

# Rainer Kaenders



## Academic career

1992 - 1993	Research Assistant, University of Bonn
1993 - 1997	PhD, University of Nijmegen, Netherlands (advisor: Prof. Dr. J.H.M. Steenbrink)
1997 - 1998	Postdoc, University of Utrecht, NWO-Project, Netherlands
1998 - 1999	Postdoc, Heinrich-Heine-University Düsseldorf
1999 - 2000	Assistant Professor (C1), Heinrich-Heine-University Düsseldorf
2000 - 2001	Teacher Education, University of Nijmegen, Netherlands (after a first phase in 1996)
2000 - 2005	Mathematics Teacher, Canisius College Nijmegen, Netherlands
2001 - 2007	Assistant Professor, Graduate School of Teacher Education, University of Nijmegen, Netherlands
2005 - 2006	Assistant Professor, Technical University Delft, Netherlands
2006 - 2007	Head of Teacher Education, University of Nijmegen, Netherlands
2007 - 2013	Professor (W3) of Mathematics and its Education, University of Cologne
Since 2013	Professor (W3) of Mathematics and its Education, University of Bonn

## Honours

1993	Felix-Hausdorff-Gedächtnispreis, University of Bonn
1993	Marie Curie Research Fellow, 5/93 - 4/95, University of Nijmegen, Netherlands
1995	Maître des Conférences invité, University of Angers, France
1996	NWO-Grant, 1/96 - 4/96, with Prof. Dr. R. Hain, Duke University, NC, USA

## Invited Lectures

2009	“Von Wiskunde und Windmühlen: Über den Mathematikunterricht in den Niederlanden”, Keynote Lecture GDM-Tagung Oldenburg
2014	“Parabool en kettinglijn, hyperbool en lemniscaat, Jakob en Johann”, Johann Bernoulli Lecture 23, University of Groningen, Netherlands
2017	“Raaklijn en oppervlakte bij een functie meetkundig afgeleid”, Leon van den Broek Lezing, WiskundeDialog 2017, Radboud Universiteit Nijmegen, Netherlands
2018	“Over wiskundige taalniveaus en het niveau van wiskundige taal”, Het Wintersymposium van het Koninklijk Wiskundig Genootschap, Academieggebouw te Utrecht, Netherlands

## Research Projects and Activities

“Epistemology and History of Mathematics in Teaching”, ongoing Research Project with the Group of Prof. Dr. Ysette Weiss from the Johannes Gutenberg University of Mainz

International Scientific Program Committee of the Eighth European Summer University on History and Epistemology in Mathematics Education (ESU-8), 20 to 24 July 2018 at Oslo & Akershus University College of Applied Sciences, Oslo, Norway

“Differential Calculus from a Different Point of View”, ongoing Research Project with Assoc.-Prof. Dr. Christoph Kirfel, University of Bergen, Norway

“Variatio Delectat!”, Common Research Project with Prof. Dr. Gert Heckman, Dr. Helma Oolbakkink and Chris Kooloos (PhD Student) from the Radboud University of Nijmegen.

Chairman (with Dr. Robert Strich) of the National Exercise Committee, Federal Mathematics Competition (Vorsitz Aufgabenkommission, Bundeswettbewerb Mathematik)

Advisory Board, German Mathematical Olympiad (Beirat Mathematik-Olympiaden Deutschland)

since 2016

Exercise Committee for Mathematics B-day, Utrecht University (in Germany: macht mathe Wettbewerbe, NRW),

since 2004

GeoGebra-Institute Cologne-Bonn, Founding Member,

since 2010

math-il.de Mathematical Internet Laboratory for Cooperation and Collaboration with Maths Teachers

Bonn Mathematics Tournament,

since 2008 (2008 - 2012 in Cologne)

International Kangaroo Camp, Werbellinsee, annually since 2006

Week of Mathematics Study for high school students (Bonner SchülerInnenwoche Mathematik), since 2014

Past activities in committees:

Dutch Teaching Commission Mathematics, NOCW

Member, 2005 - 2008

cTWO, Committee for the Reform of Mathematics Teaching, Ministry for Teaching, Culture and Science, [www.ctwo.nl](http://www.ctwo.nl)

Member, 2005 - 2008

The Education Committee of the European Mathematical Society

Member, 2005 - 2008

Programmacommissie Vakantiecursus Wiskunde, Zentrum für Mathematik und Informatik CWI, Amsterdam, Netherlands

Member, 2005 – 2008

## Research profile

In my current research, I am interested in subject-matter questions oriented towards mathematics teaching (so-called Stoffdidaktik). Recent works explored particular approaches to certain notions from analysis, algebra and projective geometry, all of them based on or related with historical ideas. These works are conceptualized in contributions reflecting more general features of the role and the use of mathematics history in teaching. Moreover, I am interested in epistemological consequences and changes for the mathematical development in students, which are caused by the employment of digital tools. Finally, I am always concerned with questions of elementary mathematics for various purposes in mathematics education like for instance the Bundeswettbewerb Mathematik, the Bonner Mathematikturnier, the macht mathe competitions and various maths camps and student activities. My research concerns moreover intervention research in cooperation with mathematics teachers (see [math-il.de](http://math-il.de)). In the role of adviser, this work is pursued in three projects of my PhD students.

In the future, I will still be concerned with subject-matter didactics in relation to history of mathematics that are relevant for mathematics teaching in school and in the early years of university. As far as epistemological questions in mathematics education are concerned, I further strive for a better understanding of mathematical awareness (in particular in relation to digital tools). Given the presently predominant competence and output orientation, the overall interest of mathematics education in the future must be to develop a modern practice of mathematics teaching that gives access to the rich mathematical culture and tradition again. How can mathematics teaching be sustainable in mathematical culture? For this, my interest is to understand better the interplay of traditions in mathematics teaching with the influence of normative theories of pedagogical psychology. Moreover, in dealing with the above mentioned research activities, there will always be aspects of elementary mathematics that call my attention and invite to contribute to the mathematical culture in mathematics education.

## Editorships

- International Scientific Program Committee of the Eighth European Summer University on History and Epistemology in Mathematics Education (ESU-8), 20 to 24 July 2018 at Oslo & Akershus University College of Applied Sciences, Oslo, Norway.
- Fachkulturen in der Lehrerbildung. Reihe Wissenschaft und Lehrerbildung (publ. with P. Geiss, R. Böler, 2016)
- Scientia in Educatione (Editorial Board, since 2016)
- Perspektivwechsel bei der Begriffsentwicklung in der Analysis. *Der Mathematikunterricht*, 61(4) (2015)
- Mit GeoGebra mehr Mathematik verstehen: Beispiele für die Förderung eines tieferen Mathematikverständnisses aus dem GeoGebra Institut Köln/Bonn (publ. with Reinhard Schmidt, 2014)
- Mit GeoGebra mehr Mathematik verstehen: Beispiele für die Förderung eines tieferen Mathematikverständnisses aus dem GeoGebra Institut Köln/Bonn (publ. with Reinhard Schmidt, 2011)
- Nieuw Archief voor Wiskunde, Zeitschrift der „Königlichen Mathematikervereinigung“ KWG (3/2003 - 11/2007)

## Supervised theses

PhD theses: 5, currently 2

## Selected PhD students

Stephan Berendonk (2014): “Erkundungen zum Eulerschen Polyedersatz – Genetisch, explorativ, anschaulich”,

now Postdoc, University of Bonn

Jennifer Klenzan (2014): “Selbstregulation im Mathematikunterricht gemeinsam entwickeln – Entwicklung, Durchführung und Evaluation einer Interventionsstudie zur Förderung von Selbstregulation im schulischen Kontext”

Mareike Mink (2016): “Geometrische Begriffsentwicklung anhand technischer Anwendungen der Kinematik”

## Selected publications

- [1] Rainer Kaenders and Christoph Kirfel. 101.05 integration by symmetry. *Math. Gaz.*, 101(550):99–103, 2017.
- [2] Rainer Kaenders and Y. Weiss-Pidstrygach. Skalen und nomogramme. *Perspektivwechsel bei der Begriffsentwicklung in der Analysis. Der Mathematikunterricht*, 61(4), 2015.
- [3] Rainer Kaenders. Funktionen kann man nicht sehen. in: R. kaenders & r. schmidt (hrsg) mit geogebra mehr mathematik verstehen. *Vieweg-Teubner, Wiesbaden*, 2011.
- [4] Rainer Kaenders and L. Kvasz. Mathematisches bewusstsein. in: Helmerich, m., lengnink, k., nickel, g., rathgeb, m., (hrsg). mathematik verstehen - philosophische und didaktische perspektiven. *Vieweg*, 2011.
- [5] Rainer Kaenders. Von wiskunde und windmühlen - über den mathematikunterricht in den niederlanden, beiträge zum mathematikunterricht, hauptvortrag gdm-tagung in oldenburg, gdm. *WTM-Verlag Münster*, 2009.
- [6] Rainer Kaenders. Zahlbegriff zwischen dem teufel und der tiefen see. *Der Mathematikunterricht*, 52(5), 2006.
- [7] Rainer H. Kaenders. The mixed hodge structure on the fundamental group of a punctured riemann surface. *Proc. Amer. Math. Soc.*, 129(5):1271–1281, 2001.
- [8] Ludwig Balke and Rainer Kaenders. On a certain type of coxeter-dynkin diagrams of plane curve singularities. *Topology*, 35(1):39–54, 1996.
- [9] Rainer Kaenders. The seifert form of a plane curve singularity determines its intersection multiplicities. *Indag. Math. (N.S.)*, 7(2):185–197, 1996.