GIORGIO BOLONDI

I currently hold academic tenure as a Full Professor in the Department of Mathematics at the Free University of Bozen-Bolzano, a position which I formerly held at the Alma Mater Studiorum-Università di Bologna and the Politecnico di Milano.
My scientific research began in the field of mathematics, specifically complex geometry (1980-1984). My PhD thesis at the University of Nizza led me to the study of algebraic geometry, particularly the classification of projective curves (1984-1990). The last part of this research (1990-2000) involved a study of larger geometric objects (surfaces of four-dimensional spaces and, more generally, subcategories of co-dimension two of projective space).
In the same period, I began to look at historical and epistemological issues, particularly concerning didactic problems. I researched the early twentieth century debate over the meaning and origin of geometry postulates (epistemological, logical and didactic aspects); Federigo Enriques (the father of Italian research in mathematics teaching); the impact of Bourbakist ideology on approaches to mathematics teaching worldwide in the mid-twentieth century. Since 2000, my research studies have centred upon Mathematics Teaching and the training of mathematics teachers. In particular, since 2008 I am working with the INVALSI team planning, designing, implementing and analyzing Large scale assessment tests and surveys in Italy. This became a substantial part of my academic research and of research of my academic team.

My main research topics in the last five years have been:
- The gender gap in mathematics learning: quantitative and qualitative mixed-method approach
- Cathegorizing and codifying answers to open-ended items in large-scale assessmments
- Networking of different theories in mathematics teaching on the regulatory principles of student behaviour
- Bridging the gap between systemic educational data and on-the-field teachers actions
- The impact of linguistic formulation of a task on students' answers
- The use of videos in training of mathematics teachers
- Conceptual changes in thinking of mathematics teachers regarding probability
- Analysis of written argumentative advanced mathematics tests
- The connection between linguistic skills and mathematics skills

I was President of the Italian Commission for Mathematical Instruction as part of the Italian Mathematics Union (2009-2012) and Italian representative at the International Commission for Mathematical Instruction.

I was Council Delegate (1996-2000, 2001-2004) of the European Mathematical Society.

I was a member of a team of experts who collaborated on the drafting of the National Recommendations for the High School Education System, the National Recommendations for the first stage of education (to the end of lower secondary school), establishment of new mathematics curricula in the Republic of San Marino, and provision of professional teaching and training courses for elementary/middle school mathematics teachers in the Canton of Ticino.

I have participated in the following projects: as part of a work group that delineated the Framework for Mathematics Invalsi Tests; as a member of the Scientific and Technical Committee for the national PQM project (Quality and Merit Project); as a member of the Scientific and Technical

Committee for the national M@tabel project; as vice-president of the Meetings with Mathematics Association, which organizes the international congress Incontri con la Matematica (Meetings with Mathematics) in Castel San Pietro Terme; as a member of the scientific committee of PRISTEM; as co-ordinator for the Italian Mathematics Union in correction work on the international survey IEA-TIMSS; as a collaborator with FIZ of Karlsruhe for a project of cataloguing and categorization of JFM; as reviewer for the Mathematical Review and Zentralblatt für Mathematik; as co-ordinator of various projects for school curricula drafting, in a national context as part of the educational reform moves and on behalf of schools in the autonomous province of Trento; as organizer of a work team for the Italian Commission for Mathematical Instruction (Italian Mathematics Union) which drafted the CIIM-UMI proposal for curricula in the two-year upper secondary school stage; as a member of the scientific council of the Marino Golinelli Foundation of Bologna.

I have supervised doctorate theses and fellowship research in Algebraic Geometry and Mathematics Education.

Furthermore, I have authored over 170 research articles and 3 books as well as acting as editor of various books on teacher training and mathematics teaching, and as organizer of many exhibitions and scientific events all over Italy.

Education

BSc Degree in Mathematics (first-class honours) from the University of Bologna; “Vittorio Emanuele II” and “Salvatore Pincherle” awards.

D.E.A. (Diplome d’études approfondies) from the University of Nice.

Mathematics Research PhD from the University of Nice (thesis supervisor – Prof. A. Hirschowitz)

15 selected publications

1) *An analysis of Differential Item Functioning on INVALSI tests, designed to explore gender gap in mathematical tasks* (with C. Giberti and C. Cascella). **Studies in Educational Evaluation**. Vol. 64, March 2020.

2) *Monomials and polynomials: the long march towards a definition* (with F. Ferretti, A. Maffia). **Teaching Mathematics and its Applications: An International Journal of the IMA**, Oxford University Press, hry015, Volume 39, Issue 1, March 2020, Pages 1–12. https://doi.org/10.1093/teamat/hry015

3) *This cannot be the result! The didactic phenomenon "The age of the Earth"* (with F. Ferretti). **International Journal of Mathematical Education in Science and Technology**. Sept. 2019. DOI:10.1080/0020739X.2019.1670366

4) *Interpreting difficulties in the learning of algebraic inequalities, as an emerging macro-phenomenon in Large Scale Assessment* (with F. Ferretti and G. Santi). **Research in Mathematics Education.**

5) *A quantitative methodology for analyzing the impact of the formulation of a mathematical item on students learning assessment* (with L. Branchetti, C. Giberti). **Studies in Educational Evaluation**, vol.58, 2018, 37-50. https://doi.org/10.1016/j.stueduc.2018.05.002

6) *Exploring students' mathematical discussions in a multi-level hybrid learning environment* (with F. Arzarello, H. Demo and Ch. Giberti). **ZDM – Mathematics Education**, vol. 54 (1).

7) *Gender differences and didactic contract: analysis of two INVALSI tasks on powers properties* (with C. Giberti, A. Zivelonghi). In Csikos, C., Rausch, A., & Szitány, J. (Eds). **Proceedings of the 40th Conference of the International Group for the Psychology of Mathematics Education** Szeged, Hungary:PME, 275-282. ISSN 0771-100.

8) *Point, Line and Surface, Following Hilbert and Kandinsky.* In V.Capecchi (Ed.)*:* **Applications of Mathematics in models, artificial neural networks and arts.** Springer Science, 2010.

9) *La France du XIX siecle: le phenomene Bourbaki*. In C.Bartocci et P.G.Odifreddi (Eds.), **La Mathématique. Les lieux, les temps**, CNRS Editions 2009. (32 pagg.) ISBN 978-2271068170

Ed. francese di La Francia del Novecento: il fenomeno Bourbaki. In **La matematica. I luoghi e i tempi**, a cura di C.Bartocci e P.G.Odifreddi. Einaudi, Torino 2007. (32 pagg.) ISBN 9788806164249

10) *Federigo Enriques e la sezione di Matematica dell'Enciclopedia Italiana* In: **Filosofia e Storia del Pensiero Scientifico in Federigo Enriques**, a cura di O.P.Faracovi, Belforte Editore, 1998 (32 pagg.)

11) *Curves of maximum genus in the range A and stick-figures* (with E.Ballico, Ph.Ellia, R.M. Mirò-Roig) **Transactions Amer.Math.Soc.** (14 pagg.) http://dx.doi.org/10.1090/s0002-9947-97-01917-x

12) *Maximal rank curves and singular points of the Hilbert scheme* (with J.O.Kleppe e R.M.Mirò-Roig) **Compositio Mathematica** vol.77 (1991), 269-291

13) *The Lazarsfeld-Rao problem for liaison classes of two- codimensional subschemes of Pn* (with E.Ballico e J.Migliore) **American Journal of Mathematics** vol.113 (1991), 117-128 http://dx.doi.org/10.1007/bf02599318

14) *The structure of an even liaison class* (with J.Migliore) **Transactions Amer.Math.Soc.** vol 316 n.1 (1989) 1-37 http://dx.doi.org/10.2307/2001271

15) *Classification of maximal rank curves in the liaison class Ln* (with J.Migliore) **Mathematischen Annalen** 277 (1987), 585- 603 **http://dx.doi.org/10.1007/bf01457859**