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From students to experts: an example of flipped classroom during the INFN-INSPYRE International School

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Outreach activities carried out by Research Institutions and Universities play a key role in bringing the public closer to scientific culture, and particularly, when aimed at younger audiences, in encouraging inspirations for STEM careers. In this context, numerous studies have highlighted that the most effective initiatives are those that allow students to immerse in the research setting and interact firsthand with researchers, but also to be involved in laboratory or hands-on activities [1]. The INternational School on Modern PHYsics and REsearch INSPYRE of the Italian National Institute for Nuclear Physics (INFN) has been a virtuous example of this for several years [2]. Organized since 2011 at the INFN Frascati National Laboratory, the School reached almost 700 high school students from all over the world. From 2025, the School is also held at the Legnaro National Laboratory. With its plenary lectures, interactions with researchers, and hands-on laboratory activities, the school provides participants the opportunity to explore the latest topics in modern and contemporary physics, while also highlighting the most recent studies and real-life applications. Strengthened by this long experience, this year we introduced a new activity that ensured a different involvement of students: a flipped classroom. In a first phase, we provided students a set of materials on dark matter to study before coming to the school. Then, during the school, we held parallel sessions with researchers in the field, during which students, divided in groups, could ask questions and share doubts. Finally, divided in 5 groups, they presented various topics to their peers. In this talk we will describe the flipped classroom and offer a reflection that may be useful in other similar contexts.

[1] B. Habig, P. Gupta, B. Levine, and J. Adams, An informal science education program's impact on STEM major and STEM career outcomes, Research in Science Education, 50(3), 1051–1074, 2020

[2] A. Postiglione, S. Bertelli, C. Curceanu, S. Arnone, D. Bifaretti, E. Patrignanelli, S. Reda, E. Santinelli (2023) Let's get INSPYREd: the impact of the "International School on Modern Physics and Research" on high school students'STEM career aspirations, EDULEARN23 Proceedings, pp. 4127-4135.

Secondary track

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