

## Global Science Opera. STEAM Projects. Spain experience

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### Abstract.

Global Science Opera the challenge to build STEM knowledge with Opera scenes. Eight anual editions around world. Each scene of GSO complete the acquisition of 4C skills, discovering a STEM content and developing Artistic elements, with Interdisciplinarity, Inquiry Methodology and Open School work . Spain completes successfull challenge.

**Keywords.** Global Science Opera, IBSE, STEAM Projects, Open School.

### 1. Introduction

To ensure that students are well prepared for the future, we create recurring questions: What knowledge, skills, attitudes and values will today need students to prosper and shape their world?. What Proposals combine the acquisition of knowledge, collaboration of the 21st century and interdisciplinarity ?. What is a STEAM education activity? . What criteria should fulfill an educational STEAM project?. Looking for that is to participate and share educational experiences, EASE Summit is one opportunity. and Global Science Opera, STEAM Project, give answers the aforementioned questions.

### 2. Global Science Opera a STEAM project

The creation of STEAM scenes from countries on the 5 continents, with interdisciplinary work and the Inquiry Methodology. Develop creative approaches based on art for an engaging science classroom.

Successive editions of the project that launched Creations, positions the Global Scientific Opera in the objective of improving the skills of young people in STEM (science, technology, engineering, mathematics) and attracting talent to scientific careers. Each edition, guided by a booklet, sequences the participation of the countries.

The operas are guided by inquiry-based learning and are referenced in the Guide to Writing a Scientific Opera [1]. And some proposals develop creative approaches based on art for an engaging science classroom. The portal on Open Discovery Space [2] extend the implementation to larger and more diverse settings.

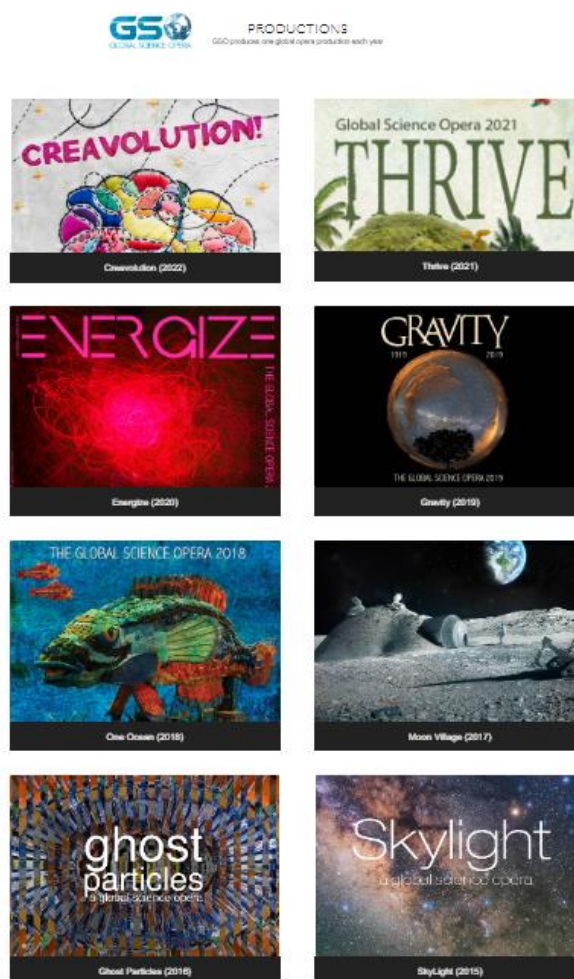


Figure 1. Global Science Opera editions.

The Global Science Opera (Fig.1) in successive editions are: Skylight 2015 - World's first Global Science Opera, Ghost Particles 2016, - Quarks and Leptons, Moon Village 2017, - One Ocean 2018 -, Gravity 2019 -, Energize 2020 -, Thrive 2021, Creavolution 2022 is in progress.

### 3.- Global Science Opera . Spain Experience.

I teach and learn with STEAM European Projects. Some years ago I discovered Global Science Opera. It immersed ourselves in STEM and Art with Inquiry methodology in the form of an Opera scene, and I coordinate Spanish GSO scenes. The work carried out in Spain, in different schools of different autonomous communities of the country, throughout the first four editions is collected in 2019 [3].

Each edition of GSO, an artistic and interdisciplinary work, determine different forms of participation in the project: Scene Stage, Choir, Choreography, Crafts, Symphonic Composition. And adds the acquisition of 4C skills (Creativity, Critical sense, Communication and Collaboration) .

I present the productions since starting 2015. Eight editions in themes connected with events of the current year, with sustainability and more. The scenes created by Spain in successive editions with direct access are: Skylight, World's first Global Science Opera [4], Ghost Particles Quarks and Leptons [5], Moon Village A school on the Moon [6], One Ocean Being Scientist 2018 [7], Gravity Earth Gravity 2019 [8], Energize 2020 [9], Thrive Camino de Santiago [10], Creavolution 2022 [11]. This work, carried out in Spain in different schools of different autonomous communities of the country, offers a wide representation of the Spain students (Fig.2).



Figure 2. Global Science Opera Spain participation.

About the scenes. we find a way to overcome the challenge on how to build STEM knowledge with Opera scenes in classrooms.

You can try to discover elements yourself analyzing on a scene. The common scene elements with artistic content are: Character. Costumes. Script. Musical Composition, Voices (Aria, Recitative, Chorus), Scenography. Libretto, Booklet.

Lets take a look at some bits of the scenes of the Spain experience in GSO Editions .

SKYLIGHT 2015 - first Global Science Opera in the International year of light. Here I discovered Creations , the GSO begining, at Marathon Summer School.

Ghost Particles. Quarks Particles and Higgs Bosson. Elementary particles that make up matter have mass. They are 6 leptons and 6 quarks. Look at the quarks taking its mass. Higgs Boson is there, like a Ghost Particle when quarks and leptons acquire mass. The Phd Jou Miravent gave the poem for the scene. Musical composition for the poem. Here begins the Experience Openschools. Technics working with students. Chorus of UAB [12] Montserrat School. Primary School. Barcelona.

Moon Village. A school is needed for children who grow up on the Moon, a place with future possibilities. Children observe the land from their school. La Salle (Professional School, Paterna, Valencia). Maestra Isabel Gallego (Gorria, Primary School, Bilbao).

One Ocean. Three generations transmit concern for caring for the health of the waters: the fisherman grandfather, his scientist son, the granddaughter and schoolmates. Pay attention to the guitar tremolo composition. Identify the voices aria, choir and recitative. Rector Adelaida de la Calle (Primary School, Málaga). San José School (Primary and Secondary School, Marbella, Málaga).

Gravity. A captivating music accompanies us on a trip through the universe, with the Oumuamua asteroid, looking for the gravity of the earth. Espiciencia (Scientific learning community, Espinosa de los Monteros, Burgos).

Energize. Spain makes a journey from the awareness of the energy of our own body , producing music with the Theremin, and the clam for renewable energies. A complex and successful coproduction of Professional theatre students (MUDIC Museum, Orihuela Alicante). Mestre Gibert School (Primary School, Barcelona). IES Thader (Secondary School, Orihuela, Alicante).

Thrive. The Camino de Santiago witnesses the pilgrimage and cultural exchange of Europe throughout 12 centuries of history. This natural space as it passes through a Coruña, demands for the Mother Earth the cleaning and the recovery of species. I highlight the costumes of the army that saves Mother Earth with recycled material. IES David Bujan. Secondary School. Os ,A Coruña.

Finally the scientific topic for 2022, The Creative Brain. Creavolution Premiere will be 2022 November 20th. La Salle Premià School (Primary, Barcelona). IES Rafael Pérez Estrada (Secondary School, Málaga). And *ace Alzheimer center* (Barcelone)

National and International Collaborations in GSO Project (Fig.3). Collaborative interaction between participating schools and society guarantees the universality and training of citizens of the twenty first century.



Figure 3. National and International Collaborations

This identifies GSO with Openschools: CERN. UAB. NASA. UCM Astrophysics Madrid. Hands on Universe Spain Astronomy. Municipal Archive of Bilbao City Council. IOE Oceanographic Institute Spain Malaga. CICEROM. UAB Audiovisual Communication. UBU, ESERO European Space Agency Office

Resources Education. UBU Burgos. MUDIC Interactive Science Museum. UMH Alicante. UMH Film director. All that an opportunity to build a universal STEAM future.

#### 4. Conclusion

This work provides STEAM achievements and establishes communication bridges that connect society and schools. The STEM content of each project worked on and the artistic design merge into a unique product: a scientific opera.

#### 5. Acknowledgements

The enumeration of participants and contributors in each edition may have been unintentionally left incomplete. So I close these lines with thanks who have been involved in the GSO Spain Experience.

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