The Activity of "Missione Al Cubo": An Academic Spin-Off of University of Calabria Devoted to Science Education and Public Engagement with Science

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Abstract: Education and Public outreach is an important part of the activities of universities and research institutions. Moreover, public outreach is becoming an interesting career path, suited for young research scientists with strong communication skills and a broad research background. To address these opportunities and challenges, we decided to set up a spin- off company. The cooperative society, which received the status of academic spinoff from the University of Calabria, was named "Missione al Cubo", a name evocative of both the "third mission" and the "cubes", the buildings of the University of Calabria. In this work we present the activities set-up by the spin-off during its first year of activity. During this period the spin-off collaborated with schools, private enterprises and public administration developing activities directly derived from the scientific research conducted by the members of the cooperative society who are also young researchers (graduate students and post docs) of the physics department of University of Calabria.

Keywords: Physics Education, Spin-off, Public engagement with Science, Science Education

Citation: Meringolo, C., Chiappetta, F., Riccardi, P., Tucci, R., Bruzzese, A., & Prete, G. (2023). The Activity of "Missione Al Cubo": An Academic Spin-Off of University of Calabria Devoted to Science Education and Public Engagement with Science. In M. Shelley, V. Akerson, & M. Unal (Eds.), *Proceedings of IConSES 2023--International Conference on Social and Education Sciences* (pp. 540-547), Las Vegas, NV, USA. ISTES Organization.

Introduction

Scientists are increasingly aware of the importance of communicating with the public and becoming more involved with the local community, especially in schools (Mack et al., 2020; Entradas & Bauer, 2019). They practice outreach with personal enjoyment and satisfaction. In particular, young researchers, like graduate students and post-docs, bring enthusiasm and passion, making outreach programs much more successful (Beck et al., 2006; Riccardi, 2016). Besides this, they have several advantages from this participation, ranging from the opportunity of improving their communication abilities to the enrichment of their curriculum, as education and public outreach is evolving as an interesting career path, suited for physicists with a strong communication skill and a broad research background (Cominsky, 2018). Nevertheless, the involvement of young researchers in education and public outreach activities is still poor (Entradas & Bauer, 2019). Moreover, despite enthusiasm and passion, outreach programs are not going to be enough. A physics department can interact with a limited number of schools and there will be sectors of public that are not going to be reached. Therefore, we asked ourselves if the market could help in increasing and improving our public engagement activities. To this end, we developed a company that received the status of academic spin-off by university of Calabria and is named "Missione al Cubo" (mission cubed), evocative of both the "third mission" and the "cubes", the buildings of University of Calabria (Riccardi, 2022a).

The spin-off is mainly composed by graduate students and aims at operating in the market sectors that are determined at the interface between research and society. The role of young researchers in our spin-off is that of setting up and conducting educational activities and products derived from research topics actually studied by the research groups of our physics department. In fact, we believe that the real strength of an outreach activity is its direct derivation from an important scientific and research structure which can provide the public with the opportunity to approach scientific research interacting directly with people who know and practice it. The product and services developed by the company are then distributed to a wide market made of schools, museums, the internet etc… This market develops primarily within our surrounding community, to inform the public about the scientific research performed in their local environment.

The discourse is then extended to the connections of this research with the global breath of the international context and with societal implications of scientific issues, that are relevant in people's everyday life and therefore can be extended to a wider market outside our region. Our choice of the form of a cooperative society for our spin-off company perfectly fits the participation of graduate students. Cooperatives have mutualistic and

democratic purposes (EPRS, 2019) that are best suited to an entrepreneurial activity based on collaboration between doctoral students. Cooperatives are autonomous associations of people aspiring to achieve their objectives through a jointly owned and democratically controlled enterprise. International organizations, such as the United Nations and the European Union (EU), value the role cooperatives play for society, the economy and (international) development (EPRS, 2019). Cooperatives operate in the interests of their members and are not managed in the interests of outside investors. Profits are received by members in proportion to their activity with the cooperative, and reserves and assets are commonly held, non-distributable and dedicated to the common interests of members. Because personal links among members are in principle strong and important, voting rights are not proportional to shareholdings (one man one vote). The capital of a cooperative is variable, which allows an easy entry and exit mechanism for members, with a very limited investment. Moreover, the cooperative form is also compatible with the scientific duties of PhD students, which can be complemented by the activity within the cooperative, according to an operating method long tested in our outreach activities (Chiappetta et al., 2020; Riccardi, 2016; Riccardi & Goletti, 2017; Riccardi et al., 2022b). The activity of the spin-off started in February 2022 and in the following we would like to discuss some of its activities that demonstrate the existence of interesting perspectives for the business idea.

Figure 1. One of the authors (FC) during an activity in a school

The Activities of the Spin-off

The spin-off originates from some specific lines of research on physics education and public engagement conducted by our group in these last years (Chiappetta et al., 2020; Riccardi, 2016; Riccardi & Goletti, 2017;

Riccardi et al., 2022b). These activities have developed mostly within the PNLS (Piano Nazionale Lauree Scientifiche – National Plan for Scientific Degrees) which is the main initiative of the minister of university of research that since 2004 promotes the interaction of universities with schools (Riccardi, 2016; Riccardi & Goletti, 2017). Within the PNLS we have developed educational activities at schools (see Fig. 1) (Riccardi, 2016; Riccardi & Goletti, 2017), in school-work alternation activities (Riccardi et al., 2022b) and, finally, in the management of the program for schools of the Planetarium of Cosenza for the school year 2019/2020 (Chiappetta et al., 2020).

In particular, the project for the schools of the Planetarium "G.B. Amico" of Cosenza (Chiappetta et al., 2020), in which the activities for the schools during the first year of activity have been conducted by PhD students from the Department of Physics (see Fig. 2 and Chiappetta et al., 2020) convinced us that there is a large market for a whole series of products and services designed with the aim of creating a solid and lasting interface between the University and the public, in all its forms. Therefore, to address these opportunities and challenges, we decided to create the spin-off company (Riccardi et al., 2022a).

Figure 2. One of the authors (GP) during a lesson at the Planetarium of Cosenza

Figure 3.Young researchers introducing the projection at the cinema Campus at University of Calabria

Figure 4: A moment of a projection at the cinema “Campus”

The cooperative society "Missione al Cubo" recently collaborated with University of Calabria and the municipality of Rende on the project "Esplorare Rende felici" ("Exploring Makes Happy"). The goal of the project was to launch in the Rende area an offer of scientific tourism, capable of making the space exploration an informal learning experience in which visitors will be inspired to imagine new perspectives for the future. It has been a cultural event in which the dissemination of knowledge of the space will also stimulate reflection on topics of current societal interest, such as the exhaustion of resources and the search for new places capable of welcoming human life. As part of the project, the cooperative produced and carried out an activity reserved for schools at the "Campus" cinema in University of Calabria. The activity was based on an interactive projection entitled "viaggio nel cosmo" ("journey into the cosmos" – see Fig. 3 and Fig. 4). The projection was produced starting from audiovisual material licensed by large research infrastructures (NASA, ESO etc...). Based on this material, a narrative was built on the themes of space exploration and space physics, calibrated to the age of the young spectators, and with young researchers from the physics department as live narrators in the room. The initiative was very successful, as evidenced by the numerous questions that young spectators asked at the end of each projection.

Figure 5: top: Primary school students at the "Città dei Ragazzi" in Cosenza observing an experiments with a Stirling engine; bottom: some of the experimental set-ups installed in the structure

Most of the activities of the society have been developed for pupils of the primary schools, which are typically not involved in the outreach program of a university. In particular, our society, collaborated with the companies that manage the "Città dei Ragazzi", a structure in the city of Cosenza dedicated to entertainment and educational activities for children. The collaboration consisted in the development of scientific activities as part of a project of which the aforementioned companies were partners. In particular, Missione al Cubo had the task of designing and installing science laboratories dedicated to didactic activities for primary school students (see Fig. 5). The collaboration was also aimed at the training and coordination of the human resources involved in the project and in the organization of activities, users and in-coming. Furthermore, Missione la Cubo also took charge of the repair and reinstallation of some scientific set-ups already present in the structure and not used for several years.

During this year of activity, Missione al cubo collaborated also with several organization participating in science fair and festivals, particularly during this summer (see Fig. 6). These events are generally very participated by the public, thus testifying the existence of a large market that is usually not reached by outreach programs. For the future, Missione al Cubo was selected by University of Calabria, together with nine other business ideas, to be hosted in the Cosenza Open Incubator (COI), an incubator that aims at giving boost to enterprises aiming at operating in the historical downtown area of Cosenza. The incubator will offer to the staff of our society services of formation and mentoring to better qualify the business idea and to identify market strategies. The teams of the ten selected ideas are going to be hosted in the historic Palazzo Spadafora, made available by the Municipality of Cosenza.

Figure 6: Images of events for the public in which Missione al Cubo participated

Conclusion

Though the pandemic crisis is still producing some negative effects, the cooperative society "Missione al Cubo" started successfully its initiatives. During this first year, the spin-off collaborated with schools, public administrations, private enterprises and the University of Calabria, developing activity for schools and the general public. The enthusiasm shown by students, teachers and by the public testifies the validity of the activities produced by the spin-off. Besides these activities, the next few years will see the spin-off engaged in the activities of the Cosenza Open Incubator, an initiative of the University of Calabria and the city of Cosenza aiming at promoting the development and the activity of new enterprises in the historical downtown area. The perspectives for the future are therefore good and we would like to encourage similar initiatives that are likely to expand the outreach activities of universities and research institutions.

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