

+YOU: ASK YOURSELF, ACT AND MAKE IT POSSIBLE! PHERECLOS PROJECT: A LOCAL EDUCATION CLUSTER AT PORTO, PORTUGAL

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Abstract

U.Porto plays a major role in the Northern region of Portugal and intends to continue to play a major role in the development of the region's future, especially establishing connections with schools and its community, municipalities, companies, and others. establishing a Local Education Cluster (LEC). Based on the experience of the University of Porto (U.Porto) regarding young public engagement through many different succeeded initiatives, like Junior University and U.Porto's Fair, the University aims to promote a closer relationship with schools and many stakeholders and not just opening its doors to the school public. These activities are well succeeded stories that illustrate the strong impact of such activities in the development of the region, together with their mobilizing effect on key stakeholders. In H2020 Partnerships for Pathways to Higher Education and Science Engagement in Regional Clusters of Open Schooling Project (PHERECLOS) U.Porto developed several entrepreneurship workshops based on an inquiry approach highlighting the importance and role of student's questions. The U.Porto intervention in this H2020 project also engaged the participation of families and CEOs from companies with some storytelling activities. This activity was an inspirational factor to develop students' involvement, strengthening the connections with the school project and also acted as a motivational factor. Other educational activities aimed to help students with innovative ideas and entrepreneurial challenges to follow in future careers, by highlighting STEAM competences that they can use in the future. All activities are done through collaborative work allowing students to learn with others and gather ideas, ambitions and interests in different careers. This group sharing initiative promotes and stimulate rethink in new approaches for a future job by the engaged students that voluntarily participated. With success in its initiatives for School Opening to society, PHERECLOS project developed diverse Local Education Cluster in the different partners' countries that will ensure the continuation of the PHERECLOS aims in future activities even after the end of the project. In this presentation, we aim to introduce LEC developed by the UPorto University and explain how family members were invited to engage with the school community. In this moment our LEC involved almost reached 100 students and more workshops are schedule to be developed with students from two public schools. The results show an increase of students' interest in entrepreneurship and a higher motivation in their academic future and employment.

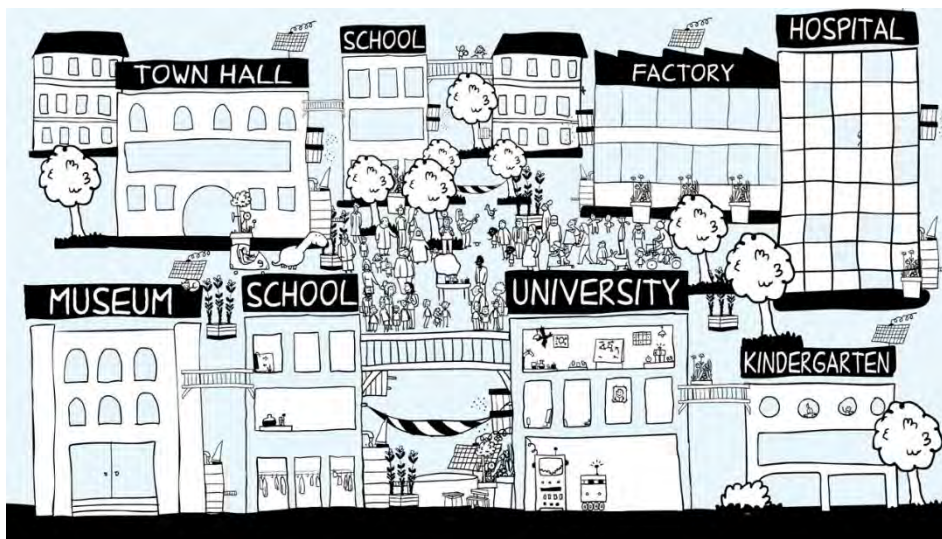
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1. The PHERECLOS project

The PHERECLOS project (Partnerships for pathways to **H**igher **E**ducation and **S**cience **E**ngagement in **R**Egional **C**lusters of **O**pen **S**choolin) builds upon the theory of science capital and on the experience accumulated over several years at Children's Universities, an important component in the Third Mission of Universities.

The PHERECLOS project (H2020 Project; Grant Agreement: 824630) aims to establish a total of six "Local Education Clusters" (LECs), which bring together schools and other relevant actors, such as business, universities, civic society organizations and educational providers, in the educational environment, supported by a mentoring program between pairs. The LECs will be local education facilitation groups that will enable dialogue between partners and help to establish joint activities in education (formal and non-formal activities) that help to develop learning environments (Figure 1).

Figure 1. The evolution of a Local Education Cluster.



(Source: <https://www.phereclos.eu/media-centre/>)

At the same time, LECs aim to impact the quality of opportunities for scientific engagement in a variety of areas. This ecosystem will witness the development of individual capacities through formal and/or non-formal STEM educational means. The operation and regional impact of similar initiatives to similar studies by know-how to implementation, are intended to cause deviations and consequences and good practices for the future.

2. The University of Porto “Junior University”

2.1. The Portuguese context

At the end of the 20th century occurred a massive expansion of the Higher Education (HE) in Portugal. Over the 1975-2001 period the average annual growth of enrolment in the tertiary education exceeded 5% (almost an exception amongst the OECD countries). Nevertheless, and despite the very high enrolment growth rate, the level of HE attainment in Portugal was still low. Moreover, during the first five years of the 21th century the Portuguese students' dropout rate, among the basic and secondary schools, was around 38.5% (46.2% for males and 30.25% for females) [Pordata - <https://www.pordata.pt/>].

It was expected by the Ministry of Education that the basic school learning reach 12 years, which happened five years later, in 2009. Government has dwelled with the problem in two main ways: on one hand, by diversifying the offer of basic and secondary level courses, notably by a wide variety of “training” and “professional” courses directed to students which don't want to follow the “regular” school curricula, but also to school dropouts, and to adults already part of the workforce who wish to improve their qualifications; on the other hand, and subject to much criticism, it has developed procedures of “recognition and validation of competences” that have spectacularly risen the number of graduates from each of the educational cycles.

Many initiatives (e.g. Junior University) begun to grow in order to attract the primary and secondary education students to HE and motivate them to pursue knowledge in many different subjects. As referred by some authors the individual in question (their motivation) and the immediate circle both actively participate in the formation of the conscious job choice (Balakhonov et al, 2021).

2.2. The junior university

The Junior University (Universidade Júnior - U.Jr) is a very large educational program conducted during the summer months by the University of Porto. The U.Jr. is directed mainly at the 10-18 age group. Junior University is a summer program that has a purpose of dissemination of different areas of knowledge, offering summer courses designed by university professors, for the youngsters. U.Jr. is a ground-breaking and very successful summer school from U.Porto that began in 2005 with the main purpose of promotion of knowledge in science, technology, and mathematics, art, humanities, and sports, with the goal of enticing newcomers to Porto University (Marques et al, 2012).

The program offers non-formal activities that cover a wide range of areas, from basic sciences to technologies, from humanities to arts and sports, that allow students to acquire knowledge, that can help

them in formal education contexts and everyday life activities. It also has the purpose to provide support in the process of vocational choice and return to society a part of the investment that was made and contribute to mitigate the low HE rates of the country, one of the aspects that throughout history has been one of the main reasons for the country's underdevelopment.

The Junior University has as main goal the promotion of knowledge – in the fields of science, technology, arts, humanities and sports – among basic and secondary level pupils. To this end, several learning programs and small research projects are annually designed by university lecturers and executed mostly by undergraduate and graduate students, under supervision, and in some cases junior researchers. Usually at each edition counts with more than 150 different activities covering many different areas of knowledge.

The University of Porto has been identifying and establishing many partnerships that are growing since the beginning of the Junior University, especially in what concerns the development of educational activities and relation with the youngsters. For instance, the House of Music, the Serralves Foundation, the Gaia Biological Park and the Ciência Viva Agency and many others jointed more recently such as Arouca Geopark, Museum FC Porto, CICCOPN, Transport and Communication Museum, Portuguese League Against Cancer, etc.

Figure 2. Junior University final meeting at the House of Music.



An important component of the U.Jr. is the promotion of pupils from underprivileged socioeconomic groups through a wide partnership with several Portuguese municipalities, associations and enterprises. Junior University has been establishing across the country many agreements with almost 50 municipalities, associations and enterprises. These strong connections have a major importance for the project because they grant the social inclusion of pupils from underrepresented groups in the summer courses.

The U.Jr. has been addressing multiple issues: vocational orientation, introduction to specific scientific areas or topics, the promotion of higher education and knowledge-based careers, and provides a glimpse into everyday life at the 14 schools that integrate the University.

During July and September, it's interesting to see the University campus full of young students and watch all the interactions that they establish each other. Every years (since 2005) almost seven thousand students enrolled in our activities. They come from all over the country and from other countries as well.

These connections and networks between the pupils continue beyond the participation in the summer courses. The pupils often contact the University of Porto, sometimes within the framework of some work they are doing with their teachers at school other times to exchange some points of view or to ask some details about a possible choice for the future at the university.

We are aware that very diverse factors shape student choice of the university, but we are sure that about the promotion of knowledge among young people, indirectly translated in HE student recruitment.

3. The University of Porto local education cluster

The Porto LEC integrates institutions ready to develop new collaborative open schools to society ecosystems, providing teachers with valuable skills and promoting connections between schools and their communities. It is based on the knowledge, expertise, and good practices of LEC's partners.

In Portugal, non-formal education has a special favorable context in primary schools, not being really formally developed in higher levels of education. Due to national exams, students from the secondary level are not really motivated to be involve in non-formal activities – they prefer to focus their time to study the conceptual knowledge to have higher grades to apply for a faculty student position. To younger students, non-formal teaching and learning activities typically include visits to museums, to biological parks, to biodiversity galleries or botanic gardens, to scientific centers or even geoparks. Some teachers also develop visits to enterprises and research centers as part of the schools' vocational orientation program.

Some Junior Universities, all over the country, open their activities in the end of the school year to develop students' interest for many different areas of knowledge. The attendance to Junior Universities' activities is high and raises every year, not only for the motivational process promoted but also as a quality leisure time.

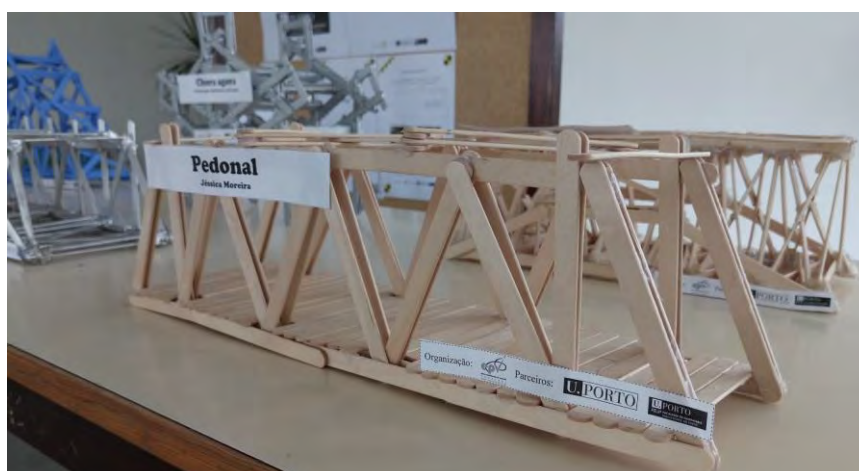
Porto LEC involved several schools and new partnerships to welcome innovative teaching projects in open schools to society in a close relation. These non-formal education exchanges will gather the experience of professors, professionals, teachers, families, and students.

STEAM4E "E" of Entrepreneurship was the project's motto. Porto LEC aims to foster creativity and entrepreneurship ideas among young people. The students' outputs, learning outcomes, and ideas will be vital to reach LEC goals. Students who engage in STEM contests (such as robotics, engineering, and scientific fairs) and afterschool STEM-related programs are more likely to express interest in a STEM-related field of work than those who do not participate (Miller et al, 2018; Maiorca et al, 2021).

Some of the actions developed were based on connections between the schools and the University, and also some inspirational talks and conferences were organized with the aim of covering some topics related with STEAM (Science, Engineering, Arts and Mathematics). One of the actions was related to a truss structure project after an approach of several concepts related with physics and forces (application, direction, direction and intensity), causing acceleration of materials particles. These forces are the cause of the cohesion or breakdown of matter, traction or compression, among many other phenomena.

Students were able to understand how the trusses work, relating with many buildings or bridges structures. This was followed by a project where students built bridge models using ice cream wood sticks (Figure 3). These students were organized into teams and all the models produced were submitted to the application of a load, in order to measure the maximum load supported.

Figure 3. Example of a structure built by students.



At the same time, some workshops on youth entrepreneurship were developed, exploring also this component. Whenever possible, it was integrated the third generation (grandparents) in the professional development of the students, through the promotion of storytelling between students, the third generation and market players. The entrepreneurs, with their own expertise, contributed for new knowledge development with short lectures during visits to the enterprises.

The starting point for the entrepreneurship approach was a process of inquiry among the students (basic and secondary) about their future interests and expectations related with the project, then a program about entrepreneurship for the secondary students, was developed by Porto Business School of the University of Porto - 12 hours' workshops were an overview of innovation entrepreneurship journey; a hands-on dive into relevant tools and methods for entrepreneurship and a way to learn, co-create and meet like-minded people. Concepts related to business plan, marketing strategies, startups, innovation, design thinking were addressed. Building a startup is often very motivating, inspiring and usually rewarding with full of new learnings, experiences, unexpected opportunities and challenges, that's why startups are called ventures or journey, and also referred as a rollercoaster ride. In startups students will learn more about world, people, business etc. more than they can imagine.

While ultimately the path to success requires entrepreneurial mindset, hard work and commitment - deciding to start that path is easy and best way is to "just do it" - take the first step. What is needed is a curious mind and motivation to build something new and meaningful together with others.

In the entrepreneurship workshops students discussed relevant concepts from the innovation entrepreneurship lexicon, learned about the startup journey and critical aspects of each phases understanding the startup development phases (problem, vision, product, business model and market fit).

4. Final thoughts

To develop some activities students were gather in groups and in every cohort was clearly perceptible a change in mindset. In the beginning of the workshops, students would verbalize their lack of entrepreneurial and creative skills, but every time it ended up with them being proud of the work they developed, the problems they explored and the prototypes they built.

These are the critical competences that students should embrace and take to their personal and professional lives - analytical and creative thinking, empathy, bias towards action, and an investigator mindset.

They learned that building businesses and coming up with innovative concepts is about constantly validating hypothesis - truly as a scientist - that starts with a blank page, a neutral conception regarding a given topic or problem, and goes exploring a new phenomenon or, as in Porto's LEC, an opportunity.

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