INNOVATION INCUBATOR SCHOOLS: EXAMPLES OF GOOD PRACTICE

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Abstract

One of the main challenges for education, and more specifically for schools, is to develop a close relationship with the agents in their environment so that they too can participate in the learning process of the students. In this sense, the OSOS project, Open Schools for Open Societies, (project included in the European Union's Horizon 2020 Research and Innovation programme 741572), works to transform the essence of education and turn schools into spaces for accelerating innovation.

Thanks to OSOS project, schools all over the world are currently implementing several initiatives for innovation and openness to the community. Becoming an open school requires transforming the culture of the school and rethinking the teaching-learning processes. It means interacting with the different agents of the environment to create projects and activities with an impact on students.

The OSOS Spain community presents in this article a series of OSOS initiatives successfully carried out in several Spanish schools. Initiatives that fight against invasive species in the landscape, intergenerational initiatives that seek to improve the physical, emotional and mental activity of ageing people, initiatives on energy poverty or climate change, recycling initiatives that involve an entire town, among others.

For each of these educational innovation initiatives, data will be presented in the paper on the number of students involved, number of teachers, actions carried out, agents with whom they have collaborated, valuation of the students, results of the scope of the initiative, evidence of the activity with the students and links to the extended description of each project.

All these innovative actions have in common the methodology of design thinking, the analysis from a scientific point of view, the resolution of real environmental problems and the impact of lasting learning among their students.

Thanks to the methodological proposal presented by OSOS, the aim is to change the culture of educational organizations and the community, not only to remain in small innovative actions, but also to prepare schools to carry out a true transformation of their way of teaching.

Keywords: Design thinking, open schooling, STEM education.

1 INTRODUCTION

One of the biggest barriers to educational innovation is the isolationist structure of many schools. OSOS project (project included in the European Union's Horizon 2020 Research and Innovation programme 741572) seeks to transform schools into incubators of exploration and invention. Schools should be accelerators of innovation. OSOS project is based on the philosophy of open schooling, i.e. the transformation of schools to innovative ecosystems, acting as shared sites of science learning for which leaders, teachers, students and the local community share responsibility. Therefore, all of them benefit through the increase of their communities' science capital and the development of responsible citizenship [1][10].

Students participating in an educational project within the framework of OSOS are making a vital contribution to their community because student projects meet real needs in the community outside of school, they are presented publicly, and draw upon local expertise and experience.

OSOS project have created a core network of 129 Open Schooling Hubs in 11 countries. Each of these schools aimed at developing a network of at least 9 additional schools to form a national network of schools where the Open School Culture is introduced. These schools have been involved in an initial piloting phase (for one full school year) in order to validate the efficiency of the Open Schooling Approach (methodology, resources and tools) before proceeding to the large scale implementation phase. There are currently more than 800 schools developing Open School Culture.
The schools that are implementing the Open School Culture are basing themselves on a series of examples of good practice, called accelerators. These are projects that have already been developed somewhere in the world and are inspiring examples of educational innovation and collaboration between schools and local agents. Thanks to these accelerators, schools can be inspired and adapt these examples of success to their reality, seeking relationships with other local agents or including the particularities of their local community. In addition, all OSOS projects have in common that they are based on the methodology of project-based learning, design thinking and are related to STEM areas (Science, Technology, Engineering and Mathematics). This is the pedagogical approach of OSOS [2][3].

All of this builds the learning ecosystem within Open School Culture in OSOS project: the Open Schooling Hubs, the innovation accelerators and the pedagogical approach.

2 METHODOLOGY

Schools that decide to become part of OSOS are committed to developing and extending the OSOS culture in their school and community. To do this, schools register on the OSOS platform, at least two teachers from the school create a user profile on the OSOS platform and one person from the school's management team answers a questionnaire called self-reflection tool. This self-reflection tool is introduced in OSOS in order to measure the Organisational Change of each school. Thanks to this questionnaire, all the participating centres are valued based on different levels of openness:

- **ENABLED**: Schools that are at an initial stage of incorporating educational innovation in the classroom and beyond.
- **CONSISTENT**: Schools that have achieved a certain level of innovation and openness through specific measures, educational ICT tools, best practices, CPD, but they still consist isolated cases without a network of other schools and external partners to facilitate the process.
- **INTEGRATED**: Schools that have achieved a high degree of innovation and openness and they have already established cooperation with community stakeholders and other external partners.
- **ADVANCED**: Schools that are considered rather extreme cases of schools that offer a glimpse to the open school of the future.

The aim of this assessment tool is to measure the Organisational Change of each school before and after the implementation to know if the level of openness of the school has increased or not thanks to the Open School Culture.

OSOS schools must also design a Development Plan explaining what actions they are going to carry out and then define the characteristics of their project based on one of the existing accelerators in the platform. Once the project is defined, teachers send a pre-test to the students and then share the project with them during the implementation so that the students can include their notes and evidence in the platform project. After the implementation phase, the teachers send a post-test to the students. The pre-test and post-test questionnaires integrate items referring to: Science Motivation, Intrinsic Motivation, Situational Emotions in science education and Problem Solving Competences [4][5][7][8].

This whole protocol defined in OSOS serves to assess the impact of the project and to ensure that schools are indeed undergoing a real transformation to innovative ecosystems.

3 RESULTS

As result of the methodological approach of this project, we present four examples of good practices below that have been developed among the schools of the OSOS Spain community.

3.1 Eradicating the Pampas Grass (P. Andrés de Urdaneta School, Loiu)

The Cantabrian coast is one of the most affected by the problems generated by invasive plant species such as the Pampas Grass whose seeds arrived in Spain from Argentina. The Urdaneta School wanted to help the Provincial Council of Bizkaia and the City Council of Loiu, with whom they have collaborated throughout the process, to eradicate this plant in their locality. First, students indicated on a paper map where the Pampas Grass were. For this, they learnt to use maps, scales, locate our position, and locate the species in the mountains. Later, students investigated how to eradicate them.
For this purpose, they studied the previous studies carried out by the University of the Basque Country and the work carried out by the Provincial Council of Vizcaya, eradicating the species in some specific areas of the province. Finally, students presented a dossier in the town hall. Then, the consistory informed the neighbours about how they should deal with this species, and a treatment in public areas will be undertaken. The work of the students can promote a campaign that will benefit their village. 156 students between the ages of 9 and 12 participated in this project, who also created and distributed leaflets on the problems of this plant in its surroundings.

Urdaneta School participated as an OSOS school Hub in the first piloting phase of the project and keeps implementing open schooling activities during the second academic year. The work carried out during these two courses has helped them to grow as a school, to become aware of the reality of their municipality and to create synergies with the town hall that have opened the door to future collaborations.

Urdaneta school has an Integrated level of Organisational Change because they have achieved a high degree of innovation and openness and they have already established cooperation with community stakeholders and other external partners.

3.2 The Silver Bay Project (CEIP San Ignacio EcoSchool, Cádiz)

The Silver Bay Project was born from the idea of making its students aware of the need to take care of their environment taking into account climate change. The more than 200 students of the third cycle of Primary Education created a video to spread the subject that they were going to work on their project and received several awareness talks by volunteers from environmental associations such as Green Peace. Thanks to all their work, on 5 June, World Environment Day, the Bay of Cadiz Natural Park is scheduled to be cleaned up with more than 2,000 people, thanks to the collaboration of around twenty public schools in the area and environmental associations in Andalusia. Ecologists, residents, businesses, City Council and Natural Park have also been involved. This is a pioneering initiative promoted by a school that has been able to involve other schools, families, administration and businesses. The impact on students has transcended to the educational community and even the local community. 220 students between the ages of 9 and 16 participated in this project.

CEIP San Ignacio EcoSchool has too an Integrated level of Organisational Change because they have achieved a high degree of innovation and openness and they have already established cooperation with community stakeholders.

3.3 Energy intelligence (Arxiduc Lluis Salvador Secondary School, Palma de Mallorca)

IES Arxiduc Lluis Salvador de Palma de Mallorca has carried out a project to eradicate energy poverty in its local community. To this end, they have developed an educational project involving students in the 3rd year of ESO and students in the Higher Technical Degree in Electrotechnical and Automated Systems. A project that starts from the students’ knowledge to make society literate in energy saving and in the management of electricity consumption in homes. Not only have informative talks been held, but also a popular inspection has been carried out to find out the energy consumption of each home and solutions have been proposed for energy saving, changing installations, etc. It is a project that starts from a real need of the students’ environment and that from the own resources of the centre, moreover, from the knowledge acquired from the students, a better solution has been offered to the community. This project has involved 12 teachers, 130 students from different educational levels, 45 family, 60 neighbours and 150 people from companies and 25 administration.

Arxiduc Lluis Salvador School has too an Integrated level of Organisational Change because they have achieved a high degree of innovation and openness and they have already established cooperation with community stakeholders.

3.4 How to transform your school into an ecological resource management company (San Vicente Ferrer School, Sagunto)

San Vicente Ferrer School in Sagunto wanted to contribute by reducing the negative visual impact created by its building located between two natural parks, adapting its façade to the environment through the construction of vertical gardens and school gardens in an attempt to reduce this visual impact and improve energy efficiency at the same time. With the help of students from Pre-school
through Secondary Education, environmental experts and the company "Servicios Medioambientales de Valencia, S.L." have been able to achieve their goal.

The students spent several days researching previous experiments on how to reduce the temperature in buildings and urban spaces, the students. They found that vegetation integrated into buildings could reduce the temperature of both the building itself and its surroundings and make it more energy-efficient. For this reason, they decided to create vertical gardens in the centre of the building. The project also involved designing an irrigation system using a closed water circuit fed by two tanks with a pulley that raised the excess water from other plants. All of this was driven by an electric motor driven by solar or wind energy. They have also designed a rainwater collection system to be able to fill the main tank.

This project has involved high-capacity students from different levels of education. Nearly 20 students from the 1st, 2nd and 3rd grade of Secondary Education have contributed to the different phases of this ambitious project.

San Vicente Ferrer School has a Consistent level of Organisational Change because they have achieved a certain level of innovation and openness, but they still are improving their network of other schools and external partners.

4 CONCLUSIONS

The development of educational projects that involve the community and are designed to benefit the community is a powerful learning experience for students. Students understand their ability to do things for the society, they feel able to provide solutions based on their skills and acquired knowledge. All this reinforces the motivation of the students and leads to an improvement in their results, in their level of involvement and in their own self-esteem. Although it is true that the management of the teaching staff of a project of these characteristics requires an important added effort, due to the complexity, the number of people who are mobilized, the class hours covered, the communication with different agents, the use of resources, and so on. From the pedagogical point of view, the impact on student learning is very significant.

For this reason, supporting and carrying out open schooling and design thinking initiatives in favour of society means making strategic decisions for the benefit of the educational centres themselves and, consequently, of the local community.

REFERENCES


