PhD course

"Methods and methodological practices in Physics Education Research"

10 seminars from March to May 2022

with national and international experts

for PhD students in Physics Education, STEM Education, or related subjects

in presence in Bologna and online

Description of the course

The course aims at providing an overview of the main research methods used in Physics Education Research. The seminars will provide both **theoretical perspectives** on the qualitative and quantitative methodologies and hands-on applications on **real data**. The course is mainly targeted to **PhD students in Physics (STEM) Education** and related subjects.

The course is organized in 10 seminars (from March 2022 to May 2022) carried out by national and international experts. It will be held **in presence** at the Physics and Astronomy Department of the University of Bologna (Via Irnerio, 46, Room 40) but also broadcasted via **Zoom**, with links made available in advance to the participants.

Applications are open until March 12th by filling the form available at the QR code on the right. The maximum number of students accepted is 20. Admissions will follow chronological order and the accepted students will be notified by March 14th.

For further information, contact the organizers Giulia Tasquier (giulia.tasquier2@unibo.it) and Eleonora Barelli (eleonora.barelli2@unibo.it).

Calendar of the seminars

March 17 15-18 CET	Overview on methodological approaches for Physics Education Research	Olivia Levrini and Paola Fantini (University of Bologna)
March 22 15-18 CET	Socio-cultural perspectives on learning: the case of CHAT	David Stroupe (Michigan State University)
April 7 15-18 CET	Introduction to thematic analysis with NVivo	Giulia Tasquier and Eleonora Barelli (University of Bologna)
April 22-29 15-18 CET	Systematic analysis and questionnaire design	Rimantas Rauleckas and Raminta Pučėtaitė (Kaunas University of Technology)
May 11-12-13 17-18:30 CET	The Knowledge in Pieces perspective: p-prims, coordination classes and methodologies in recent researches	Andrea A. diSessa (University of California, Berkeley)
May 20 16-18 CET	Learning analysis in Physics Education Research and the learning sciences	Bruce Sherin (Northwestern University)
May 26 15-18 CET	Workshop on Knowledge in Pieces and Knowledge Analysis	Mariana Levin (Western Michigan University)

Speakers

Olivia Levrini is Associate Professor in Physics Education and History of Physics at the Department of Physics and Astronomy "A. Righi" of the University of Bologna, Italy. Her current research work includes: interdisciplinarity in STEM education; educational reconstruction of advanced current topics in physics (thermodynamics, relativity, quantum physics); cognition and conceptual change; identity and processes of appropriation; instruction design on future-oriented STEM issues (climate change, artificial intelligence, quantum computing).

Paola Fantini is a high-school teacher at the "Liceo Einstein" in Rimini, Italy. In 2014, she obtained the doctoral degree in Epistemology of Complexity at the University of Bergamo with a dissertation on the characterization of the humble theory of appropriation in physics education. As a teacher-researcher, she regularly collaborates with the research group in STEM education of the Department of Physics and Astronomy of the University of Bologna, participating in the research activities within national and international projects (like I SEE, FEDORA, and SEAS).

David Stroupe is an Associate Professor of teacher education and science education, the associate director of STEM Teacher Education at the CREATE for STEM Institute, and the Director of Science and Society at State at Michigan State University. He has three overlapping areas of research interests anchored around ambitious and equitable teaching: framing classrooms as science practice communities; how beginning teachers learn from practice in and across their varied contexts; how teacher preparation programs can provide support and opportunities for beginning teachers to learn from practice.

Giulia Tasquier is Junior Assistant Professor in Physics Education at the Department of Physics and Astronomy "A. Righi" of the University of Bologna, Italy. Her research interests include: design and implementation of innovative teaching materials on modern physics and SSI; the correlation between knowledge and behavior in dealing with climate change; the role of epistemological knowledge on models and modelling in teaching/learning physics; instruction design on future-oriented STEM issues. She is the coordinator of the national open schooling network of the Horizon 2020 project called SEAS.

Eleonora Barelli is a Physicist and postdoc researcher in Physics Education at the Department of Physics and Astronomy "A. Righi" of the University of Bologna, Italy. Former PhD student in Data Science and Computation, her research is focused on education in complex systems and computational simulations as interdisciplinary and future-oriented objects able to support the development of agency, decision-making and future-scaffolding skills.

Rimantas Rauleckas currently works as Associate Professor at the Faculty of Social Sciences, Arts and Humanities, Kaunas University of Technology. He conducts research in Public Policy and Public Administration, focusing on application of quantitative data analysis methods such as structural equation modeling, application of Python and R for task automation and reproducible research.

Raminta Pučėtaitė is Associate Professor at the Faculty of Social Sciences, Arts and Humanities of Kaunas University of Technology, Lithuania. Her research fields are applied ethics (including responsible research and innovation), organizational innovativeness, gender equality, social entrepreneurship and corporate social responsibility. She has served on the committees of academic ethics and research ethics and is enthusiastic about promoting research integrity in the community.

Andrea diSessa is Professor of the Graduate School in the Graduate School of Education at the University of California, Berkeley. He is a member of the National Academy of Education. His research centers on experiential and conceptual knowledge in physics, and "computational literacy", including principles for designing flexible, comprehensible systems. He directs the Boxer Project. Boxer is designed to be the first viable medium to support a widespread computational literacy, where everyone - especially teachers and students - can be both consumers and creative producers of diverse computational objects and documents.

Bruce Sherin is Professor in Northwestern University's School of Education and Social Policy (Evanston, Illinois). His work focuses primarily on conceptual change in science. In early work, he engaged in the design and study of novel interventions for physics instruction. As part of that work, he explicated his theory of Symbolic Forms, which captures the conceptual structures that successful physics experts learn to see in equations. More recently, his work has focused on applying techniques from natural language processing to interview protocols. He is also the designer and developer of Tactic Text, which is a web-based text mining environment designed for qualitative data analysts.

Mariana Levin is Associate Professor of Mathematics Education in the Department of Mathematics at Western Michigan University. Her research focuses on understanding the role of knowledge and epistemic affect in moment-by-moment processes of reasoning and sense-making. Her edited volume "Knowledge and Interaction: A Synthetic Agenda for the Learning Sciences" (with A. A. diSessa and N.J.S. Brown) explores this line of work, connecting insights from diverse research traditions on learning processes as they unfold in real-time in real-world contexts. Her current work explores the development of mathematical agency and autonomy in undergraduate students' experiences in proof-intensive mathematics courses.

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