Lab2Go: a Project for Fostering Interest in Laboratory in Different Contexts

Vera MONTALBANO

Department of Physical Sciences, Earth and Environment, University of Siena, via Roma 56, 53100, Siena, Italy
Istituto Nazionale di Fisica Nucleare (INFN) Sezione di Pisa, Edificio C – Polo Fibonacci Largo B. Pontecorvo 3, 56127, Pisa, Italy

Abstract. The physics laboratory is a very engaging teaching tool and allows to clarify fundamental conceptual issues of physics. However, little time is often dedicated to it. Problems, like the lack of maintenance of the instruments or the limited equipment available, could render it difficult. The LAb2Go project propose support in an optional laboratory. The activities carried out as part of this project in three schools will be compared, highlighting the need for context analysis to implement truly effective activities both from the point of view of the primary objective, i.e. restoring tools and experiences, both for educational effectiveness in physics.

Introduction

The physics laboratory is a powerful teaching tool and allows students to clarify and explore the fundamental conceptual issues of physics. In the continuing relationship between modelling and experiments, activities in laboratory should be central to physics teaching [1, 2]. However, in school practice, little time is often dedicated to it or proposed as a mere verification of laws introduced as absolute. Added to this unfortunate teaching situation other problems could render it very difficult, like e. g. lack in maintenance, the limited equipment available, missing catalogue, the stratification of the most disparate working, obsolete and non-functioning equipment about which the know-how has lost due to the turnover of teachers and, where still present, technical staff.

Since 2016, the LAB2GO project [3], a national project of third-mission of the INFN (National Institute of Nuclear Physics) aimed at high schools, has been trying to remedy this situation by proposing support to students and teachers in an optional laboratory activity.

The activities carried out as part of this project in three schools will be compared, highlighting the need for context analysis to implement durable effects both from the point of view of the primary objective, i.e. restoring tools and experiences of significant laboratory, both from the point of view of educational effectiveness in physics.

The *LAB2GO* project

The project was born in 2016 to establish a continuous collaboration between schools and researchers. Sapienza Università di Roma and INFN designed the activities in the framework of actions promoted by the Italian Ministry of Education (PLS, Programme for promoting Scientific curricula in the university and PCTO, Path for acquiring Transversal Competences and Orientate students' career), with the goal of spreading the laboratory practice among students and teachers in high schools. LAB2Go started in Rome and was focused on physics [4], however in just few years it has expanded across Italy reaching a large number of regions and town thanks to the increasing involvement of INFN and has enlarged its scope to other scientific disciplines (Biology, Botany, Chemistry, Robotics, Earth Science and History of Science).

The project consists in at least two steps:

- schools were selected to provide an inventory of the devices found in their laboratory, done by about 10-15 students per school coordinated by one or more teachers with the help of a physicist. Students realise web pages on a dedicated web server, and information provided is open to everyone, containing an accurate description of the instruments found in their laboratory. The idea is to have a short general description of a given object accompanied by more detailed information about the usage of the particular device found in each school,
- testing and documenting specific experiments made with the devices listed in the system performed by students, supervised by their teachers.

LAB2Go in southern Tuscany: different actions in different contexts

The project has recently arrived in Tuscan schools. The activities and results of the first year will be compared in 3 different contexts. The schools are scientific high schools, respectively in a provincial capital (school with dozens of sections), in a provincial city with an industrial vocation in crisis for decades, and in a tourist location (school with only one scientific section). The role played by the social context, the expectations of the teachers and students involved, the history of the laboratory and its use or abandonment was fundamental in designing the project activities. The results presented are based on the analysis of the difficulties encountered, the strategies adopted to overcome them and the evaluation of their effectiveness through interviews with students and teachers.

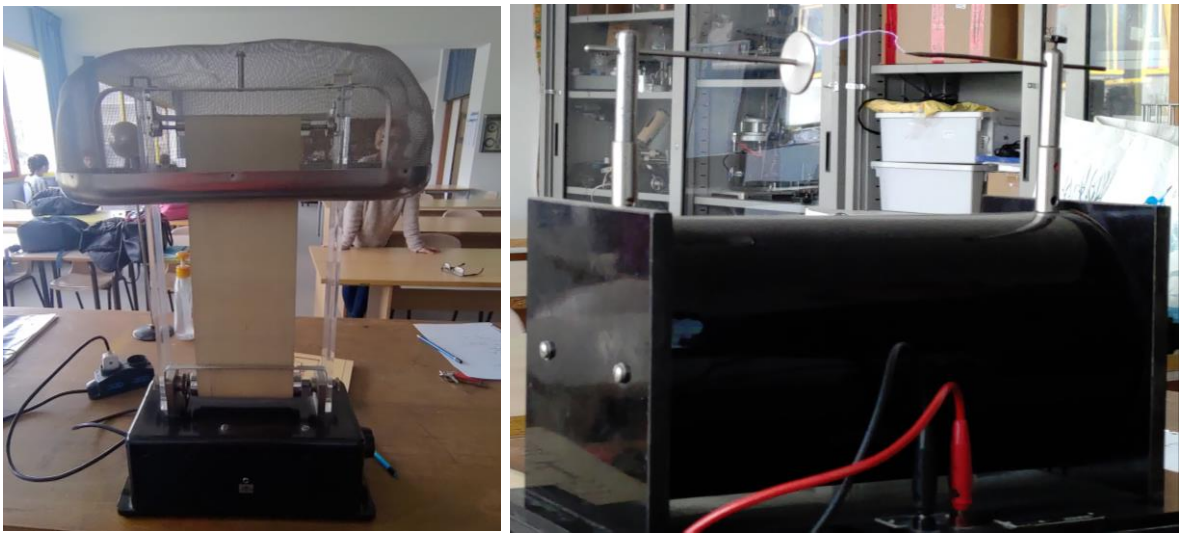

Fig. 1. Testing a Van der Graaf Generator on the left and a Ruhmkorff coil on the right.

References

[1] D. Sokołowska and M. Michelini, (Eds.). *The role of laboratory work in improving physics teaching and learning*, Springer, Berlin/Heidelberg, 2018

[2] V. Montalbano, Active training for the physics laboratory, *Giornale di Fisica* **LXIII** (2022) 163-172 doi 10.1393/gdf/i2022-10438-8

[3] G. Organtini, F. Ameli, G. Cavoto, E. Di Marco, … and R. Faccini Promoting the physics laboratory with LAB2GO, *EDULEARN17 Proceedings*, 5264-5268, 2017

[4] A. Mirco, P. Astone, C. Donatella, A. Cartoni, F. Casaburo, ... and F. Safai Tehrani,. Il progetto Lab2Go per la diffusione della pratica laboratoriale nelle scuole secondarie di II grado, *La Fisica nella Scuola* **52** (2020) 121-132.