SVELAMI-B project results within primary schools

Daniela DI MARTINO, Laura D’ALFONSO, Nadia MALASPINA, Silvia PENATI

University of Milano Bicocca, Milan, Italy

**Abstract**. The SVELAMI-B project aimed at carrying out STEM activities to elementary school children and secondary school boys and girls. We will present the project and its activities within two primary schools, outlining some results.

# Physics into STEM education

The **SVELAMI-B** (*SVolgere Esperimenti nei LAboratori di MIlano-Bicocca*) project is an Italian project aimed at offering STEM (Science, Technology, Engineering, and Math) activities to school students, whose acronym stands for “to carry out experiments in the Milano-Bicocca laboratories”. The project, coordinated by the Physics Department of the University of Milano-Bicocca, included several actions and activities among STEM subjects (in particular, Physics, Earth Sciences, Mathematics and Computer Science) for elementary school children (3rd and 4th grade) and secondary school (11th and 12th grade) boys and girls, with a particular attention to the gender gap issue. The majority of students were indeed of female gender, with 44 girls out of 73 elementary school participants and 92 out of 139 secondary school participants.

The whole project lasted 40 hours for each school and it was carried out completely through remote access (online platforms), due to the COVID-19 emergency restrictions. The project was designed following inquiry-based principles [1]: focusing on the primary school activities, science experiments were proposed, presenting them also in playful formats, and the work of famous female scientists was presented too.

The design of the project was twofold: the first step was a common discussion with a multidisciplinary community of practice, within the Milano-Bicocca University, to define a strategy of presentation to the classes; then, the designed activities were shared and discussed with the class teachers, to verify the best presentation modality to the pupils [2].

One of the main goals of the project was to engage female students: first of all, by including a majority of girls in the school groups, then to make STEM attractive, also by offering them a *role model* (both referring to famous female scientists in the past, and also by activities conducted by present female scientists of the University of Milano-Bicocca).

# Discussion and perspectives

The underrepresentation of the female gender in STEM is still a compelling issue [3]. One of the results of the **SVELAMI-B** project was to underline the presence of female scientists, both in the past and in the present time. Indeed, many questions asked by children before and after our activities were related to the gender issue. For examples, here are three comments we recorded in the questionnaires administered after the activities:

“I learned that there are female scientists”;

“I learned that being a female scientist is not an easy task but it is very fascinating”;

“I learned that there are female scientists too and one of them figured out how the first computer worked”.

The project obtained many positive effects: pupils were indeed very active and curious, and they participated also after the sessions with numerous questions and many “homeworks”, like drawings that tried to represent “what a black hole is?” or photographs taken hunting for rainbows. Moreover, also teachers had a real opportunity to learn and deepen their knowledge of various STEM subjects.

As a perspective, we plan to replicate the **SVELAMI-B** project in different schools. We also plan to go deeper in the analysis of the questionnaires administered, and to administer a new questionnaire to the same participants (*ex-post*), taking inspiration from the questionnaires administered by TIMMS (Trends in International Mathematics and Science Study [4]). The results will give an insight on how much students appreciate and rely on science, and they could be compared with the Italian statistics.

**References**

1. M. Pedaste, M. Mäeots, L. A. Siiman, T. de Jong, S.S.N. van Riesen, E.T. Kamp, C.C. Manoli, Z.C. Zacharia and E. Tsourlidaki. *Phases of inquiry-based learning: definitions and the inquiry cycle* Educ. Res. Rev.14 47–61 (2015).
2. D. Di Martino, L. D’Alfonso, N. Malaspina, S. Penati “S. Penati, *SVELAMI-B project: online Physics activities within STEM education*, to be presented at the forthcoming GIREP WEBINAR 2021, PHYSICS TEACHER EDUCATION – WHAT MATTERS?, Malta 10-12 November 2021.
3. B. A. Wassell, M. F. Hawrylak, & K. Scantlebury, *Barriers, resources, frustrations, and empathy: Teachers’ expectations for family involvement for Latino/a ELL students in urban STEM classrooms,* Urban Education, 52(10), 1233-1254 (2017)
4. I. Mullis, M. Martin, P. Foy, D. Kelly, & B. Fishbein,. *TIMSS 2019 International Results in Mathematics and Science*, TIMSS and PIRLS International Study Center, 2020 (see questionnaires on pages 434, 439, and 449).