

School-University Collaboration and Teachers' Professional Development

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Abstract. This Workshop (WS) aims at sharing a history of collaborative research between schools and universities developed within the Italian PER community, discussing where we are and identifying future perspectives. The WS outcomes will inform a position paper.

Introduction and goals

Teachers' professional development is a central theme in Physics Education Research (PER) [1-3], which GIREP has been working for many years in dedicated congresses [4] and seminars [5]. Several widespread models are offered in literature, e.g. Metacultural, Experiential and Situated [6], but recent studies have highlighted didactic research in the professional development of teachers and community-based approaches to propose new modalities with focus on new strategies and methods, including specific aspects, as the role of technology, interdisciplinary frames, efforts in teaching/learning quantum mechanics [7-18].

In the context of the Italian Scientific Degrees Plan (PLS) [13], a network was built among colleagues working on teachers' professional development¹, hinging on university-school collaboration and integrating PER experiences. The network has served to compare tools and methods in a survey of 136 activities from 33 universities in part already cooperating within an institutional Master initiative [9], a survey on teachers' education in quantum mechanics [19], and a reflection on physics teaching for primary-school teachers [20]. First perspectives for community growth have been included in a reference publication [21], on which the Italian PER community wishes to engage and confront within the international 4th WCPE community.

Framework and research proposal

All GIREP members are invited to share by July 25th, 2024, a compact form of their contributions submitted to the 4th WCPE, so to form the base for the Workshop (WS) discussion as follows. After a half-an-hour introduction summarising the main contributions results, one hour will be dedicated to discussing in each of three groups one of the emerging questions: (1) Which needs do teachers express and perceive? Which are effective approaches, strategies, and methods, for their professional development? (2) Which activities should we focus on, in which context (individual, local/regional, national), with which PER role? (3) What role and commitment are required for the teacher? Which transfer/impact on, and temporal continuity of, teaching professionalism and

¹ The reference persons from each University are: Chiofalo M (PI), Corradini O (MO), De Angelis I (RM3), Giliberti M (MI), Immè J (CT), Longo A (LE), Malgieri M (PV), Michelini M (UD), Montalbano V (SI), Orgatini G (RM1), Pagliara S (BS), Pavesi M (PR), Sabbarese C (CE), Salamida F (AQ), Straulino S (FI).

classes? Finally, the last half-an-hour will be dedicated to a plenary discussion of the results reported by the groups and concluding perspectives.

Findings and perspectives

A concluding article will provide a review of the contributions received [7-18], followed by a position paper highlighting future perspectives based on the results of the discussion.

References

- [1] S. Levy, E. Bagno, H. Berger, B. S. Eylon, Professional Growth of Physics Teacher-Leaders in a Professional Learning Communities Program: the Context of Inquiry-Based Laboratories, *Int. Jour. of Scie. and Math. Educ.* **20** (2022) 1813–1839.
- [2] E. Etkina, B. Gregorcic, S. Vokos, Organizing physics teacher professional education around productive habit development: A way to meet reform challenges. *Phys. Rev. Phys. Educ. Res.* **13** (2017) 010107.
- [3] L. C. McDermott, P. S. Shaffer, C. P. Constantinou, Preparing teachers to teach physics and physical science by inquiry, *Phys. Educ.* **35** (2000) 411.
- [4] W. Kaminski and M. Michelini (Eds), *Teaching and Learning Physics Today: Challenges? Benefits?* (2014). Girep book of the GIREP-ICPE-MPTL Intl. Conf., Reims 2010, 2014.
- [5] J. Borg Marks et al. (2023). Girep Malta Webinar 2021 Vol. 2490 IOP: *Conf. Series*
- [6] M. Michelini, Dialogue on Primary, Secondary and University Pre-service Teacher Education in Physics. In: J. Guisasola & K. Zuza (Eds), *Research and Innovation in Physics Education: Two Sides of the Same Coin*. Challenges in Physics Education. Springer. Cham, 2020.
- [7] J. Borg Marks, (2024). *An overview of the outcomes of the GIREP Malta Webinars 2020&2021*. Sub. to 4th WCPE
- [8] G. Organtini, M. Carli, O. Pantano, P. Sapia, *ADELANTE project*. Sub. to 4th WCPE, 2024.
- [9] M. Chiofalo, M. Michelini, L. Santi, *The IDIFO Master*. Sub. to 4th WCPE, 2024.
- [10] C. Suttrini, M. Malgieri, G. Zuccarini, C. Macchiavello, *Teacher professional development on quantum science and technology: the Pavia approach*. Sub. to 4th WCPE, 2024.
- [11] M. Michelini, *University Italian network for teacher professional development*. Sub. to 4th WCPE, 2024.
- [12] O. Levrini, G. Tasquier, *Challenges of Climate Change Education for Teacher Education*. Sub. to 4th WCPE, 2024.
- [13] C. Fazio, *The PLS-Physics project*. Sub. to 4th WCPE, 2024.
- [14] M. Tuveri, A. Steri, V. Fanti, *Designing a teaching experiment for training lower secondary school teachers in classical mechanics*. Sub. to 4th WCPE, 2024.
- [15] V. Montalbano, E. Mariotti, *Professional Development Programs in Physics in Tuscany*. Sub. to 4th WCPE; Montalbano, V. *The training needs of physics teachers: a challenge from the APT*. *ibid.*; Montalbano, V., Marchini, D. *Active in-service training on transversal skills: two pilot cases in STEM disciplinary teaching*. *ibid.*, 2024
- [16] M. Carpineti, M. Giliberti, *Guess the Color at the Edge of the Rainbow*. Sub. to 4th WCPE, 2024.
- [17] M. Giliberti, M., Michelini, S. Pagliara, M. Pavesi, *The Beauty of Teaching Physics: a PLS joint Teaching Training Course*. Sub. to 4th WCPE, 2024.
- [18] V. Bologna, F. Longo, G. Modugno, M. Peressi, *Developing new habits for Physics teachers through Creative Ateliers*. Sub. to 4th WCPE, 2024.
- [19] O. Corradini et al., *Inquiry on Italian PLS University Initiatives for teacher professional development on quantum physics*, Internal report, 2022.
- [20] M. Chiofalo, O. Corradini, I. De Angelis, L. Falomo, L. Bernarduzzi, M. Malgieri, C. Suttrini, M. Giliberti, J. Immè, M. Michelini, G. Organtini, S. Pagliara, M. Pavesi, C. Sabbarese, F. Salamida, S. Straulino, Physics for Primary School Teachers in Italy: Comparative Analysis in a Dedicated Survey. In J. Borg Marks & P. Galea (Eds). *Physics Teacher Education. Challenges in Physics Education* (p. 163). Springer, 2023.
- [21] J. Immè, M. Michelini (Eds.), *Giornale di Fisica* **63**(s01) (2022). <https://doi.org/10.1393/gdf/i2022-10468-2>.