people to become socio-scientific citizens, cultivating a society where people are part of the scientific narrative. EPE offers accountability to publicly funded research, and by engaging with the public, our research can strive to be more relevant and responsive to the needs of society, fostering trust with our stakeholders.

In this brochure, we will explore the diverse ways in which SSPC has worked with different stakeholders over the years to drive positive change.

Prof. Damien Thompson
SSPC Director

295 SSPC Scientists Involved in the programme

224,315 People Directly Engaged

5,686,693 People Indirectly Engaged

1,818 Public Engagement Events

46 SSPC Led Projects

21 Collaborative Projects

€1,262,571 SSPC Funding Generated

28 Research Publications

1 Patent

EPE Inititatives at **SSPC**

SSPC supports a suite of EPE initiatives to provide various opportunities for our stakeholders. It is vital to meet people 'where they are at'. There are structural inequalities in the development of medicines and SSPC EPE activities aim to address these barriers, creating meaningful involvement for a variety of public stakeholders across the research life cycle.

DIALOGUE

Informing and inspiring public stakeholders about SSPC research to increase its accessibility and build a solid foundation of awareness, information and understanding among the public.

The **"A Day in the Life"** Campaign utilised YouTube videos to bring SSPC scientists' daily lives to life, this campaign which was developed and delivered during the Covid-19 pandemic offered the public insights into the lives and work of scientists during a time where demystifying these roles was critically important for socio-scientific dialogue. SSPC develops many popular science articles with **RTÉ Brainstorm** where contemporary discussions such as health risks around **vaping** are brought to the general public.

ENGAGED RESEARCH

Engaged research (collaborating & co-producing) describes a wide range of research approaches and methodologies that share a common interest in collaboration with societal partners. It is advanced with societal partners rather than for them.

Our **Hand Hygiene in Schools citizen science project** involves collaboration with scientists, clinicians, teachers and Transition Year (TY) students, asking students to conduct experiments on their handwashing practices. This study can help co-design a new approach to hand hygiene testing which has potential benefits in the areas of education and disease control. The Erasmus+ funded projects DiSSI (**Diversity in Science Towards Social Inclusion**) and ESTA (**Educating Science Teachers for All**), deal with developing new pedagogies to handle diversity in science education. These pedagogies are co-designed with teachers, students and professional bodies to help improve inclusivity in education.

PARTICIPATION

Stimulating and understanding thinking & informing decision-making includes interactive and dialogic activity, building capacity among public stakeholders to meaningfully engage with SSPC research, and inform our research into STEM public engagement practice.

Our **Medicine Maker workshop** is a hands-on learning activity that asks participants to make their own mock pills with real world pharmaceutical equipment, tackling issues around quality control and counterfeit medicines. We also work with science teachers through the Irish Science Teachers Association (ISTA), Teachers in Residence programmes, and national agencies such as Junior Cycle for Teachers (JCT). This collaboration provides training and materials for primary and second level education, helping to contextualise science education, attitudes and perceptions towards science among students.

SSPC
Education & Public Engagement Timeline

2013

SSPC Phase 1 Funding

SCIENCE WEEK 10-17 NOVEMBER 2013 WWW.SCIENCEWEEK.IE

TEMI

Junior Achievement Ireland

2014

National Crystal Growing Competition

SSPC iCRAG

SSPC Public Lecture Series

Chemistry Demonstration Workshop

TY Week 1.0

2015

SSPC Workshop Series

Gross Germs and Bizarre Bacteria

Smell Factory

Science Show 2.0

SCIENCE LIVE

2016

RACE RAw Communications & Engagement

ARTIST Action Research To Integrate Science Teaching

ROYAL SOCIETY OF CHEMISTRY

2017

SSPC TY Week 2.0

RTÉ Brainstorm

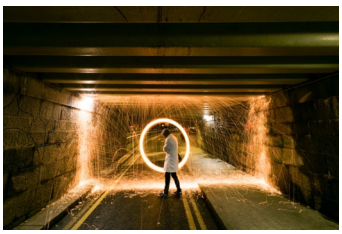
2018

SSPC Science Week Special

Sites 4 Science

News Mag Media

Crystal Drop Workshop



2019

SSPC Phase 2 Funding

K4C

ESTA

SSPC MEDICINE MAKER WORKSHOP

STEAM

DiSSI

2020

BACKYARD SCIENCE

Junior Achievement Ireland

SSPC LAB BOX

A Day in the Life of a Scientist

2021

Hand Hygiene in Schools

STEM Matters

SSPC HAND HYGIENE

EPE Bursary

SCIENCE by the Shannon

2022

ELEVATE

C.S.G. × SSPC

Crystal Clear Citizen Science

CRYSTAL CLEAR PROJECT

2023

UL Academy for Children

Pillosophy at Electric Picnic

UNIVERSITY OF LIMERICK
OLLSCOIL LUIMNIGH

Discover Our **Impacts**

Check out more impacts in SSPC's Education and Public Engagement section @ **sspc.ie/sspc-research-discover-our-impacts**

Collaborations

At SSPC we have a strong track record of collaborating with many partners to produce **impactful public engagement**. This has taken the form of consultation, design and delivery of activities and co-creation with members of staff.

Three prominent collaborations are highlighted below:

British Telecom Ireland (BT)

BT YOUNG SCIENTIST & TECHNOLOGY Exhibition

Over the past 10 years, our community has partnered with BT and aided in the delivery of Ireland's largest school science fair, the BT Young Scientist and Technology Exhibition. Our community of has played significant roles in the shortlisting of projects and judging over multiple days, as well as the delivery of 50 science kits to teachers across Ireland and multiple panel discussions on topics such as vaccines, cancer and carbon capture.

Pfizer

Pfizer and SSPC have collaborated on multiple projects around the delivery of STEM to primary schools including the co-design of new activities. To date, SSPC jointly instigated the Crystal Drop Workshop with Scoile Bhríde in Cork, distributed 9 SSPC 'Hand Hygiene in Schools' boxes to Pfizer staff that were used in local primary schools and current work is on the design and delivery of a Pfizer Escape Room. The escape room will reflect all of the various on-site processes in Pfizer with students acting out the roles of real-world scientists and engineers.

News Mag Media

Over the past 5 years, SSPC has collaborated with News Mag Media to develop articles for primary school readers around science. Through this strategic partnership, we have been able to create dynamic STEM content in a language children can relate to and easily understand. This has helped us reach out to children aged 7 to 13 and present various STEM topics (some complex) in an accessible and fun manner, backed up by real-life STEM researchers and scientists. SSPC also spearheaded the STEM Matters series, a 10-part series of STEM mini-magazines featuring SFI centres for 9–12-year-olds in primary schools across Ireland. The series was loved by both teachers and pupils and created a unique platform for the promotion of STEM careers among children.

Since 2013 SSPC have delivered 32 industry-focused training courses with approximately 1400 participants. These courses have brought the latest SSPC research to our industry partners through a mixture of online and in-person, interactive methods.

Our **Partners**

Over the years, SSPC has worked closely with a multitude of partners in a variety of capacities. We are always looking to collaborate and learn so feel free to get in contact if you have a project we can work on together.

Academic National

- iCRAG
- Confirm
- Lero
- IPIC
- CURAM
- APC
- VistaMilk
- I-Form
- REACH RCSI
- IUA
- UL Engage
- EMBL
- NICB
- Access campus UL
- Otter Project
- Academy for Children
- Campus Engage
- I'm a Scientist
- Soapbox Science
- Sophia Project
- Kitchen Chemistry
- Physics Busking
- WiSTEM
- ThesisinThree

Academic International

- Universitetet I Sorost-Norge
- Universitat Wien
- Univerzita Karlova
- Queen Mary University of London
- Hogskolen I Buskerud Og Vestfold
- Universita Degli Studi Di Milano
- Universitaet Bremen
- Sheffield Hallam University
- Universitetet I Sorost-Norge
- Ludwig Maximilian University of Munich
- University of Sarajevo
- University of Mostar
- De La Salle University (Manila)
- Philippine Normal University
- Shota Rusteveli State University, Georgia
- Ilia State University, Georgia
- Ateneo de Manila University, Philippines
- Oranim Academic Arab College for Education in Israel
- Weizmann Institute of Science
- Universiteit Leiden
- Uni Strathclyde
- Uni Ljubljana
- SS Cyril and Methodius University
- Iakob Gogebashvili Telavi State University
- Uppsala University
- University of Eastern Finland
- Technical University of Madrid
- Universitaet Klagenfurt, Austria
- Gazi Universitesi, Turkey

Community & NGO

- St. Gabriel's
- Southill Hub
- Tait House
- ISTA
- Learning Hub Limerick
- ProBus
- iWish
- RSC
- TRACES logo
- Junior Achievement Ireland
- UNESCO K4C
- Pint of Science
- FameLab

Company

- Cnotinfor – Centro De Novas Tecnologias Da Informacao, Limitada
- Rusal Aughinish Alumina
- Tara Mines
- Regeneron
- Pfizer
- Johnson and Johnson
- BT Ireland
- Milk Market Limerick
- Electric Picnic
- Hunt Museum Limerick
- BELLTABLE Limerick
- Scifest
- ESB Science Blast

Government Agencies

- Geological Survey of Sweden, SGU
- Tukes (Finnish Safety and Chemicals Agency)
- GeoZS logo
- JCT STEAM
- European Researchers Night
- Cork Carnival of Science
- Professional Development Service for Teachers
- National Council for Curriculum Assessment

Media

- Silicon Republic
- News Mag Media
- RTE

EU Project:

TEMI: Teaching Enquiry with Mysteries Incorporated

Supporting actions on Innovation in the classroom: teacher training on enquiry based teaching methods on a large scale in Europe

TEMI A teacher training programme across Europe

Partners

Università degli Studi di Milano (Marina Carpineti and Marco Giliberti), Universitaet Bremen (Ingo Eilks), University of Limerick, Sheffield Hallam University, Hogskolen i Sorost Norge (Jorn Nyberg), Universitaet Wien (Anja Lembens), Weizmann Institute of Science, Universiteit Leiden, Univerzita Karlova V Praze, TRACES, Cnotinfor_portugal

TEMI was an FP7 Science and Society project which worked with schools across Europe to develop and implement innovative education and training programmes to help transform science and mathematics teaching practices across Europe, by giving teachers new skills to engage with their pupils, exciting new resources and the extended support needed to effectively introduce enquiry-based learning into their classrooms. This project was part of a response from the European Commission to tackle "the alarming decline in young people's interest for key science studies and mathematics" (European Commission 2007), with a focus on inquiry-based science education (IBSE).

This was done by working with teacher training institutions and teacher networks across Europe where we implemented innovative training programmes called 'enquiry labs'. The enquiry labs used scientists and communication professionals (e.g. actors, communication experts, etc.) to mentor teachers through the transition to use enquiry to teach science.

Summary of the impact and outputs

- TEMI delivered 183 training courses, 1371 hours, across the TEMI partners in 11 countries, training 958 teachers,
- T**eaching the TEMI way:** how using mysteries support science learning a booklet describing in an easy format the TEMI methodology and the TEMI Book of Science Mysteries which provides 30 lessons plans deploying the methodology, (see full output here: bit.ly/4acuQfX).
- **TEMI produced Light Mystery:** script with added comments, a resource for schools and theatre companies. The play explores the world of physics to trigger wonder and curiosity. The play was performed in Italy by the University of Milan partner team and used in the TEMI training with discussion on how to use scientific theatre to engage with young people. Communicated results at 97 public events and 68 conferences on teaching and education.
- 20 articles published in academic journals. Listed in 5 international repositories, 25 articles in practitioner and general press.
- TEMI App for android and iTunes
- 60 teachers convened at the European Space Agency Summer Teachers Programme in the Netherlands and discussed how to explain the concept of gravity to post-primary pupils by using the enquiry-based approach and the TEMI methodology.
- 11 Pre-Service science teachers (PSSTs) were involved in three rounds of development from 2013-2016, supported by the SSPC-UL team. The PSSTs developed TEMI classroom materials for the project as part of their Final Year Research Projects (FYRP). The SSPC-UL TEMI team now have a bank of over 30 developed, trialled and evaluated TEMI lessons, via participatory action research approaches.
- The SSPC-UL team disseminated the TEMI methodology nationally with 233 teachers via the Irish Science Teachers Association (ISTA) in-service workshops and for PSSTs in UL prior to their final year school placement. An online Community of Practice was developed to support the sustainability of the project.

Supporting actions on TEMI online @: Supporting actions on Innovation in the classroom: teacher training on inquiry based teaching methods on a large scale in Europe (europa.eu)

Grant agreement ID: 321403

EU Project:

RACE: RAw Communications and Engagement

RAw Communications and Engagement (RACE) was an EU Horizon 2020 EIT RawMaterials funded programme aimed at changing the way scientists and researchers connect with the public on the topic of raw materials.

Partners

There are numerous barriers to scientists taking part in science communication; studies have shown that many scientists lack an appropriate skillset for successful communication and public engagement, and that training opportunities to develop these skills are lacking. RACE's primary objective was the development and enhancement of awareness and understanding of the topic of raw materials (RM), and the potential careers available in this field. To achieve this, the team developed and implemented a training module. This module nurtures students and professionals in the science communication of raw materials to the public.

The module was co-created by industry and academic partners, ensuring that the voice of both stakeholders was reflected in the content and learning objectives. This approach also ensured that the resulting module was developed and delivered in a way that was accessible to the working professional and suitable for hybrid learning.

Summary of the Impact

The RACE Programme shares science communication expertise with scientists, to help make their work more transparent and accountable, to actively address the public deficit model of communication and to move towards research that is more responsive to societal needs.

RACE worked across multiple European countries and institutions. Experts in communication worked with masters and PhD students to transform their work. Students undertaking a technical graduate programme in a scientific background (pharmacy, materials science, engineering, etc.) linked to raw materials and the course enabled them to build outreach and public engagement skills, which they can translate, to their own research area. This led to the development to a huge array of outreach events being developed.

- Over 24 public engagement activities in 4 countries, with > 4,000 participants
- Three focal face-to-face training events took place in 2017 and the RACE summer school. The three events trained 140 participants on a variety of STEMM communication skills. Once trained, many of these individuals, particularly lectures and university teachers delivered modules in their region as a lateral and sustainable knowledge progression.
- A modular science communication programme that can be adapted to any topic: SSPC Structured PhD, CDT, CRT, SSPC training
- Academic outputs (5 publications) along with practitioner training and evaluation guides bridged the gap between theory and practice.

Book Chapter:

McHugh, M., Hayes, S., Stapleton, A., & Ho, F. M. (2019). RAW Communications and Engagement (RACE): Teaching Science Communication Through Modular Design - bit.ly/4afIKxH. In Research and Practice in Chemistry Education: Advances from the 25th IUPAC International Conference on Chemistry Education 2018 (pp. 185-202). Springer Singapore.

More information on the project @ sspc.ie/race-raw-communications-and-engagement

SSPC Bursary Programme

Elevate VR led by Dr Jerry Reen, UCC

The project aims to aid students in their understanding of core scientific concepts, such as cell biology, by merging educational research and virtual reality (VR) technology. The simulations place the user in an interactive 3D world with a human and bacterial cell, with the aim of they can be applied in classrooms as a learning tool. Working with teachers, we are co-creating teaching methodologies and refining simulations simultaneously. In the current phase we have recruited a variety of teachers from the Munster area to test VR simulations and headsets.

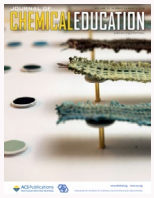
'Developing Student Co-Designed Immersive Virtual Reality Simulations for Teaching of Challenging Concepts in Molecular and Cellular Biology' (bit.ly/3wdHltWW). Reen FJ., Jump O., McEvoy G., McSharry BP., Morgan J., Murphy D., O'Leary N., O'Mahony B., Scallan M., Walsh C., Supple B., (2022) *Fems Microbiology Letters*.

Crystal Clear Project led by Assoc. Prof. Sarah Guerin, UL

This project brings Prof. Guerin's state of the art ERC research together with our EPE community partnership programme to deliver real and meaningful engaged research.

The 'Diversity in Science for Social Inclusion' (DiSSI) project was a three-year project funded by the Erasmus+ Social inclusion & common values programme. DiSSI addressed an identified gap in research and practice, namely approaches for inclusive science teaching currently tend to focus on only one dimension of diversity at a time. This neglects the fact that diversity is multidimensional in nature and the consideration of only one dimension of diversity can yield inclusive practices of only limited scope. The primary focus of the work is to promote inclusive teaching practices for non-formal environments, dealing with several dimensions of diversity simultaneously. SSPC-UL partnered with an international consortium of 5 partners.

Through this project SSPC build a community-consortia partnership with a single-sex female post-primary school categorised as DEIS. This school catered for pupils who are traditionally marginalised and particularly under-represented in science. Through co-creation, we built trusted relationships and a transition year element of the DiSSI project led to further work via the SSPC EPE Bursary scheme. (DiSSI-Logo-details-RGB-L AND erasmus plus logo) The Crystal Clear Project encouraged students to take ownership in terms of designing a national citizen science project where the public will be asked to grow crystals. Over 10 weeks, DiSSI researchers guided students through the initial crystal growing experiments and gradually released responsibility as their scientific autonomy grew along with their confidence. Over the course of the 10 weeks, the students designed and tested multiple crystal growing kits until a pilot kit was developed. The "student first" approach has many advantages over traditional design methods given that the kits have been stress tested my multiple users through multiple modalities and more critically, students get the opportunity to co-create real science for the real world.



A Rising Tide Lifts All Boats? The Model of Differentiation As a Tool for Diversity in Science toward Social Inclusion (bit.ly/3Wyxzx0). Kieferle, S., Devetak, I., Essex, J., Hayes, S., Stojanovska, M., Mamlok-Naaman, R., & Markic, S. (2024). *Journal of Chemical Education*.

Education highlights

The SSPC EPE Lab

Through a variety of programs and initiatives, we strive to make complex scientific concepts accessible and engaging for all. Based at the Bernal Institute, University of Limerick, the EPE lab is designed to host workshops and schools to foster wider community engagement.

Exploring the Values that Inform STEM Curricula Development & Selection in the Junior Cycle

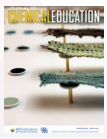
Prof. Orla McCormack is leading this project at UL with **Joan Costello**, PhD researcher. Secondary school participation in Science, Technology, Engineering and Mathematics, and aspirations to STEM careers, are patterned along gender, class, ethnicity and identity lines. The curriculum forms part of a joined-up approach to widening STEM participation, however, the curriculum is not systemically included in initiatives promoting STEM. This research examines the transformation of original knowledge. Competing interests, ideologies and the objectives of the stakeholders involved in the recontextualization process, shape the curriculum and students are socialised through the norms it transmits. More on the project and potential impacts @ https://bit.ly/4b4s0ef.

Medicine Maker

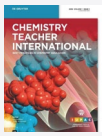
Medicine Maker is a hands-on workshop where participants make proxy medicine. Utilising inquiry-based learning, participants use real pharmaceutical equipment to make medicine as precisely as possible. Recently published in the Journal of Chemical Education (below), the workshop provides a starting point for conversations around health literacy, medical use, and illicit substances. Formal and informal feedback from participants indicates that the workshop can help foster a more critical understanding of medicine manufacturing, quality control, and personal health. More on the project @ bit.ly/3UPCnNq.

Medicine maker: an outreach activity for pharmaceutical manufacturing and health literacy (bit.ly/3Wpx3S2). McHugh, M., Hayes, S., Tajber, L., & Ryan, L. (2022). *Journal of Chemical Education*.

Highlights from EPE collaborative publications



Top Tips for Designing and Managing a Public Engagement Laboratory (bit.ly/3UO6ftw). McHugh, M., Eren, E., Guralp, G., Hayes, S., O'Hehir, C., O'Sullivan, E., Zauers, A. & Tyndall, C. (2023) *Journal of Chemical Education*.



Some people and personalities of organic chemistry: a teaching hook for mid-level university students (bit.ly/44vTirg). Mackey, K., McHugh, M., & McGlacken, G. P. (2022). *Chemistry Teacher International*.

What is it good for? Basic versus applied research (bit.ly/3wrl0b6). McHugh, M., Baumann, M., Hayes, S., Reen, J., Ryan, L., Tiana, D., & Whelan, J. (2021). *Acta Tropica*.

Science in School
The European journal for science teachers

Primary School

K4C-4-Kids project

The K4C-4-Kids project is a collaboration between UL Engage, SSPC and local primary schools. UL is part of the UNESCO sponsored Knowledge for Change (K4C) global consortium of Higher Education Institutions committed to best practice community-based learning and research. The programme is aimed at 11–13-year-olds DEIS students, co-designed with a class teacher in the partner school.

Secondary School

Crystal Growing Competition

The competition challenges participants to grow crystals using ingredients readily available at home. This fun hands-on STEM experience directly maps to SSPC crystal engineering research.

Medicines In My Life

The purpose of the initiative, is to support the SSPC's innovative educational programme for post-primary teachers and pupils, titled 'Innovation in Medicines', a module designed to introduce participants to world of medicine.

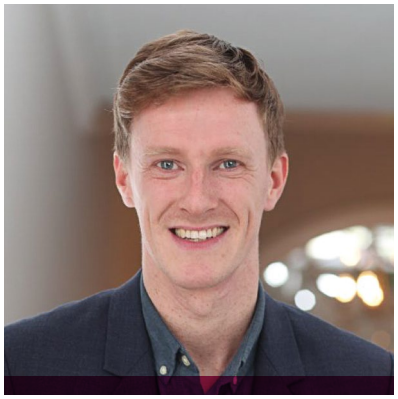
Teachers

We have a long established participatory action research community of practise with pre- & in-service teachers. Continuous professional development (CPD) is co-considered and created under this model through numerous programmes.

Policy

SSPC continuously engages with government agencies, departments and working groups to bridge research, practice & policy.

Contact Details, Staff & Acknowledgements



Colm O'Hehir
Education Training and
Public Engagement Manager

Dr Martin McHugh
Projects and Public
Engagement Officer

Dr Sarah Hayes
SSPC COO

The work featured in this brochure has not been completed in isolation, this work has been developed through a process of ideation, development, delivery, evaluation, reflection with the engagement of all the partners and stakeholders noted and with the significant effort of the SSPC Education and Public Engagement team over the last decade, which it was my pleasure to lead for 8 years, namely: **Dr Aimee Stapleton, Dr Martin McHugh, Laurie Ryan, Joan Costello, Prof. Merrlyn Goos, Dr Orla McCormack, Dr Genco Guralp, Dr Ebru Eren,** and **Colm O'Hehir**.

And we would like to thank everyone who has been part of the team for their contributions over the years.

Dr Sarah Hayes
SSPC COO

If you would like to get in contact with the EPE team, please contact colm.ohehir@ul.ie or martin.mchugh@ul.ie

SSPC

www.sspc.ie